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01

ACUTE LONG DISTANCE TRAIL RUNNING INCREASES SERUM IL-6, IL-15 AND HSP72 LEVELS

Introduction and Purpose: Myokines are important molecules secreted from skeletal muscle. Especially IL-6 is known to have a regulatory role in glucose metabolism, whereas IL-15 demonstrates its metabolic effects on fat metabolism. On the other hand, heat shock proteins play a role to chaperone misfolded and denatured proteins, in order to protect the protein homeostasis of the cell. In addition, increased Hsp72 levels has been shown to prevent insulin resistance. Although it is very clear that IL-6 increase following acute exercise, there are some contradictory results about the increase in IL-15 and Hsp72 levels. Long-distance trail runs are gaining more popularity each year as a large number of elite and recreational athletes from all age groups are involved in such events. Involving more uphill and downhill running is one of the characteristics of a trail run, therefore compared to city marathons, trail runs are more demanding and challenging. This research covers serum levels of three molecules that all together have effects on glucose and fat metabolism and cellular stress response following an acute long distance trail run.

Material and Methods: The runners who attended Cappadocia Ultra-Trail® had to complete the 36-km course in less than 6 hours, during which the total climb was 940 m. The temperature on the race day was between 13-18 °C, with heavy rain. The air humidity on the race day was 68-93% and the wind speed was 13km/h on average. Blood samples were collected before and 15 minutes after the race. Total blood count was analyzed immediately, and rest of the samples were kept at room temperature for half an hour, then centrifuged at 1500 rpm for 10 minutes to obtain serum. Serum samples were stored in ice, transferred to the laboratory on the same day and stored at -80 °C until the day of analysis. Serum IL-6, IL-15 and Hsp72 levels were measured by sandwich ELISA method with commercially available kits according to the manufacturer's instructions. All serum samples were tested in triplicate. Because of the low serum volume, IL-15 and Hsp72 were assayed only in 26 and 17 subjects, respectively. Corrections were made for each athlete to eliminate the effect of hemoconcentration according to the hematocrit values before and after the race.

Results: A total of 37 athletes participated in the study (n = 37). Eleven of the athletes were female (29,72%) and 26 were male (70,27%). The mean age of the athletes was 38.9 ± 10.1; mean body mass indexes were 23.22 ± 2.21. After the race, the IL-6, IL-15 and Hsp72 serum concentrations showed a significant increase; 13.2 fold, 2.22 fold and 1,6 fold respectively (p<0.001, p<0.001, p<0.039 respectively).

Discussion: It is well known that exercise promotes glucose uptake independent of insulin, increases insulin sensitivity, accelerates fat metabolism, prevents obesity and development of the metabolic syndrome. This study clearly showed that IL-6, IL-15 and Hsp72, three molecules known to be effective in glucose and fat metabolism, increased significantly after a 36-km trail run. Our results suggest that long-distance trail runs improve fat and glucose metabolism.

Conclusion: Although very compelling and physically challenging, long-distance trail runs seem to be beneficial for participants in regards to their metabolic effects.

02

AN INNOVATIVE SYSTEM TO ASSESS PROFESSIONAL DRIVERS VISUAL SKILLS RAFFAELE SANGIUOLO, MAURO BACCI, MASSIMO LANCIA, MARIO SANGIUOLO SEZIONE DI MEDICINA LEGALE,SCIEN

Introduction and Purpose: This project represents forty years of experience in ophthalmology as binocular vision system expert and in motorsport as international endurance racing car driver. These two parallel experiences gave me the opportunity to deeply evaluate the visual problems that may affect driver's performance in extreme situation. The professional driver's visual skills evaluation should be made with the purpose to achieve total safety for everybody. Professional driver's visual skills should be tested both in quantitative and qualitative way and in different environmental conditions. The vision evaluation of a professional driver is a particularly complex task because of the extreme working conditions. For this reason it must be carried out with particular criteria and adapted to these specific conditions. Purpose: On the first place we created a digital technology instrument capable to offer a quantitative evaluation of all the different factors that contribute in varying degrees to determine the drivers global vision. In second place we created particular evaluation criteria specifically designed for the high level of visual performance required for professional drivers. They have been adapted to the varied visual conditions that they might encounter due to the high speed and difficult environment conditions as darkness, rain or fog.

Material and Methods: We have appropriately modified the program of the digital technology viewer software that we normally use to evaluate all drivers visual skills. In particular we left unchanged the examination system that we used to quantify visual acuity, stereoscopy, contrast sensitivity and glare recovery time while we modify the evaluation levels. These changes have been made through test results analysis performed with a high immersion driving simulator. Instead to evaluate the visual field we have replaced the usual examination system with a dynamic test that defines not only the perceived spots in the visual field, but all the spots in the visual field whose perception is able to induce an adequate sensory motor reaction (Useful Field of Vision). The limits of the Useful Field of Vision have been revealed to be very variable for all the different drivers examined in a very subjective way. Again we have found that the Useful Field of Vision reduction has been extremely variable in the different tested drivers. This kind of individual sensitivity may be a further important evaluation criteria regarding professional drivers visual skills.

Results: We have created a specific Visual Index dedicated to professional drivers through a specific algorithm that combines the results obtained with these parameters and we have introduced it in the viewer's software.

Discussion: In the motorsport world the different teams select future drivers making significant economic investments. Knowing every psychophysical details of these candidates can be a great help to improve the drivers selection criteria. In this perspective knowing from the beginning the exact level of driver's visual skills can help in a relevant way to predict its potential. A driver with excellent visual skills will not be necessarily a champion, but a champion cannot prescind from an excellent visual quality.

Conclusion: In recent years, great investments have been made related to the safety of the circuits and the strength of the cockpits of the racing cars. At the same time, at least for the professional drivers, it is necessary to improve the quality of the assessment of their visual skills increasingly stressed by ever higher levels of performance.

03

ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION: TRANSTIBIAL HAMSTRING VS ANATOMICAL PATELLAR TECHNIQUE. A MINIMUM 2-YEAR FOLLOW-UP STUDY

Introduction and Purpose: In spite of all the publications about anterior cruciate ligament reconstruction (ACLR), the graft choice is still controversial. Anterior cruciate ligament (ACL) injury is a serious knee injury that often prevents young and active people to perform heavy physical work or to engage in sport at recreational or elite level without satisfactory treatment. The incidence rate of ACL injury per 100,000 person-years is 80, whereof 50-60% of are treated with ACLR surgery. Because the mean age at primary ACLR is young, the highest direct and indirect medical cost of sport injuries are found after ACL injury. ACLR is, however, considered a cost-effective knee stabilizing treatment. In terms of graft choice for ACLR there has been a shift from patellar tendon to hamstring tendon usage over the past few years because of donor site morbidity issues such as anterior knee pain and extension deficits. However, the use of hamstring tendon grafts in ACLR seem associated with an increased risk of revision compared to patellar tendon grafts, in particular during the first year after surgery. This high re-rupture rate was also noticed at our centre. For this reason, some of our orthopaedic surgeons switched from transtibial quadruple-strand semitendinosus/gracilis tendon (4SGT) ACLR to anatomical bone-patellar tendon-bone single-bundle (PT) ACLR. The purpose of this study was to evaluate differences in objective and subjective outcomes after PT or 4GST ACLR. We hypothesised that there would be no differences in outcome at a minimum of 2-year follow-up.

Material and Methods: Ultimately, 47 patients with a PT and 36 with a 4GST ACLR completed a questionnaire (patients' characteristics, International-Knee-Documentation-Committee-subjective-score (IKDC), Visual-Analogue-Scale (VAS-pain and VAS-satisfaction), Tegner-activity-scale, 12-Item-Short-Form-Health-Survey (MCS-12 and PCS-12)) retrospectively and were included in this study. 77 patients (93%) had a sports activity before ACL injury of recreational and competitive level. 69 patients also visited our hospital for a physical examination (range-of-motion (ROM), Lachman-test, anterior-drawer-test, pivot-shift-test, hop-test-battery). Differences in outcome were calculated with the Pearson-chi-squared-test, Fischer's-exact-test, unpaired-t-test or Mann-Whitney-U-test. The significance level was set at $P < 0.05$.

Results: Although there was more meniscus and collateral damage ($p=0.045$) and more concomitant repair ($p=0.001$) in the PT-group, these patients ultimately achieved a significant higher sports level ($p=0.044$) and reported a significant superior state ($p=0.012$) of mental health (MCS-12 score).

Discussion: Surprisingly, our study revealed, that although there was more concomitant injury in the PT group and subsequently more concomitant repair during PT ACLR, these patients ultimately achieved a significant higher sports level and reported a significant superior state of mental health (MCS-12 score). Webster et al. conducted a RCT (transtibial PT graft versus 4SGT graft) with a follow up time of 15 years, that is in support of our results as their PT graft patients were also more active in sport participation. Furthermore, it is interesting to mention that a former report of Vella et al. showed that there is an association between sport involvement and mental health in adolescence. To explain these similar results, we think that it could be argued that patients with a significant superior state of mental health have more confidence in their knee, which could result in less fear of a re-rupture.

Conclusion: Both surgical techniques provide good patient outcomes. However, in this study a higher return to sport activity level and a better health state was found in favour of the PT-group.

04

ASSOCIATION OF MCT1 A1470T POLYMORPHISM (RS1049434) WITH FORWARD FOOTBALL PLAYER STATUS

Introduction and Purpose: The MCT1 (monocarboxylate transporter 1) A1470T polymorphism leads to the replacement of glutamic acid with aspartic acid in the MCT1 gene (also known as SLC16A1; location: 1p12). Carriers of the minor MCT1 T allele have lactate transport rates reduced by 60%-65% and higher blood lactate accumulation during high-intensity circuit weight training, compared with carriers of the MCT1 A allele. Based on the known relationship between blood lactate accumulation and the MCT1 T allele and the assumption that football players who have greater lactate transport rates have a higher capacity to maintain their performance at intense effort levels (such as the ability to perform repeated sprints at the highest possible speed), we hypothesized that the MCT1 A1470T polymorphism could be associated with playing positions. The aim of this study was to investigate the association between the MCT1 A1470T polymorphism and positional roles in a large cohort of professional football players from five different countries.

Material and Methods: We compared genotype distributions of the MCT1 A1470T polymorphism between football players ($n=694$) and non-athlete controls ($n=781$) from Italy, Poland, Lithuania, Ukraine and Malta and we analyzed the MCT1 genotype distributions with respect to the players' positions on the field (e.g. forwards, midfielders, defenders and goalkeepers). Genomic DNA was extracted from either buccal epithelium or peripheral blood using a standard protocol. OR were calculated to estimate the likelihood that individuals with the advantageous genotype/allele become an elite football player in a specific position.

Results: In the pooled cohort of Italian, Polish, Lithuanian and Ukrainian football players, forwards ($n=148$) were more likely than controls ($n=781$) to possess the A allele ($\chi^2=7.067$, $p=0.029$, FDR q value 0.116), with a greater likelihood of having the AA genotype compared with the TT genotype (OR=1.97; C.I.=1.07-3.64; $p=0.021$, FDR q value 0.086).

Discussion: In the present study we found, for the first time, that the MCT1 A allele is associated with forward football player status and that the TT genotype was less prevalent in forwards than in controls (OR=0.50; C.I.=0.27-0.93; $p=0.021$, FDR q value 0.086). The MCT1 AA genotype was almost twice (OR=1.97) as common in forwards than controls, which suggests individuals with lower H⁺ blood accumulation are more suited to forward play. This result emphasizes the importance of the MCT1 A allele and AA genotype (associated with a higher lactate clearance) to forward football players' performance, because they covered the longest sprint distance and they showed significantly better Repeated Sprint Ability (RSA) performance than defenders and midfielders.

Conclusion: The MCT1 AA genotype was significantly more frequent in forwards than in controls. The MCT1 polymorphism is one of the many genetic variants that could offer an athletic advantage to forward football players performance. Further studies are needed to confirm these findings in other professional football player cohorts.

05

CONTENT AND CONCURRENT VALIDITY OF AN ISOKINETIC AND ISOTONIC LIFT TESTS USED FOR MEASURING MUSCLE STRENGTH IN SOLDIERS: INTRA- AND INTERRATER RELIABILITY OF THE ISOKINETIC TEST

Introduction and Purpose: Valid and reliable instruments are important issues in both sports as well as in occupational preventive medicine, especially when tests are used to discriminate between individuals. The objective was, firstly, to investigate the content validity of two muscle tests, which included an Isokinetic lift test used for admission into the Swedish Armed Forces (SwAF) and a deadlift test measuring muscle strength condition during service. The secondary objective was to investigate the concurrent validity of the Isokinetic test in comparison to a submaximal 5-10 repetition maximum (RM) deadlift test, as well as to investigate the inter- and intrarater reliability of the isokinetic test.

Material and Methods: The content validity index (CVI) was calculated by using nine selected experts, representing the Netherlands, Canada and Sweden, who rated the relevance of the tests in relation to what a NATO (the North Atlantic Treaty Organization) research group earlier identified as the five most common work tasks in military settings. The content validity reflected the physical capacity of lifting material, carrying equipment on one's body or in one's hands, climbing in terrain, and digging. The concurrent validity examination included 28 male and 16 female soldiers (20 - 59 years) who performed an Isokinetic lift test, followed by a submaximal 5-10RM deadlift test. In order to estimate the 1RM of the 5-10RM deadlift test, the equation developed by Mayhew et al. was used. The Pearson's correlation coefficient was calculated to evaluate the validity between the Isokinetic and the estimated 1RM deadlift load. Concerning the reliability investigation, 374 Swedish male conscripts (18-21 years) accepted to participate. The intrarater sample included 236 conscripts, with 138 conscripts in the interrater part. The Isokinetic tests were performed two hours apart. The Intraclass Correlation Coefficients (ICC) with its 95 % confidence intervals (95%CI) was calculated.

Results: The result showed excellent CVI (≥ 0.78) for three of the military work tasks i.e. tasks for carrying with hands, lifting, and digging, in both tests. The peak force of the Isokinetic test evaluated in relation to a 5-10RM deadlift test resulted in good- to-excellent correlation with the estimated 1RM deadlift load yielding a correlation coefficient (95%CI) of 0.84 (0.72 - 0.91). The intra- and interrater reliability were excellent, where the intrarater ICC1,1 was 0.85 (0.81-0.88) and the interrater, ICC2,1, 0.86 (0.81-0.90). The agreement estimates, standard error of the measurement, and SEM% were 5,7 and 5,6 while the smallest real difference (SRD%) was 15,7 and 15,4, respectively.

Discussion: Using the CVI method for evaluating the content validity of different tests as a first critical step, and thereafter examining the concurrent or criterion-related validity, could be recommended when developing test systems. The present tests can be used in selection procedures in order to accurately evaluate maximal dynamic muscular strength according to work requirements, and for evaluating longitudinal changes in muscle strength. Further, they can be validated for demands required to complete a specific job in other contexts than military service

Conclusion: The Isokinetic lift test could be considered a highly relevant and reliable measure of soldier's maximal dynamic muscular strength used for admission into the SwAF, and the result could be transformed and compared with a submaximal 5-10RM deadlift test for measuring and monitoring muscle strength during military service.

06

DYNAMIC COMPARISON OF BOTH KNEES AT SINGLE LEG JUMP-LANDING TASK IN ATHLETES WITH PREVIOUS HAMSTRING INJURY

Introduction and Purpose: Hamstring and quadriceps co-activation has an important role on knee joint biomechanics and its dynamic stability. On the other hand, hamstring strain and its recurrence are common in different fields of sports. The aim of this study was comparing the kinetic and kinematic factors of both knees at single leg jump-landing task, in athletes with previous hamstring strain.

Material and Methods: In this study 16 college athletes (with previous hamstring strain at one leg) participated. All participants had history of acute hamstring strain more than 3 months, without any other lower extremity injury and they had returned to sport after rehabilitation and functional training. All they did single leg jump-landing task, 3 trial for each leg, then their knee kinetic and kinematic recorded by six high-speed (200 Hz) cameras (JVC) and force plate. Knee angles and moments in 3 dimensions and also knee muscles power in sagittal plane were compared between two legs, at initial contact and maximal events of landing. After data collection, statistical analysis such as paired T-test and Wilcoxon were used for comparing two legs.

Results: There were no significant differences in knee joint kinematics between two legs ($p > 0.05$), also in the pick point of abductor moment, extensor moment, extensor and flexor forces ($p > 0.05$). Just there was significant difference at the pick point of knee flexor moment between both legs ($p < 0.05$).

Discussion: It seems no significant differences in knee joint kinematics at 3 dimensions were due to complete rehabilitation treatment of hamstring strain and two legs functional similarity after 3 months. This finding is supported with some previous studies that illustrated no functional differences at hamstring injury after some months and rehabilitation, despite of remaining some pathological changes and scar tissue. Also, increasing abductor moment during deceleration phase of landing in both legs with no significant difference was seen, that could be related to the kinematic changes specially in frontal plane we mentioned above. As we know, increasing adductor angle and abductor moment such as happened here, is related to the rate of dynamic instability and knee ligaments injury. But no significant differences in frontal plane between two legs indicated that both knees biomechanical reaction after hamstring strain was the same. At knee kinetic assessment in sagittal plane, significant difference was seen at knee flexor moment with lesser pick point of healthy leg. This finding was similar to flexor muscle force pick point that was lesser at healthy leg, despite of non-significant difference between two legs. By matching kinetic and kinematic sagittal graphs, we understood all kinetic fluctuations occurred during deceleration phase of landing, between initial contact to maximal knee flexion. It illustrated that flexor moment with concentric contraction of flexor muscles altered to extensor moment with eccentric contraction of extensors, during this phase. Then less flexor moment and force in healthy leg indicated less hamstring participation in this sequence and exchanging its responsibility with extensor muscle group. There are some previous studies that indicated ipsilateral changes and neuromuscular inhibition of opposite leg after one lower extremity injury. They also suggested that hamstring functional deficit in hamstring-quadriceps co-activation can influence on knee joint dynamic stability and injury prevention.

Conclusion: Since none of the kinematic variables had significant differences and in kinetic variables were seen just in flexor moment, it seems that hamstring rehabilitation and functional training can recover the biomechanical deficit of this muscle in injured leg. Then we can conclude that negative biomechanical changes are more in healthy leg and it can be at risk of ligaments injury, more than the leg with previous hamstring injury.

07

EFFECTS OF CHRONIC HYPOBARIC HYPOXIA, BIOLOGICAL MATURATION AND ENDURANCE TRAINING ON HEMOGLOBIN MASS AND BLOOD VOLUME IN CHILDREN AND ADOLESCENTS

Introduction and Purpose: The total hemoglobin mass (tHb) expresses the amount in grams of hemoglobin that is found in the body and, unlike the hemoglobin concentration, [Hb] is independent of the fluctuations in body fluids. Likewise, it is a determining factor of oxygen transport capacity and, therefore, of maximum oxygen uptake (VO₂max). In children and adolescents, tHb may be influenced by biological maturation, endurance training and chronic exposure to hypobaric hypoxia (HH), which has not been described yet. Therefore, the aim of this study was to analyze the effects of HH, biological maturation, sex and training on tHb, blood volume (BV), erythrocyte volume (EV) and plasma volume (PV) in children and adolescents.

Material and Methods: Transversal study. Participants were 476 children and adolescents of both sexes (217 women, 259 men), Tanner IV on the sexual maturation scale, trained in endurance sports (T) and untrained controls (UT), residents at two different altitudes: low altitude (LA; <1000 m) and moderate altitude (MA; 2500 -3000 m). tHb, BV, EV and PV were determined by the optimized CO rebreathing method. Hemoglobin (Hb), hematocrit (Hct), ferritin, erythropoietin (EPO) and body composition parameters were measured.

Results: The statistical analysis was carried out through linear regressions and classification and regression trees (CART). Men had higher values of tHb, BV, EV, PV and ferritin than women ($p < 0.001$). In men, tHb, EV, BV and ferritin were mainly influenced by biological maturation and Tanner III-V subjects presented the highest values ($p < 0.001$). Sex was the variable with the most important effect on Hb (54%) followed by biological maturation (29.2%). The importance of the effect of altitude and training on tHb and EV was reduced (5-15%). Trained (T) men, Tanner III - V, and MA residents had the highest tHb value relative to body mass (tHb/kg) of the whole population (14.3 ± 1.2 g/kg), with a significant difference of 4.5 g/kg ($p < 0.0001$) with respect to the group with lower tHb/kg corresponding to UT women. The PV was determined mainly by the training with higher values in the T subjects ($p < 0.001$). A maturation and training effect was observed in the BV.

Discussion: Our findings showed that absolute tHb was higher in men than in women in 42.4%; the adjustment of the values to body mass (tHb/kg) decreased the difference to 23%. tHb/kg had variations according to the degree of biological maturation in men, being higher in subjects Tanner III - V. The effects of chronic exposure to HH and training were observed. The tHb was higher in those living in MA (5.6% with respect to LA) and in the trained subjects (22.0% with respect to the UT). In women, tHb/kg was not influenced by maturation. On the contrary, in men it was evident that in Tanner III - V the tHb was higher by 27% than in the others, which shows that the increase in tHb is mainly linked to the maturational changes that include a set of modifications at neuroendocrine level. Different studies support our hypothesis that in men, tHb is affected by the production of androgens and that the increase in its production after puberty could determine the increase in tHb/kg and the marked differences with women. In pubertal women, there is no clarity about the regulation of erythropoiesis and the production of hemoglobin. Although, it has been suggested that there is a regulatory effect of estrogens on this process and that estradiol could be related to the inhibition of erythropoiesis and Epo activity.

Conclusion: In children and adolescents, tHb and BV parameters are mainly influenced by sex and biological maturation and, to a lesser extent, by training and altitude. From puberty, tHb, EV and BV begin to increase significantly in men while in women they stabilize. There is a stimulating effect of training on tHb and BV in women and Tanner III-V men, as well as a synergistic effect of training and HH. Men Tanner III and MA are those with higher tHb/kg.

08

FEATURES OF ELECTROENCEPHALOGRAPHIC CHANGES IN AMATEUR BOXERS SUFFERING FROM REPEATED MILD TRAUMATIC BRAIN INJURY

Introduction and Purpose: Computer electroencephalography (CEEG) at athletes, in particular boxers, have repeatedly undergone traumatic brain injury (TBI), has a diagnostic value, since this method provides for the obtaining of thin, objective criteria of the functional state of the brain, and when carried out in the dynamics provides an opportunity to detect a favorable and unfavorable course of traumatic illness. The purpose of the study is to investigate the features of electroencephalographic changes in amateur boxers based on CEEG data.

Material and Methods: By means of CEEG we examined 135 amateur boxers aged 16 to 32 years who had had repeated mild TBI as a result of knockdowns and knockouts. The number of boxing matches held in each of the surveyed ranged from 25 to 315. The surveyed boxers were in the preparatory period at the training camp. Among the surveyed boxers there were 16 (11,85 %) candidates for masters of sports, 67 (49,63 %) masters of sports, 41 (30,37 %) international sports masters, 11 deserved masters of sports (8,15 %). The control group consisted of 30 healthy people of similar age who were not engaged in boxing and did not have a history of TBI. The recording of CEEG was carried out according to the standard procedure on a 24-channel computer electroencephalographic complex with computerized protocol processing.

Results: The most common changes on CEEG in examined boxers were diffuse changes of bioelectric activity of the brain of moderate severity (in 66,67 % of cases), whereas in the control group they occur in 50,00 % of cases. Dysfunction of nonspecific median structures was found in 59,26 % of the representatives of major groups, diffuse unepileptiform changes – 48,15 %, focal changes on the left side – 39,26 %. In the control group such changes were recorded in 46,67 %, 30,00 % and 10,00 % of cases respectively. Epileptiform changes and paroxysmal activity according to CEEG were only found in the group of boxers – 5,19 % and 3,70 % of cases. Dominant alpha rhythm was detected in 97,78% of surveyed boxers. Indicators of the amplitude of the alpha rhythm of the representatives of the main group significantly decreased in comparison with the control group, and the oscillation frequency of the alpha rhythm is significantly increased, although they are within the normal range.

Discussion: Neurophysiological data obtained with the help of CEEG examination of boxers, indicate the role of EEG as an indicator of the functional state of the brain and the index of neurodynamic changes in the central nervous system.

Conclusion: These CEEG studies of amateur boxers who had had TBI can be used as diagnostic and prognostic criteria for objective estimation of the functional state of the brain, timely detection of diseases, planning of individual loads and if necessary further target treatment.

09

FLOW CYTOMETRY AND DNA ANALYSES: A COMBINED APPROACH TO IMPROVE HOMOLOGOUS BLOOD TRANSFUSION DOPING DETECTION

Introduction and Purpose: Homologous blood transfusion (HBT) is a cheating way used by athletes to improve the performance by increasing their oxygen availability. This practice is banned by the World Anti-Doping Agency (WADA) and the anti-doping method of choice to detect HBT is identifying mixed populations of red blood cells (RBCs) by flow cytometry, based on their minor blood groups phenotype. However, the sensitivity of this method is compromised by the frequent observation of uncertain peaks on the flow cytometric histograms since the established condition to declare a double population of cells is the presence of two clearly separated peaks, representing the antigen expressing and non-expressing populations. Forensic human DNA typing strategy, based on the analysis of little portions of DNA called Short Tandem Repeats (STRs) has been proposed as an alternative way to detect HBT but it has not been validated yet for anti-doping purposes. This study aims to depict flow cytometric and DNA analyses outcomes in order to improve the sensitivity of the HBT doping detection.

Material and Methods: Ex vivo mixtures of blood samples (from 30 healthy volunteers) at 0.5, 1, 2, 3, 5, and 10% of antigen expressing and non-expressing RBCs (and vice-versa) were analysed by flow cytometry and DNA strategy.

Results: Nine hundred flow cytofluorimetric histograms were generated: the Y axis representing the number of events and the X axis representing the fluorescence intensity of antigen expression, in a log scale. The double erythrocyte populations were classified according to their shape: single symmetric peak (level I), asymmetric single peak (level II), shoulder-type peak (level III), two overlapping peaks (level IV), and two baseline-separated peaks (level V).

Discussion: The data analysed showed that the classification varied progressively according to the proportion of the minor population of erythrocytes in the blood mixture, and it also varied in relation to the antigen and to whether the major population was expressing or not the antigen. The sensitivity of the technique to detect HBT was 57% considering level V as threshold, 70% considering level IV, and 83% using level III as threshold. Three hundred histograms of single populations of RBCs were analysed: 84.5% of them were classified as level I, 14.5% as level II, and 1% as level III. Mixtures with false negative results due to atypical histogram peaks (levels I, II or III) could be detected by DNA analysis when the concentration of the minor population in the mixture was higher than 2%.

Conclusion: In conclusion, these results indicate that flow cytometry and DNA analyses may be combined in order to improve the sensitivity of anti-doping HBT detection.

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IMPAIRMENT ON CARDIOPULMONARY FUNCTION AFTER MARATHON: ROLE OF EXHALED NITRIC OXIDE AND LUNG ACUTE INFLAMMATION

Introduction and Purpose: Previous studies indicated the muscle oxygen transport as a major factor to endurance exercise performance. Muscle oxygen transport impairment reduces VO_{2max} , compromises endurance performance and can promote the fatigue development and decrease on cardiopulmonary function. The endurance exercise promotes muscle, heart and respiratory fatigue, evidenced by morphofunctional cardiac changes, release of myocardial injury biomarkers and reduction of maximal voluntary ventilation and oxygen consumption (VO_2) at peak exercise. The exhaled nitric oxide (eNO) is centrally involved in the regulation of pulmonary gas exchange and in oxygen perfusion in muscle periphery. In fact, a study has demonstrated that reduced levels of eNO correlates with increased exercise intolerance and with impairment on ventilatory response. Purpose: The aim of this study was to investigate cardiopulmonary fatigue after marathon and its correlation with pulmonary levels of exhaled nitric oxide (eNO) and inflammatory mediators.

Material and Methods: 81 male marathoners, age 38.96 ± 8.6 years, without previous cardiac disease, marathon time 258.8 ± 41 were evaluated by cardiopulmonary exercise test three weeks before and between three and 15 days after a marathon; eNO analysis and spirometry before, after, 24, 72 hours and 15 days after the marathon, and induced sputum cytokines level (IL) (IL1ra, IL6, IL8, IL10 and IL12p70) assessment before and after the marathon.

Results: Marathon induced a decrease in the spirometry parameters (forced vital capacity, forced expiratory volume in 1 second and peak of expiratory flow) in all time points assessed after the marathon ($p < 0.05$) returning to basal values 15 days after marathon as well as in cardiopulmonary capacity, evidenced by a reduction in VO_2 , VCO_2 and ventilation peaks (57.4 ± 6.3 to 55.6 ± 5.9 mL.min⁻¹.Kg⁻¹, 4.3 ± 0.6 to 4.17 ± 0.5 L.min and 134 ± 19 to 132 ± 18 Lpm, respectively, $p < 0.05$). We observed a decrease in IL10 and increase in IL1ra. The pro inflammatory mediators, IL6, IL8 levels in induced sputum and eNO concentrations (35.3 ± 24 to 29.6 ± 16 ppb) was not altered after marathon. Moreover eNO reduced 24 and 72 hours after marathon returning to basal levels 15 days after (11.1 ± 10.8 e 12.6 ± 9.2 ppb, $p < 0.05$). Finally, we demonstrated a positive correlation between the decrease in VO_2 and decrease in eNO 24 and 72 hours after marathon ($r = 0.298$, $p = 0.05$).

Discussion: Marathon runners presented cardiopulmonary fatigue evidenced by reduction in VO_2 and ventilation peak in cardiopulmonary test and reduction in pulmonary capacity in spirometry parameters. The cardiopulmonary capacity was correlated with pulmonary immunosuppression demonstrated by reduced acute inflammatory response in sputum and in eNO 24 and 72 hours after marathon.

Conclusion: Marathon induces cardiac fatigue related by pulmonary immunosuppression.

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PLATELET RICH PLASMA FOR ACUTE ACHILLES TENDON RUPTURE: RESULTS OF THE PATH-2 STUDY, A DOUBLE-BLIND MULTICENTER RANDOMISED PLACEBO-CONTROLLED TRIAL

Introduction and Purpose: Disability and slow return to sport and work after tendon rupture are major clinical challenges. Platelet Rich Plasma (PRP) is an autologous supraphysiological concentration of platelets from whole blood that has demonstrated positive cellular and physiological effects on healing in laboratory conditions but evidence from adequately powered robust clinical trials is lacking. We aimed to determine the clinical efficacy of PRP for treatment of acute Achilles tendon rupture.

Material and Methods: In a placebo-controlled, participant- and assessor-blinded, trial at 19 UK National Health Service hospitals we randomly assigned 230 adults starting acute Achilles rupture non-surgical management to PRP injection or dry-needle insertion (placebo) to the rupture gap under local anaesthetic. Patients with confounding or contraindicated concurrent medical conditions were excluded. Preparation and administration of the intervention were performed according to a standardized protocol. PRP quality was assessed at a central laboratory. The primary outcome was muscle-tendon function, assessed by the limb symmetry index (LSI, uninjured limb/injured limb x 100, higher scores better) of the work (Joules) performed during the heel-rise endurance test (HRET) at 24 weeks. The HRET primary outcome assessment was performed by blinded assessors to a defined protocol. Secondary outcomes were: Achilles Tendon Rupture Score (ATRS, 0-100, higher scores better), maximum heel rise height and repetitions during the HRET, quality of life (SF-12), pain, and goal attainment (Patient Specific Functional Scale). Participant blinding was assessed after the 24-week assessments. Trial registration: ISRCTN54992179.

Results: Participants were aged mean 46 years and 57 (25%) were female. 103/114 (90%) of the PRP group and all (n=116) in the placebo group received allocated treatment. PRP administered was consistently high quality in terms of cellularity and activation status. At 24 weeks, mean LSI was 34.4 for the PRP group and 38.8 for placebo (adjusted mean difference -4.4 95% CI -11.2 to 2.5, n=201) and ATRS was mean 65.2 PRP vs 65.8 (adjusted mean difference -0.6, 95% CI -4.9 to 3.7, n=224). There were no differences between groups in the other secondary outcomes. Assessments of participant blinding confirmed that they were not able to predict their allocated treatment.

Discussion: We found no evidence of PRP efficacy for improving muscle-tendon function or patient-reported recovery after acute Achilles tendon rupture. The larger sample size than previous trials, careful standardization of intervention procedures, PRP quality assurance, choice of placebo intervention, and blinded outcome assessments were important aspects of study design to address some of the limitations of existing research.

Conclusion: Our findings challenge the increasing global use of PRP for acute tendon injury and indicate that robust evaluations are required in other applications.

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REVERSE CARDIAC REMODELING IN ULTRA-TRIATHLON ATHLETES

Introduction and Purpose: There is a growing scientific interest in cardiac structural changes from aerobic training (AT), in ultra-endurance sports, but especially in ultra-triathlon, there are few records. In order to differentiate pathological changes from those considered physiological (R-remodeling), one of the techniques used is the detraining (D) -interruption of training for a period of time. Our goal was to evaluate the effect of the detraining process on athletes finishers of ultratriathlon Brazil (UB5515').

Material and Methods: Athletes without comorbidities who completed the UB5515'® (3 days duration totaling: 10km of swimming, 421km of cycling and 84km of running) were evaluated in MR (Siemens Essenza 1.5T) one day after the end of the competition and 30 day after (detraining period). All the images were analysed for atrial, ventricular thickness and volumes and septum for thickness.

Results: Five male athletes were analyzed 24 hours after competition (D1) and 30 days after (D30, detraining). The average age of athletes was 47.6 ± 9.2 years, training time was 27 ± 4.8 hours, time of practice of triathlon was 18.3 ± 12 years. End diastolic vol. left ventricular (LV) index (ml/m²): D1- 93,8 D30- 80,8 p<0,059; End sistolic vol. LV index (ml/m²): D1- 35,2 D30- 30,4 p<0,168; Edjectiv volume index (ml/m²): D1- 58,6 D30- 50,4 p<0,040; Mass index (g/m²): D1- 87,4 D30-75,0 p<0,040; End diastolic diameter (mm): D1- 53,4 D30-53,4 p=1; Septum (mm): D1-10,2 D30- 11,6 p<0,038; Lateral wall (mm): D1- 10 D30- 9,4p< 0,305; Ejection fraction (%): D1- 62,4 D30- 62,8 p< 0,825; Left atrial volume index (ml/m²): D1- 44,6 D30- 45,2 p<0,908; End sistólic vol. right ventricular (RV) index (ml/m²): D1- 101,4 D30- 79,8 p<0,009; Ejection fraction RV (%): D1- 59,2 D30- 56,8 p<0,109.

Discussion: Cardiac remodeling of the athlete may sometimes be confused with diseased hearts as in hypertrophic cardiomyopathy. The conduct in cases of doubt is detraining. As noted in the literature, detraining even after a short period, as in the present study, can generate regression of the changes induced by the training. Perhaps a longer period of detraining is needed for more noticeable modifications.

Conclusion: In this small cohort we can already observe a significant reduction in the volume of the right ventricle, after 30 days of detraining. Left ventricular ejection volume, mass and septal diameter also changed. These data help us to better understand the expected behavior of cardiac structure after detraining.

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SIX-MINUTE WALK TEST AS A METHOD OF PRESCRIBING THE INTENSITY OF INTRADIALYTIC AEROBIC TRAINING IN PATIENTS WITH CHRONIC KIDNEY DISEASE

Introduction and Purpose: The relative risk of cardiovascular death in patients with chronic kidney disease (CKD) stage 5 is 20 to 30 times higher when compared with the general population. CKD patients on hemodialysis (HD) tend to be sedentary and associated with numerous risk factors present in these patients increase the cardiovascular complications and mortality. Physically active patients have a higher survival rate and a lower incidence of cardiovascular diseases. The intensity of aerobic exercise component is considered the most important variable in order to obtain benefits of regular exercise, and ideally, the prescription must be individualized. Oliveira et al., 2016, proposed the formula maximum heart rate (HR) in six minute walk test (6MWT) plus 10% ($MHR_{6MWT} + 10\%$) to the submaximal aerobic training of heart failure patients. The 6MWT may be a better approach for the prescription of exercise intensity in an individualized way when compared to the empirical formulas of maximum heart rate and training, as these are not specific to patients with chronic diseases and do not consider the medication used by the patient. Objectives: Evaluate the use of 6MWT and the method of Oliveira et al 2016 for a submaximal training HR range to guide the intensity of aerobic intradialytic training using cycle ergometer. Evaluate the effects of this training on aerobic capacity, measured by the distance of the 6MWT, the maximal oxygen consumption (VO_2 peak), on the levels of C-reactive protein (CRP) and brain natriuretic peptide (BNP) in patients with CKD in HD.

Material and Methods: 16 patients were studied in RenalCor clinic, where 9 were randomized to the exercise group (EG) (5 men, 4 women, average age of 45.6 ± 7.6 years, BMI of 24.0 ± 2.9 Kg/m²) and 7 for the control group (CG) (3 men, 4 women, age of 47.8 ± 4.5 years, BMI of 23.5 ± 1.0 Kg/m²). The physical exercise program was individualized on a stationary bicycle adapted during 3x / week dialysis sessions for 3 months with a duration of 45 minutes of aerobic training. HR target has been set from the 6MWT and checked for HR in real training time. The VO_2 peak was estimated by the formula: $VO_2 \text{ peak} = 0.02 \times \text{distance(m)} - 0.191 \times \text{age(years)} - 0.07 \times \text{weight(kg)} + 0.09 \times \text{height(cm)} + 0.026 \times \text{Rate Pressure Product} \times 0.001 + 2.45$. CRP and BNP levels were evaluated before and after the 3 months, in both groups. By two-tailed t test statistic of Student or Mann-Whitney.

Results: After 3 months of exercise, EG showed significant increase in distance (meters) of the 6MWT, and their respective VO_2 (ml.kg⁻¹.min⁻¹) estimated, 462.3 ± 46.4 (16.4 ± 2.8) to 497.3 ± 61.4 (18.85 ± 2.9), with significance respectively $p = 0.03$ and $p = 0.001$. There was no significant difference in CG with 427.1 ± 79.2 (15.11 ± 1.7) to 400.3 ± 127.1 (16.1 ± 3.2), respectively $p = 0.34$, $p = 0.27$. The BNP values were reduced in 68.6 EG to 33.7 pg/ml (median) ($p = 0.02$) and there was no significant change in CRP values. In the CG, none of these biochemical variables changed. There is no major adverse events in EG.

Discussion: The main finding of this study is that 3 months of aerobic physical training, with intensity determined by the 6MWT, significantly improved VO_2 , BNP and the distance covered by patients in the exercise group. The duration of studies that found a positive effect of exercise on CRP was 6 months. This may explain why our 3-month study was not able to find a significant difference. Exercise on HD can be performed safely, is simple and feasible to administer, and should be advocated as a standard of practice.

Conclusion: The 6MWT was effective and safe as method for guiding the intensity of intradialytic aerobic training and being able to trigger significant changes in distance covered on the 6MWT, estimated VO_2 and in BNP.

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THE FLUIDITY OF GENDER AND IMPLICATIONS FOR THE BIOLOGY OF INCLUSION FOR TRANSGENDER ATHLETES INTO ELITE SPORT

Introduction and Purpose: One of the most contentious issues in modern day sport arises when sports are divided into male and female categories. In 2015, the International Olympic Committee allowed women transgender athletes to compete in international events without undergoing sex reassignment surgery, as long as they could demonstrate a total testosterone (T) level below 10 nmol/L for at least 12 months prior to the first competition as well as during the competitive period. This decision has received several criticisms and considered by some as unfair. However, the Fundamental Principles of the Olympic Charter stipulates that athletes compete without discrimination of any kind and therefore evidence-based decisions are needed to implement the inclusion of transgender athletes into elite sport in the fairest possible manner. With this challenge in mind, we recently proposed a system to deal with gender variant athletes that relies on a determination of an athlete gender.

Material and Methods: To gauge opinion, the concept of an athlete gender was presented to the sports medicine community (2 events) and the public (1 event). Participants were invited to complete a short survey questionnaire and indicate whether they agreed or not with the concept of the athlete gender. Those who disagreed with the solution could provide their opinion on the best way to separate athletes into male/female categories. Responses were analysed and divided into categories by 2 independent evaluators.

Results: Of the 154 participants who answered, 71% agreed with the idea, whereas 23% disagreed and 6% abstained from providing an opinion. Among those which disagreed/neither agreed nor disagreed (42), the most frequent options selected to separate athletes into male/female categories was chromosomal pattern (43%), gonadal sex (36%), gender identity or self-determination (7%) and legal status (5%). A total of 50 participants responded with comments. Among of the 25 that agreed with the concept of the athlete gender, the need for continuous monitoring of hormonal values (32%), inclusion of transgender athletes (24%) and more studies need (20%) were the main responses. Of the respondents that disagreed with the idea ($n=17$), biological differences between males and females are retained after therapy (47%), insufficient data (17%) and transgender athlete exclusion from sporting competitions (17%) were the main responses.

Discussion: The majority of participants agreed with the athlete gender solution. The main justification being the likely detrimental effects of hormone therapy on performance, such as reduced muscle mass and aerobic capacity and lower levels of T offsetting any advantages maintained after the transition. In this way, transgender women with T within the normal range for females could compete against cis gendered women fairly.

Conclusion: Although more studies are necessary to obtain further evidence to support this solution, we consider hormonal control the best way at present to ensure as fair as possible inclusion of transgender athletes into elite sport.

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RANGE OF MOTION, BALANCE DIFFERENCIES AND MOTIVATION OF KITESURFERS

Introduction and Purpose: Participation in popular extreme sports is getting more common around the world. People prefer to spend their time and energy in different sports activities and want to escape from their daily routines. Kitesurfing is one of the novel extreme water sports and it also carries risk to injuries and even death. To know sports specific injury type is essential but knowing the basic causes of injury is more essential to take care. This is the first study that investigates the motivation of kitesurfers to participate in a such high risky sport and relation between injury and range of motion (ROM), balance differencies of professional kitesurfers.

Material and Methods: In this prospective and controlled study, we enrolled 54 professional Turkish kitesurfers who participated in the Maximum Kiteboard Turkish Open and European Championship between the dates from 12th to 20th August, 2017 at Tirmata Beach, Kilyos, Istanbul, Turkey. Control group was consisted of 50 healthy nonathletics at the same period of time. The same physioterapist measured upper and lower extremities ROM with standard goniometer, checked Thomas and Y-Balance test. Sports Participation Motivation Questionnaire (SPMQ) was self reported. SPSS 15.0 for windows program was used for statistical analysis. Two groups variables were compared with student t test or Mann Whitney U test according to distribution normality and more than two groups variables analyses Paired t test or Kruskal Wallis was used. Spearman Correlation analysis was used as nonparametric test. Alpha significant level was $p < 0.05$.

Results: The age range of the study group was 13-57 years and the control group's was 23-50 years. 12 kitesurfers were under 18 years old. Bilateral internal and external rotation of shoulders of the kitesurfers was lower than the control group ($p < 0.001$). Bilateral planter flexion of foot of the kitesurfers was higher than control group ($p < 0.001$). Bilateral anterior, posterior medial (postmed) and posterior lateral (postlat) side of Y-balance test was higher than the control group ($p < 0.001$). Gender differencies were significant in kitesurfers' Y-balance test ($p < 0.05$). Lower extremity injuries were more common in kitesurfer group (73.5%) and tendon injuries were most common (53%). A kitesurfer who has had any shoulder injury, had lower IR and ER ROM ($p = 0.049, 0.005$), but bilateral postmed ($p = 0.011$) and postlat (0.005) values were higher than in no-injury group. Especially, left shoulder IR was lower in kitesurfer group who has had a previous upper extremity injury ($p = 0.021$). A positive correlation was found between kitesurfers that have had more than one injury and ROMs of shoulder and hip joints and Y-balance test. But we did not find a significant difference between kitesurfers who had not had any previous injury and shoulder and hip ROMs. There was also not a significant difference in Y-balance test in the no-injury group. According to SPMQ, suitability/spending energy (8.55 ± 1.44), talent development (7.02 ± 1.21), enjoy (6.91 ± 1.36) were the main reasons to begin kitesurfing. A negative correlation was found between age and being member of team and friend subgroups of SPMQ.

Discussion: In this study, it is shown that in some kind of sports when not to support regular rules injury risk is getting higher. Shoulder ROM was lower in kitesurfer group and lower extremity injuries were higher especially on knee joint and tendons. Injuries were positive correlated with exercise and experience durations. Y-balance test measurements were higher than no-injury and control groups.

Conclusion: People prefer kitesurfing at any age especially for suitability, spending energy and talent development. It is predictable that kitesurfer number will increase in the future and become an olympic sport. At the off seasons and the seasons, careful exercise and check-up programs according to movement analyses of kitesurfing must have planned to avoid serious injury.

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ANALYSIS OF VARIATIONS IN THE BODY COMPOSITION OF PROFESSIONAL FOOTBALL PLAYERS AND THEIR CORRELATION WITH THE PLAYING POSITION.

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Introduction and Purpose: A football match demands from athletes intense physical performance and intermittently interweaves phases of effort and rest. From the physiological point of view, there is a predominant participation of aerobic metabolism. Being this the most important thing involved in the moments off the ball, the anaerobic metabolism becomes crucial in periods of possession of the ball and marking of goals. In practice, depending on the position they occupy, players are subjected to different physiological demands. The objective of the present study is to demonstrate that there were changes in the body composition of 19 professional football players during the season and to correlate these changes with the respective positions in the game.

Material and Methods: In this research, the data of the body composition of 19 professional football athletes will be analyzed quantitatively and qualitatively, extracted by means of Dual-energy X-ray absorptiometry (DXA). An evaluation was performed at the beginning and another at the end of the season. The project is descriptive, transversal and retrospective.

Results: Satisfactory data were observed when analyzing the initial and final means of the 19 athletes, since there was a significant loss of fat and gain of lean mass. The mean change in fat loss was $-5908.53g$ (5.52%) and lean mass gain was $+4353.2g$ (+5.49%). In relation to bone mass, total mass, android/gynoid fat and bone mineral density, there were no significant variations. To statistically analyze the relation between variables, the 19 athletes were categorized into five different categories (Goalkeeper, Defender, Full-Back, Midfielder, Forward) and multinomial logistic regression was applied. For interpretation, the value of the coefficient of determination R^2 (R-square) was observed. A significantly higher value of the relationship between the position of the athletes and the fat variations is highlighted, resulting in a 70.2% R^2 percentage value. Therefore, we found in this study, in particular, the strong relation between field positions and variations in fat levels. The positions that presented the highest average fat variations in absolute numbers were the full-back ($-9247,20g$), followed by the defense ($-7719,45g$) and the midfielder ($-6282,31g$). And the one that presented the highest average change in lean mass was the goalkeeper ($+6703.1g$).

Discussion: Football is a sports mode based mainly on endurance, the main energy source being the oxidative metabolism of glucose and fatty acids; the latter mobilized from adipose tissue. Therefore, moderate aerobic exercise promotes reduction of fat tissue. This data corroborates the result found in this study that demonstrated fat reduction in all athletes evaluated. The anaerobic metabolism is essential at times when it takes muscle strength and explosion, which are the most crucial to the game, and directly involve possession of the ball and marking of goals. A significant finding was the strong relation between the variation of fat levels and the position of the players in the field. We observed that the positions that presented the greatest variations were the full-back, the defense and the midfielder respectively, being the full-backs and the midfielders the ones covering the longest running distances, both of which play a role of connection between the players. The greater variation of lean mass presented by the goalkeeper is important because in this position are prioritized short but high intensity movements.

Conclusion: The results of this study satisfy the hypothesis that there is a change in the body composition of professional football players during the season and that this change is related to the position in play; its implications may give better direction to the training of these athletes to depend on the position, balancing resistance training with strength training.

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THE 1000 ATHLOMES PROJECT FOR 2020 SUMMER OLYMPICS IN TOKYO

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Introduction and Purpose: Despite numerous attempts to discover genetic variants associated with elite athletic performance, injury predisposition and elite/world-class athletic status, there has been limited progress to date. A retrospective view of genetic association studies with complex disease traits indicates that transition to hypothesis-free genome-wide approaches will be more fruitful. In studies of complex disease, it is well recognized that the magnitude of genetic associations is often smaller than initially anticipated and, as such, large sample sizes are required to identify them robustly. Thus, alternative approaches involving large-scale, collaborative efforts, within which high-resolution genome-wide data is generated and interrogated using advanced bioinformatics approaches, are likely necessary for meaningful progress to be made.

Material and Methods: Whole genome sequences of athletes were determined by next generation sequencer Illumina HiSeq X-10 (PE 150 bp, x30 coverage). Variant call files (VCF) were generated by Illumina HiSeq Analysis Software (HAS) v2.0. Variants were interpreted by Opal Clinical at Fabric Genomics. Results: The 1000 Athlomes Project aims to sequence 1000 genomes of sprinters and distance runners of West and East African descent.

Results: An important aim of this sequencing project is to document the genotype distribution of elite east and west African athletes. The large amount of genotype data to be generated from the 1000 Athlomes project will serve 1) as a reference panel for future performance studies, and 2) to guide other extreme phenotype studies in medical science. The 1000 Athlomes Project aims to sequence 1000 genomes of sprinters and distance runners of West and East African descent. Phase 1 of the project involves the sequencing of 7 Ethiopian and 6 Kenyan distance runners of the highest level (i.e. world record holders, Olympians and World Champions). Phase 2 (2018-2020) will involve increasing the sample size for sequencing to 160 genomes (40 Ethiopian, 40 Kenyan, 40 Jamaican, and 40 US athletes).

Discussion: The Athlomes project will develop principles and protocols for safeguarding participants rights to access, confidentiality, privacy of data, and assurances that there is no significant mission drift of the kind of which is permitted under some conceptions of broad consent. This would, for example, prohibit commercialization of participants' data. In order to preserve the integrity of this process and the principles, rigorous anonymization processes will be developed by a partner institution that does not have any direct role in data collection, storage or analysis. This will assure independence and integrity to the process. This is especially important in this case since some of the research participants are public figures, which increases the likelihood that someone might be interested in re-identifying their data and genomic sequences. The independent institution would also have an oversight of each new proposal for the Athlomes project going forward in order to ensure compliance with those principles and protocols.

Conclusion: Identifying genetic markers of exercise capacity, adaptation to exercise programmes and in the predisposition to injury is certain to provide useful information to prescribe personalised exercise interventions in the context of 21st century medicine, which should not be based only on identifying new drug targets but also on implementing lifestyle interventions for disease prevention at the individual level.

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INFLUENCE OF HIGH-INTENSITY INTERVAL TRAINING AND INTERMITTENT FASTING ON APOPTOSIS-SIGNALING PATHWAY AND MORPHOLOGY IN HEALTHY RATS MYOCARDIUM

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Introduction and Purpose: There are evidences that high-intensity interval training (HIIT) as well as intermittent fasting promotes cardiac adaptations. However, the effects of the combination of both interventions in myocardium and involved mechanisms remain to be elucidated. This study evaluated the influence of HIIT and intermittent fasting on apoptosis pathway and morphology in healthy rats myocardium.

Material and Methods: Male Wistar rats (n=60) were allocated into four groups: Control (C), Intermittent Fasting (IF), Physical Exercise (EX) and Physical Exercise + Intermittent Fasting (EIF). The C and EX groups were fed daily with rat chow ad libitum, whereas rats from IF and EIF groups received the same standard chow administered ad libitum in 24-hour cycles, alternating with days of total fasting. The EX and EIF animals were submitted to a protocol of HIIT, five times a week, for 12 weeks. At the end of the experiment, exercise tolerance and serum biochemical profile were evaluated. Cardiomyocyte cross-sectional area and collagen interstitial fraction were assessed in histological sections stained with hematoxylin-eosin and Picrosirius red, respectively. Expression of apoptosis signaling-pathway proteins (BCL-2, BAX, Cytochrome C, Caspase-3) was analyzed by Western blot. Statistical analysis: Two-way ANOVA and Tukey.

Results: Exercise tolerance was higher in EX and EIF groups than in C and IF, respectively, and higher in EIF than EX. Regarding biochemical profile, serum levels of triglycerides, total cholesterol, glucose, and albumin did not differ between groups. Cardiomyocytes cross-sectional area was lower in IF than C, and higher in EX than C and EIF. Interstitial collagen fraction (C: 3.1 ± 1.1 ; IF: 2.3 ± 0.6 ; EX: 4.6 ± 0.7 ; EIF: $3.2 \pm 1.0\%$) was higher in EX than C and EIF, and higher in EIF than IF. BAX protein expression was lower in IF than C. Protein expression of BCL-2 (C: 0.93 ± 0.28 ; IF: 1.69 ± 0.38 ; EX: 0.84 ± 0.48 ; EIF: 1.43 ± 0.16 arbitrary units) was higher in IF and EIF than in C and EX, respectively. Cytochrome C expression (C: 2.11 ± 0.75 ; IF: 1.34 ± 0.27 ; EX: 1.10 ± 0.27 ; EIF: 0.91 ± 0.40 arbitrary units) was lower in EX and IF than C. Caspase-3 protein expression (C: 0.65 ± 0.27 ; IF: 0.70 ± 0.37 ; EX: 1.08 ± 0.29 ; EIF: 0.77 ± 0.37 arbitrary units) was higher in EX than C.

Discussion: HIIT improved exercise tolerance and the combination of intermittent fasting intensified this change. According to literature, in high energetic requirement and low food intake conditions (like exercise and caloric restriction, respectively), mitochondrial biogenesis-related genes activation occurs, improving energetic efficiency and aerobic capacity. Furthermore, HIIT resulted in cardiomyocyte hypertrophy, augmented left ventricle collagen interstitial fraction and myocyte apoptosis. Cardiac hypertrophy is an adaptive response that contributes for maintaining high cardiac performance during long-term intensive exercise. Concerning cardiac fibrosis and apoptosis, although responsible mechanisms are not completely understood, these alterations are possibly associated to intensive exercise-induced oxidative stress. Otherwise, intermittent fasting attenuated cardiomyocyte hypertrophy and left ventricle fibrosis, and reduced myocardial apoptosis. The cardioprotective effect of intermittent fasting may be related to energy conservative mechanisms, increased cellular resistance to stressor stimuli, and diminished oxidative stress.

Conclusion: HIIT promotes cardiomyocyte hypertrophy, left ventricle interstitial fibrosis, and myocardial apoptosis. Intermittent fasting, alone or in combination with exercise, reduces myocardial apoptosis and attenuates cardiomyocyte hypertrophy and left ventricle interstitial fibrosis induced by HIIT. Financial support: CAPES.

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ANALYSIS OF VARIATIONS IN THE BODY COMPOSITION OF FOOTBALL PLAYERS AND THEIR CORRELATION WITH INJURIES

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Introduction and Purpose: The Dual-energy X-ray absorptiometry (DXA) is a valid, reliable and accurate non-invasive method of collecting data on the various tissues present in the human body. In high-performance athletes, the detailed information about body composition is of utmost importance for an improvement in performance. Careful follow-up is required for proper exercise prescription and effective nutritional counseling. Within the football industry, the economic benefits of being able to assess body composition and intervene adequately in the athlete's routine are clear. The general objective of this study is to analyze how the changes in body composition of football players before and after the championship are related to the incidence of injuries.

Material and Methods: The body composition evaluation was performed through Dual-energy X-ray absorptiometry (DXA). We evaluated 19 professional athletes of a professional football team in the state of São Paulo, each of which was submitted to two evaluations: the first one occurred before the beginning of the championship and the second after the end of the championship. After the data were tabulated and analyzed, we observed changes in fat mass, fat percentage, lean mass, percentage of lean mass, total mass, bone mass, android/gynoid fat (AND/GIN) and bone mineral density (BMD). The injury rate in the athletes during the championship in question was quantified and compared with the changes in body composition described. In this work, an injury was defined as any physical impairment occurred with the player during the training or game period. Thus, a form adapted from a study conducted by the FIFA Medical Assessment and Research Center (F-Marc) was completed by previously researchers based on the affected body part, the type of injury, the diagnosis, if the player had an injury whether it was traumatic or not, whether it occurred during training or play, whether it was with or without contact and for how long the player was away. In this research, the data was analyzed quantitatively and qualitatively. The project is descriptive, transversal and retrospective.

Results: It can be seen that, of the 19 athletes, five were injured during the season and 14 remained healthy. In general, it was observed that the relationship between the injured players and the mean deviations of the body composition indices analyzed shows that, injured athletes - mostly midfielders - have a lower total fat loss, percentage of fat, greater gain of lean mass - both total and percentage - besides having a decrease of mean deviations of total mass, AND/GIN and BMD. In order to statistically analyze the relationship between variables, the logistic regression model was used. There is no statistically significant evidence that correlates the values of fat, fat percentage, lean mass, lean mass, total mass, bone mass, AND/GIN and BMD scores of the 19-player group, where 5 (26.3%) had some type of injury and 14 (73.7%) remained healthy throughout the season. The proximity between the fact of the players being injured and Bone Mass and BMD, with relationships of 14.6% and 17.1%, respectively, stands out.

Discussion: According to the results, during the analyzed period, the athletes who were injured lost more total mass, bone mass, BMD and percentage of total fat. Meanwhile, non-injured athletes lost more absolute fat and gained more total mass, bone mass, and BMD.

Conclusion: Although Dual-energy X-ray absorptiometry is an excellent way to analyze body composition in a multicompartmental manner, the differences between the results obtained were not significant.

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PHYSICAL FITNESS AND HYPERTENSION IN ADOLESCENTS OF THE PUBLIC EDUCATION NETWORK AS A RISK FACTOR FOR CARDIOVASCULAR DISEASES

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Introduction and Purpose: According to the Ministry of Health, Brazil has about 17 million hypertensive people, of whom 4% are children and adolescents. Because it is a disease with asymptomatic evolution, systemic arterial hypertension (SAH) in adulthood has been strongly related to high blood pressure levels in the early stages of life. Positive association between high body mass index and the prevalence of hypertension are described in the literature. According to the V Brazilian Guideline for Hypertension, excess body mass may be responsible for 20 to 30% of the cases of HAS. In view of the above, the objective of this study was to evaluate systemic arterial hypertension in schoolchildren and show their association with anthropometric factors and physical activity practice. **OBJECTIVE:** The study was a case-control study with a sample of 326 adolescents, from the public network of the municipalities of Iguaba Grande and São Pedro da Aldeia, RJ. Anthropometric measures of body mass, height, waist circumference, body mass index, Roher and height waist ratio were collected.

Material and Methods: The present study was characterized as a case-control epidemiological survey and was developed in the period from March to October of 2016 in the public school system of the municipalities of Iguaba Grande and São Pedro da Aldeia (Rio de Janeiro - Brazil). The sample was invited to participate in the study and was composed of 326 individuals, aged between 13 and 18 years, of both sexes, being 178 girls (55%).

Results: Male subjects had a lower Roher index and higher maximum oxygen consumption and height when compared to females ($p < 0.001$), and the other variables were homogenous. Subjects classified with normal BMI (\leq per.85th) had a reduction in the chance of acquiring the disease in 7% (OR: 0.93; CI: 0.901 - 0.977) when compared to subjects with overweight and obesity ($>$ per 85th). No significant association was found with the other variables analyzed. Anthropometric differences and oxygen consumption between genders were observed, with the observation of the association of the reduction of the risk of hypertension among subjects below the cut-off compared to their overweight pairs.

Discussion: Currently, the percentages of young subjects with arterial hypertension oscillating from low to worrying frequencies of cases. Among the risks of hypertension found in our results is corroborated by investigations that already observed hemodynamic changes already develop in 54% of the cases in young hypertensive patients with metabolic changes, chronic and cardiovascular diseases, and are shown to be precursors of atherosclerosis in younger populations as the age increases. In summary, there were no differences in blood pressure between the sexes but rather in the higher anthropometric indices among boys, which may be a strong indicator of the risk of developing hypertension for males, but also for those with excess blood pressure. weight in adolescence.

Conclusion: There were no differences in blood pressure between the sexes and a higher prevalence of above-average anthropometric parameters among boys was observed, possibly indicating an increased risk for the development of hypertension in men in adulthood.

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CARDIOVASCULAR RESPONSES DURING ONE-REPETITION MAXIMUM TEST (1RM) IN NORMOTENSIVE AND PRE-HYPERTENSIVE MEN

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Introduction and Purpose: Arterial pre-hypertension is a risk factor for cardiac diseases and has a worldwide prevalence ranging between 21% and 37.7%. However, few studies have showed the potential effects of one-repetition maximum test (1RM) on blood pressure and heart rate variability (HRV) in pre-hypertensive subjects. The current investigation purpose was to analyze profile of blood pressure levels as well as HRV in normotensive and pre-hypertensive subjects during a 1RM performance for lower limbs.

Material and Methods: Twenty-four male adult participants with at least three months of practice in resistance-exercise training were recruited and divided in two groups: G1 and G2. While G1 was constituted by 12 normotensive (25.5±5.7 years-old), G2 included 12 pre-hypertensive volunteers (24.9±2.4 years-old). Bioimpedance analysis was performed in order to assess body composition. Afterwards, subjects were submitted to a 1RM test for knee extension on a Leg press 45°. Blood pressure and HRV were examined before (rest), immediately after 1RM and at the moments of 10, 20, 30 and 40 minutes of recovery. An oscillometric sphygmomanometer was used to evaluate the BP, while HRV was evaluated using a Polar® V800 device. Repeated measures two-way ANOVA and Bonferroni's test were used to statistical analysis. Analysis of covariance (ANCOVA) was used to examine the effect of body composition as an intervening variable on HRV outcomes. The level of significance was considered to be $p < 0.05$.

Results: With respect to the anthropometry, G2 presented higher body mass index and adiposity than G1. Relative to the cardiovascular findings, G1 presented lower values of systolic (SBP; G1: 112.6±5.6, G2: 131.1±3.2 mmHg; $p < 0.05$) and diastolic blood pressure (DBP; G1: 64.2±5.1, G2: 75.8±8.1 mmHg; $p < 0.05$) than G2 at the resting moment; this profile was maintained in all moments of evaluation. Furthermore, both groups showed a blood pressure peak immediately after 1RM. Relative to HRV, pre-hypertension was associated with lower measures of percentage of absolute differences between successive normal RR intervals that exceed 50ms (pNN50; G1: 1.58±0.35, G2: 1.13±0.66 %; $p < 0.05$) at resting time. Considering frequency domain variables, G2 has also showed lower ratio between high and low frequencies (LF/HF) than G1 before 1RM. After adjusting the LF/HF for adiposity values, no changes in the LF/HF (G1: -0.18±0.04, G2: 0.18±0.06, $p > 0.05$) values were observed. With respect to 1RM, no intergroup differences in terms of HRV variables were identified at the other moments of analysis.

Discussion: Resistance exercise-training has been associated with increase in blood pressure values during its execution, resulting in potential cardiovascular risks, particularly in pre-hypertensive subjects. However, blood pressure responses to 1RM protocol were similar between groups. Likewise, pre-hypertension had also been associated with lower HRV in resting, which might result from sympathetic activation and/or parasympathetic inhibition. Since LF/HF was normalized after adjusting per adiposity, it is probable that body composition contributes to lower HRV in pre-hypertensive adults. However, both groups presented the same HRV profile in response to the 1RM, minimizing potential cardiovascular risks for this population.

Conclusion: Pre-hypertension is associated with increased blood pressure and reduced heart rate variability at resting condition. However, 1RM does not impair these features, suggesting that it is a secure method to assess muscle strength in normotensive and pre-hypertensive subjects.

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THE EFFECTS OF ISOFLAVONE SUPPLEMENTATION PLUS COMBINED EXERCISE ON SALIVARY MARKERS OF OXIDATIVE STRESS IN POSTMENOPAUSAL WOMEN

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Introduction and Purpose: Isoflavone has a potential antioxidant effect alone, but its effect with exercise performance is unknown. This study tested the effect of isoflavone supplementation in addition to combined exercise training in salivary oxidative stress markers in non-obese postmenopausal women

Material and Methods: Thirty-two non-obese postmenopausal women without hormone therapy were randomly assigned to exercise + placebo (PLA; $n = 15$) or exercise + isoflavone supplementation (ISO; $n = 17$) groups. They performed 30 sessions of combined exercises (aerobic plus resistance) over ten weeks and consumed 100 mg of isoflavone supplementation or placebo. Saliva samples were collected after an overnight fast, five days before, and 72 h after, the last exercise training and analyzed by commercial kits. Superoxide dismutase (SOD), total antioxidant capacity (FRAP), thiobarbituric acid reactive substances (TBARS), catalase (CAT), total protein and nitrite were determined before and after ten weeks of the intervention. The two-way ANOVA were applied with a of 5%.

Results: Both groups increase ($p < 0.05$) SOD activity and decrease Catalase levels. There was interaction (time*group) in both Nitrite and TBARS results. The Nitrite and TBARS increases ($p < 0.05$) in PLA group and decrease ($p < 0.05$) in ISO group. No interaction, time or group effect was found for FRAP or TP.

Discussion: Exercise performance increases oxidative stress and activity of antioxidant system especially of SOD probably by increasing superoxide production. Isoflavone probably decrease oxidative stress and the oxidative effects of exercise performance decreasing the nitric oxide and peroxide nitrite production and also lipid peroxidation.

Conclusion: The combination of isoflavone supplementation and exercise training can promote an antioxidant effect through reduction of lipid peroxidation and concentrations of salivary nitrite.

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ANALYSIS OF VARIATIONS IN THE BODY COMPOSITION OF FOOTBALL PLAYERS AND THEIR CORRELATION WITH THE USE OF DIETARY SUPPLEMENTS

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Introduction and Purpose: Numerous factors influence the human body composition, such as physical exercise, nutrition, growth and age group. A very efficient noninvasive method of assessing body composition is the Dual-energy X-ray absorptiometry (DXA). It was analyzed the variations of the body composition (bone mass, fat mass and lean mass) of professional football athletes during a championship, with the objective of confronting them with the use of dietary supplements - substances increased in the diet orally to complement a certain nutritional deficiency and promise several actions such as increase of muscle mass, decrease of fat percentage and improvement in physical performance.

Material and Methods: To verify the influence of these supplements on the body composition of football players, 19 athletes were submitted to two evaluations by DXA, one before and one after the end of the competition. They also responded to a survey on the use of dietary supplements. The data of the body composition of 19 professional football athletes was analyzed quantitatively and qualitatively. The project is descriptive, transversal and retrospective.

Results: In short, 6 of the 19 athletes (31.57%) used supplements during the season and demonstrated significant variations compared to non-supplemented athletes. Although the non-supplemented players are mostly in relation to those supplemented, the values of the supplemented players are significant, with better results than the non-supplemented players: higher rates of total weight loss (-103.12g), fat (-7700.47g) and fat percentage (-7.23%) and better gains on lean mass (5829.87g) and the percentage of lean mass (7.28%). However, the maximum values of individual variation for percentage fat loss, lean mass gain and percentage gain of lean mass were not of supplemented athletes.

Discussion: The players who supplemented themselves were using hyper proteins, although their diets were already rich in carbohydrates. The high protein intake associated with resistance training has been positively associated with improved body composition, while carbohydrates act on rehabilitation after training and competition, preventing infections and reducing inflammation and pain. Therefore, the consumption of carbohydrates present in their diets is consistent with the results obtained by DXA, since the player with the highest percentage fat loss, the player with the highest lean mass gain and the player with the highest percentage gain of lean mass was also not supplemented. This happens because prolonged field sports, such as football, demand high energy expenditure, resulting in mechanical and metabolic stress. Therefore, the use of carbohydrates before and after intense physical activity increases the muscular stores of glycogen, contributing to a better endurance and better muscle recovery - which can be accentuated when combined with proteins and fats, due to a greater insulin response and resynthesis of muscle glycogen and protein. The player with the highest fat loss was supplemented, which corroborates with the mechanism of thermal effect of food (TEF) proposed to justify weight loss in hyperproteic diets: in the postprandial period, there is an increase in the energy expenditure necessary for digestion, absorption and metabolism of nutrients. In addition, the protein is not stored in the body as fats and carbohydrates, being immediately metabolized. The energy derived from this process is mainly used in protein synthesis, urea synthesis and gluconeogenesis.

Conclusion: We conclude that the use of supplements is an important ally for the improvement of high-performance athletes. However, considering the size of the sample, subsequent work is required for statistical refinement of the presented results.

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RELATIONSHIP BETWEEN PROFILE OF STREET CORRIDORS WITH INCIDENCE OF INJURY IN THE MUNICIPALITY OF CRICIUMA - SC

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Introduction and Purpose: Introduction: Annually there has been an increase in the adherence of people to the practice of street racing. Therefore, the number of studies in this population has also increased and on several such as the discovery of motivations for this phenomenon and also for the improvement of sports performance. Objective: To verify the incidence of injuries in street race, the profile of the evaluated ones, the characteristics of the training (like professional accompaniment).

Material and Methods: The population consisted of runners of both sexes, aged between 18 and 70 years, with practice time equal to or greater than three months, with weekly frequency of at least twice a week, with or without orientation and longer than 20 minutes per workout. The sample consisted of a descriptive cross-sectional study with 88 runners, 56 males and 32 females

Results: The sample had a mean age of 36 years, 55.4% with weekly practice of running 3 times a week; 43.2% already had some injury, and the knee (52.6%) was the most affected site. The data showed a positive correlation between number of injuries and the practice time of the modality ($r = 0.269$), and with the average daily training distance ($r = 0.226$), as well as the preventive work did not demonstrate efficacy in decreasing incidence of lesion ($r = -0.133$).

Discussion: In national studies a variation between 25% and 40% in the incidence of lesions was found, this variation in other studies was even greater between 19.4% and 92.4% in lower limb injuries. In this analysis there was an incidence of 43.2%, similar to the national studies, not only in the last 6 months. Therefore, there is an indication of a correlation between the time of practice and distance traveled with the increase in the incidence of injury, indicating the need for prevention taking into account that the number of adepts the practice of street racing grows each year. In addition to the use of other training such as bodybuilding, pilates and functional training, with the purpose of making use of these methods as a preventive activity to injury, but without a training planning favors the incidence described previously. The criteria chosen to establish the injury, describes how any pain or injury that has limited or removed the athlete from training or competitions for one or more days, not establishing the severity of the injury, however identifies the location and nature of the same. The data from this study are corroborated with other studies reviewed, which also found a higher incidence of knee injuries. For some time, with the frequent advancement of technologies, the idea that runners are injured due to inadequate footwear has been discarded and reinforcing the idea that the training variables as intensity and volume are the main causes, as in this study, which showed a positive correlation ($r = 0.226$) between lesion incidence and mean daily distance.

Conclusion: There is a direct relationship between distance traveled and injury, as well as practice time. The orientation of professionals does not present a significant influence in the reduction of the lesions, that is, many injuries can be due to the volume and intensity of prescribed or performed training in the wrong way, not respecting current physical conditioning and biological individuality. As well as the studies carried out on prevention do not prove to be effective in the recurrence of injuries.

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WOLFF-PARKINSON-WHITE SYNDROME IN PROFESSIONAL SOCCER ATHLETES IN THE STATE OF PARÁ: CASE REPORT

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Introduction and Purpose: Wolff-Parkinson-White (WPW) syndrome consists of the presence of an anomalous pathway of cardiac electrical conduction which allows early depolarization of the ventricle. It is also the most frequent among the pre-excitation syndromes, with a prevalence of 0.1% a 0.3% in the general population and in athletes. When symptomatic, the WPW syndrome patient presents palpitation, vertigo, syncope, dyspnea, chest tightness or precordial pain. However, most cases are asymptomatic. Patients with this syndrome have an increased risk of developing atrial fibrillation, which in turn may trigger ventricular fibrillation because of the greater chance that the electrical stimulus will be delivered to the ventricles via the anomalous pathway. The athlete population, especially at the professional level, has as an aggravating factor - the strenuous physical exercise, since the adrenergic discharge favors the electrical conduction by this accessory path, generating the mechanism that can trigger Sudden Death (SD). The WPW syndrome diagnosis, whether in high-performance athletes or not, determines withdrawal from their sports activities due to the inherent risk of such pathology. This paper aims to discuss the clinical presentation, diagnosis and treatment of WPW syndrome.

Material and Methods: A 17-year-old asymptomatic male patient. Professional soccer game athlete in his city (Abaetetuba State of Pará, Brazil). No personal or family morbid antecedents. A pre-soccer-game medical evaluation in September 2017 identified a short PR interval as well as the presence of Delta wave, both leading to the characteristic ECG findings in the Wolff-Parkinson-White (WPW) electrocardiographic pattern. Subsequent ergometric test results showed that the pre-excitation pattern was maintained. The athlete was temporarily removed from his professional activities and was referred to electrophysiological study (EPS). Patient underwent radiofrequency ablation of the anomalous pathway at a reference hospital in the city of Recife, Brazil. The procedure was successful and resulted in total disappearance of Delta wave. Athlete released to resume his professional activities two days after the intervention.

Results: WPW syndrome diagnosis. Evolution to healing after catheter ablation. Patient released for high performance activities.

Discussion: The WPW diagnosis is usually assigned to the patient who presents a short PR interval in ECG (less than 0.12 seconds) as well as enlargement and thickening of the QRS complex (greater than 0.12 seconds). Besides, the ECG must show evidence of Delta wave (thickening of the initial part of the QRS complex with duration of 0.03 to 0.06 seconds), and ST-segment and T-wave alterations, following anomalous ECG depolarization in sinus rhythm and evidence of paroxysmal supraventricular tachycardia (PST), which are common non-lethal arrhythmias to the syndrome. The major risk for WPW syndrome patients is the development of atrial fibrillation occurring in 15 to 30% of cases, which can degenerate to ventricular fibrillation and Sudden Death (SD). Although asymptomatic patients have a good prognosis, there is a risk of 0.1% per year of progression to malignant arrhythmia and SD, which may be the first manifestation of the syndrome in 53% of cases. The treatment choice is catheter ablation either by conventional radiofrequency or cryoablation technique. In symptomatic cases, adenosine may be used to reverse tachycardia.

Conclusion: Due to the asymptomatic nature of WPW syndrome and DS as a possible first manifestation, it is necessary for professional and non-professional athletes to undergo pre-participation clinical evaluation for early diagnosis and subsequent withdrawal from such activities until the EPS, the risk stratification and seizure of the most appropriate conduct. Catheter ablation is considered a definitive and safe therapy in such cases.

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ASSOCIATION BETWEEN STRENGTH, SPEED IN SOCCER BASED CATEGORIES

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Introduction and Purpose: It is referred to as a period of training between the initiation of sport and high-performance sport. In this sense, for the player's performance are linked to the specific actions taken during the match, that the physical qualities are the factors that determine the type of work for the physical conditioning of the player. The work tends to contribute a more specialized look on the profiles of the athletes and more interesting about the characteristics found in each category, which refers to a deepening about the progression process of the athletes in the subsequent categories, which is sometimes only by age and not physical, technical and tactical capabilities. In this context, the relationship between physical abilities, specifically strength and speed is widely discussed. Objective: To evaluate the association between strength and speed in basic soccer categories

Material and Methods: The sample consisted of athletes of the following categories: children (sub 14 and 15 years) with N = 39 athletes, juveniles (sub 16 and 17 years) with N = 32 athletes and juniors (sub 18,19 and 20 years) with N = 20 athletes of a Club A of the Brazilian Soccer Championship 2014. The research was descriptive. Horizontal jump tests and a 30-meter Sprint test were performed. For the statistical analysis, the data were tabulated and categorized in the Statistical Package for Social Sciences (SPSS) version 20.0 and analyzed by Kruskal Wallis and U Mann Whitney, and Student's t test.

Results: The research was constructed and divided according to the percentages: children category 42.9% of the athletes, juvenile category 35.5%, junior category 22.0%. He presented significant differences in strength and speed variables according to the categories: Infant: mean strength 2.22 + 0.24, mean velocity 4.52 + 0.23. Juvenile: average strength 2.49 + 0.14, average speed 4.19 + 0.17. Junior: average strength 2.47 + 0.17, average speed 4.11 + 0.10.

Discussion: The infant category presents inferior results compared to the other categories, in relation to variables of strength and speed, as expected. In the juvenile category, however, there is a stabilization in this evolution, presenting data very close to the junior category, thus, have the variables at that age well developed, having a considerable evolution from category to category. When evaluated the age data of the athletes in relation to their classification, they are separated by children (14 to 15 years), juveniles (16 to 17 years) and Junior (18 to 20 years), and not by physical and technical abilities, that is, for the control of the categories is used to the chronological age of the athletes, being of no importance the biological age. On the correlation between velocity and age, velocity improves according to the advancement of chronological age, developing linearly in boys from 5 years to 17 years (chronological age). Strength is also increased in relation to maturational advancement, where age is important for strength growth. Thus, soccer performance is determined by a set of skills, abilities and qualities that interconnected complement each other, where the athlete has to have a balance of these factors in order to excel in the sport.

Conclusion: The research brings important notes for the construction of the training process and progression of athletes, demonstrating that there are differences between the ages when the physical capacities are evaluated. The greater the age and training time the better the physical condition, there is no correlation between strength and speed, the athletes are organized into categories by age.

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TARSAL TUNNEL SYNDROME SUBTALAR ARTHROSCOPY TREATMENT: SERIES OF CASES

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Introduction and Purpose: Pain presence in tarsal sinus region can usually mean a common local condition occurrence. Tarsal sinus syndrome is characterized as a change compendium that causes local pain and functional loss. Although its incidence is not reported as high, it often presents with an extremely subjective pain and disability, which may keep athletes from their activities for long periods. When associated with previous trauma presence at site (subtalar sprains or subluxations), it has synovitis and local ligament rupture chronic occurrence. Initial treatment is based on motor physical therapy and semi-rigid orthoses use that reduce mobility in region. In non-surgical approach failure, arthroscopic debridement appears as a viable alternative and with high good result rates. Technique is performed through two portals anterior to lateral malleolus, seeking visualization and ligament remnant resection, as well as synovial hyperplastic tissue. Present study objective to describe clinical and functional results subtalar arthroscopy in tarsal sinus syndrome treatment.

Material and Methods: Eight patients were retrospectively analyzed between years 2015 and 2017. Four males and four females, mean age 43 years (35-55) and mean follow-up 10 months (4-24) included sample. All eight patients had previous trauma history in ankle region and underwent arthroscopic resection of disorganized tissues through anterior subtalar arthroscopy by two portals.

Results: All patients exhibited intense synovitis in region. Seven patients had talocalcaneal ligaments remnants and six cervical ligaments. Increase was observed in visual analogue pain scale (VAS) [7.9 (5.1-8.7) to 1.7 (0.3-3.1) and American Orthopedic Foot and Ankle Society - Hindfoot (AOFAS) [66 (58-76) to 81 (69- 90)] No complications were reported.

Discussion: A nonspecific pain complaint in lateral ankle region motivates a good number of athletes and sedentary patients to seek care for their resolution. Among possible differential diagnoses, we highlight tarsal sinus syndrome, a common region pain, frequently undiagnosed and poorly conducted. This condition is characterized by pain in this topography, commonly associated with previous traumatic episodes or ankle and subtalar instability. Initially, to approach these individuals is non-operative. Failure after conservative treatment often requires surgical resolution, which can be performed in open or endoscopic manner. Our work seeks to describe technique choice that has been used in our service in recent years, as well as this treatment results in a patient group. Results were shown consistent with current literature and we had no complications.

Conclusion: Subtalar arthroscopy is an effective and long-lasting tool in the tarsal sinus syndrome treatment. Patients who undergo this surgery may expect improvement at functional and pain level. Studies with control groups and with greater number of individuals are necessary for technique standardization.

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FUNCTIONAL TESTING OF USE TO DETERMINE FUNCTIONAL DEFICITS IN SOCCER ATHLETES

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Introduction and Purpose: In view of the frequent occurrence of imbalance between the lower limbs, limiting the practice of sports performance. The isokinetic evaluation is determined as a gold standard to determine muscular strength, but little used due to high cost, necessitating alternative methods of assessing deficits. Objective: To evaluate the correlation between unipodal functional tests and isokinetic evaluation to verify deficits among the lower limbs in professional soccer athletes.

Material and Methods: Fourteen professional soccer players, from the first division of the Brazilian championship, underwent functional evaluation (unipodal vertical jump and triple jump in Cross over distance) and Isokinetic evaluation, in the preseason period of the year 2013.

Results: The bilateral comparison showed that there was no difference between the lower limbs and showed a positive intragroup correlation ($p < 0.05$). No significant differences were found in the correlation between the functional and isokinetic evaluation methods.

Discussion: No differences were found between the dominant and contralateral side demonstrating symmetry and homogeneity of the data, but showed a positive correlation between the tests and the dominant and contralateral side, inferring the possibility of using the functional tests to determine muscular deficits. One study evaluated 101 female soccer players and did not observe differences between dominant and non-dominant limbs, both in peak torque of knee extensors, as well as in functional tests (including unipodal vertical jump and triple unipodal jump). Other studies evaluating the reliability of some unipodal functional tests (including vertical jump and cross over) observed lower limb differences of less than 1%, corroborating the present study. When the correlation between the vertical jump, peak torque and quadriceps and hamstring strengths, as well as the cross over with the same isokinetic variables related to the functional test and isokinetic variables were evaluated, a positive correlation was observed between some variables, but not sufficient statistical power to support the substitution of evaluation methods. Although they found a moderate correlation for the dominant limb ($r = 0.78$), the authors suggest that the isokinetic evaluation is not sufficient to determine if an individual is fit to return to their functional activities after injury.

Conclusion: The functional test is valid to evaluate the symmetry and force production between the dominant and contralateral side, and with this interfering in the professional's behavior, therefore, observing disproportions to the probability of having an injury incidence as described in the literature. However, there was no statistical difference in the correlation between the isokinetic evaluation and the tests of unipodal vertical jump and unipodal cross over jump. Such a result suggests that the functional tests in question can not replace the isokinetic evaluation to determine functional deficits, indicating the restriction in the use of tests.

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PREVALENCE OF LABORATORY TESTS ALTERATIONS IN YOUNG ATHLETES AT A PROFESSIONAL SOCCER CLUB

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Introduction and Purpose: The application of lab tests prior to sports activities in professional athletes is common among medical clinics and clubs. It is useful to identify alterations that can assist on diagnosis and on preventing diseases, further it can facilitate personalized training methods. Athletes at an expert level are exposed to intense physical routines, which can lead to incipient injuries or exacerbate existing ones. The objective of the present study is to describe lab tests alterations in young athletes of a professional soccer club by displaying the results of years 2017 and 2018.

Material and Methods: This retrospective cross sectional study is based on a data collected from young soccer players over a period of two seasons, 2017 and 2018. In total, 248 male athletes from under 14, under 15, under 16, under 17, under 19 and under 20 categories of São Paulo Futebol Clube were submitted to annual routine pre-season lab tests such as complete blood count test, sodium, potassium, urea, creatinine, total cholesterol and fractions, triglycerides, total testosterone, thyroid stimulating hormone, free T4, glucose, AST, ALT, GGT, hemoglobin electrophoresis, iron and ferritin. These tests were obtained from blood and complemented with urinalysis and coproscopy. The patient's medical records were acquired at the club's medical department and data was collected during June 2018.

Results: In total, 115 individuals were evaluated in 2017 and there were lab alterations in 64,34% of volunteers. Among those, 18,91% of white blood cells count and 4,05% of red blood cells count, 9,45% of hemoglobin electrophoresis, 47,29% of cholesterol, 6,75% of triglycerides, 16,71% of total testosterone, 2,7% of thyroid stimulating, 8,10% of hepatic enzymes, 22,9% urine and 9,45% of coprology tests were altered. In 2018, among 133 individuals there were divergences in 83,4% when compared to normal values. Among those, 24,32% of complete red blood count, 9,9% of yellow blood count, 4,5% of hemoglobin electrophoresis, 58,55% of cholesterol, 8,1% of triglycerides, 13,51% of total testosterone, 4,5% of hepatic enzymes, 31,5% of urine and 7,2% of coprology tests were altered.

Discussion: The main alteration found in this study relates to cholesterol levels, highlighting LDL and total cholesterol being above normal values. Moreover, some individuals presented HDL below normal recommended values. The second most altered test is associated with a slight decrease in hemoglobin and hematocrit, however it did not meet the diagnostic criteria for anemia. It is noteworthy to mention iron and ferritin serum levels were analyzed, all within normal patterns. Urine test was the third with the most alteration in both years. It was identified calcium crystal, phosphate and urate in greater quantity than normal levels. Furthermore, mucus, leucocytes, erythrocytes, hemoglobin and bacteria could also be found in samples. Total testosterone was elevated in most collected tests, which is explained by the age of individuals, whom were mostly at puberty. The remaining test alterations presented discrete leukocytosis and leukopenia in white blood cells. Also it was identified hereditary hemoglobinopathy, being most common the presence of S hemoglobin and later C hemoglobin. The increase of triglycerides was also noted, however less prevalent than cholesterol alterations. Most of the coproscopies indicated symbiotic protozoan cysts and the only parasite identified was Giardia Lamblia.

Conclusion: This study shows the importance of lab tests application in athlete's evaluations, from youth soccer categories until they reach professional levels, based in the fact of the high prevalence of alterations founded. Identificating these conditions and intervening whenever possible, can contribute with health and performance of such groups.

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PHYSICAL ACTIVITY AND FOOD INTAKE EFFECT ON TOTAL BODY COMPOSITION IN MALE ELITE ATHLETES AT NATIONAL SPORTS HOSPITAL OF INDONESIA

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Introduction and Purpose: Total Body composition plays a important role in achieving athletes achievement. The purpose of this study was to analyze the effect of physical activity and food intake on total body composition (body fat percentage) in male elite athletes.

Material and Methods: This study used observational analytic research with cross sectional design in 30 male athletes who performed total body composition examination in October 2016 - January 2018 at National Sports Hospital of Indonesia. The sampling technique used is total sampling. Data of food intake was obtained through food recall 72 hours questionnaire, and physical activity was obtained from global physical activity questionnaire (GPAQ WHO). The total body fat percentage was obtained from total body composition examination using DEXA (Dual Energy X-ray Absorbtiometry).

Results: Athletes in this study came from various sports, there are Basketball, Judo, Karate, Running, Archery, Paragliding, Swimming, Football, and Taekwondo. the largest percentage of physical activity in male elite athletes in Indonesia is high physical activity that is 28 respondents (93.3%). The largest percentage of food intake in male elite athletes in Indonesia are normal energy intake (33.3%), very less carbohydrate intake (40%), excess protein intake (60%), excess fat intake (33.3%).The highest percentage of total body fat is not obese that is 22 respondents (73.3%). The result showed that there was no correlation between physical activity ($p = 0.469$) with total body fat percentage. There was no correlation between carbohydrate intake ($p = 0.345$), and protein intake ($p = 0.419$), in the contrary there was a correlation between energy intake ($p = 0.01$) and fat intake ($p = 0.00$) on the percentage of total body fat. Multivariate analysis showed that energy intake was the most influence variable on the percentage of total body fat ($p = 0.149$, OR = 0.146).

Discussion: This study explores the correlation between pysical activity, food intake (energy intake, carbohydrate intake, protein intake, fat intake) and body composition by assessing fat mass in male elite athletes of Indonesia. Base on sample of 30 respondents there are 8 obese athletes. the majority of athletes who are obese have physical activity in the high category as much as 50% and in bivariat analysis show that there is no correlation between physical activity and total body fat percentage proves that increased physical activity can not affect percent body fat in elite male athletes of Indonesia. there is correlation between food intake (energy and fat intake) with body fat percentage proves that athletes who have high physical activity in the management of body composition more emphasis on diet compared with the increase of physical activity

Conclusion: The conclusion is the energy intake and fat intake associated with the percentage of total body fat and energy intake has the most significant effect in male elite athletes at National Sport Hospital of Indonesia. Keyword: Athletes, Total Body Composition, Physical Activity, Food Intake.

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TWO YEAR OUTCOMES AFTER PECTORALIS MAJOR TENDON RECONSTRUCTION IN A CROSSFIT® ATHLETE

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Introduction and Purpose: Pectoralis (PEC) major tendon ruptures are a relatively rare lesion in athletes¹. We have not notice any previous lesion reports in the literature associated to CrossFit® training but the specialized press however, has been reporting a rising number of PEC tears in CrossFit® competitions. The main purpose of this case report is to present the outcome of a two years surgical repair of pectoralis major tendon rupture in a CrossFit® athlete.

Material and Methods: Relato de caso

Results: MGL, 25-year-old male CrossFit® athlete (for 18 months) reports a loss of strength and pain in the shoulder and chest at the start of the concentric phase of the horizontal abduction / adduction movement of the right arm (Supine exercise) during a CrossFit® competition. Magnetic resonance imaging confirmed clinical suspicion of complete lesion of the pectoralis major tendon, and surgical reconstruction with ipsilateral hamstrings tendons was performed after 3 weeks.

Discussion: Athlete restarted full CrossFit training exercises after 6 months of specific rehabilitation and strengthening. A two-year follow up evaluation shows similar outcomes in muscular strength and balance with isokinetic shoulder evaluation and eletroneuromiography

Conclusion: The treatment proposed in this case proved to be efficient in re-establishing CrossFit® practice to levels prior of injury.

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MAIN ROTATOR CUFF INJURIES AND THEIR THERAPEUTIC APPROACHES

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Introduction and Purpose: The rotator cuff is a group of four muscles and its tendons that surround the shoulder joint, keeping the head of the upper arm bone firmly within the shallow socket of the shoulder. The muscles that constitute the rotator cuff are — supraspinatus, infraspinatus, teres minor and subscapularis. The rotator cuff plays a critical role in the stabilization of the glenohumeral joint, acting in an antagonistic way to the excessive translocations of the humeral head. In addition, infraspinatus and teres minor produce the external rotation of the humerus, which occurs during normal arm lift. Shoulder pain, a common clinic complaint among the general population, is often a frequent symptom in patients with lesions in the muscles of the rotator cuff, which is usually originated from tension overload or extensive exaggerated movements. Injuries to the joint complex of the shoulder happen relatively frequently in sports that require repeated movements above the head and at high a speed, such as volleyball and swimming. Based on this, the present study will show the most common injuries caused to the rotator cuff and its options of treatments.

Material and Methods: A non-systematic review was performed on the main rotator cuff injuries and their treatments. The bibliographic search portals used were: SciELO, sbrate and Lilacs. Were selected 12 articles about rotator cuff lesions and 2 anatomy books. The selected articles obeyed inclusion criteria that sought to quantify the lesions in each modality.

Results: Batalha et al exposed that the group of swimmers, when compared to the control group, presented a greater muscular imbalance in the articulation of the shoulder, therefore, a greater risk of injury. Souza et al, in the same context, found out that the swimmers who take part in competitions present greater aggression to the rotator cuff muscles than the ones who practice recreational swimming. Besides, 62% of the competitors reported shoulder pain. Mendonça et al, in their study on the isokinetics of shoulder rotators in volleyball athletes, discovered that players with higher training intensity, who repeatedly perform the cut movement, can further injure the rotator cuff. Regarding the treatment, Ramos et al found that surgical treatment is the most effective for the rotator cuff lesions in patients who perform intense physical activity and Malone et al exposed that the conservative treatment of complete ruptures of the rotator cuff can be useful in sedentary people.

Discussion: The following results found in this work on rotator cuff injuries confirm the idea that sports with a high degree of rotation demand of the upper limb make the rotator cuff group more vulnerable to injuries and wear. In different studies, Batalha et al and Souza et al agree that swimming practitioners turned to sports competition when compared, respectively, to a control group and a group of recreational swimmers, present a notoriously greater degree of involvement of the rotator cuff. Similarly, the intensity of the movements in volleyball also proved capable of injuring the cuff muscles. The arthroscopic repair of extensive rotator cuff injuries leded to satisfactory outcomes for most of the patients, with a high satisfaction degree and the conservative treatment proved to be useful for sedentary patients.

Conclusion: In conclusion, it is exposed the great impact of high intensity sports to the four muscles of the rotator cuff. Several clinical trials have demonstrated significant positive effects of shoulder exercises in alleviating shoulder impingement symptoms, but surgery is the most effective treatment for patients who intend in continue their physical activities after lesions.

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OSTEONECROSIS OF THE FEMORAL HEAD AND SPORTS MICROTRAUMA: IS THERE A CORRELATION? - CASE REPORT

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Introduction and Purpose: Osteonecrosis of the femoral head is a disease whose pathogenesis has not well defined yet, with progression to femoral head collapse and destruction of the hip joint. Among the defined risk factors, there are ischemia (rupture or vascular compression, vasoconstriction, thrombus), direct cell toxicity or altered differentiation of mesenchymal stem cells. Ischemia may be related to several causal factors, such as thrombophilia, embolization, use of corticoids, alcohol abuse or direct trauma. In this report, we present a case of femoral head osteonecrosis in a competitive fighter and discuss a possible relation between the diagnosis and sports activity.

Material and Methods: Case report and literature review.

Results: MARS, 44 years old, male, muay thai and jiu jitsu fighter, starts attending at the Sports Medicine outpatient clinic for complaints of groin pain began eight months before. This symptom started abruptly and intensely at the end of a high volume frontal kick training. By his own decision, the patient performed one month resting, but the symptoms recurred when he returned to the activity, with intensity that was limiting the training. He presented pain mainly in the frontal and lateral kicking movement. On physical examination, he presented pain poorly located in the inguinal region, deep, in the hip flexion movement. Palpation of the iliopectineal topography was painful, as the palpation of the inguinal canal. There were no palpable hernias. The Thomas test was negative, either the FADIR and FABERE tests. It was considered the possibility of iliopectineal muscle injury and started physiotherapy for rehabilitation, but since the clinical condition was not completely convincing, it was requested MRI of the hip, which demonstrated osteonecrosis of the femoral head. The patient denied the presence of risk factors such as smoking, alcoholism, use of illicit drugs, use of corticosteroids and family diseases. Extensive laboratory investigation was performed for coagulopathies and rheumatologic pathologies, completely negative.

Discussion: Previous review suggested that the cartilage of the anterosuperior surface of the femoral head would be very suggestive to damage by overload, and could evolve with occlusion of its vessels. There are some experimental bases for this theory, substantiated on studies with animal models, in which intentional overload in the femoral head increased the chance of osteonecrosis in rats and rabbits. Reviewing data from human studies, we observed a series of three cases of girls engaged in high-demanding sports with femoral head osteonecrosis, in which the authors mention the possibility of the etiology relating to the repetitive sports microtrauma inherent to the physical activities practiced. Another study presents a review of 120 cases of girls diagnosed with Legg-Calvé-Perthes Disease, in which there was a high association with competitive artistic gymnastics in the patients presenting symptoms after 10 years. There are also reports of capitata, semilunar and scaphoid osteonecrosis in children practicing competitive sports. Although there is no solid evidence of this association in adult individuals, considering current knowledge about the pathophysiology of the disease and the sparse evidence in children, it seems reasonable to consider that competitive sports practice and its inherent repetitive microtrauma may contribute to the pathogenesis of femoral head osteonecrosis in a subgroup of adult patients.

Conclusion: There is a possible theoretical relation between competitive sports practice and femoral head osteonecrosis, but at present moment there is no solid evidence to support this.

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VO₂MAX PROFILE BY PLAY POSITION IN FEMALE MEXICAN PROFESSIONAL SOCCER PLAYERS

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Introduction and Purpose: Soccer is the most popular sport in the world, wherein physiological and biomechanical requirements and technical-tactical skills are needed to satisfy optimal game demands. The maximum oxygen consumption (VO₂max) is considered the gold standard of aerobic capacity measurement and is an important indicator of performance in soccer. Higher levels of aerobic capacity provides a player with greater participation during a soccer match. Due to the importance of aerobic system's contribution on the production of energy during a soccer match, aerobic evaluations through the measurement of VO₂max becomes an important variable in the sport performance. Although most of the evidence in soccer is described in male population, the participation of women in this sport is increasingly high, with an increase in the number of studies focused on injuries, physical load during training and games, physical capacity and sports performance. Nowadays women's soccer has more than 29 million players, which corresponds about 10% of the total number of soccer players worldwide. Recently, professional women's soccer league has been implemented in Mexico, therefore there are no established benchmarks and data of soccer performance for Mexican female players. The purpose of this study was to determine VO₂max of a sample of Mexican professional female soccer team and compare the measurements among play positions.

Material and Methods: Forty three female professional soccer players participated in the study. Informed consents were signed. Athletes were divided according to their play position into four groups: Goalkeepers (GK), Defenders (DF), Midfielders (MF) and Forwards (FW). VO₂max was calculated using Pugh's equation [VO₂max (mL . kg⁻¹ . min⁻¹) = 3.656 (speed in km) - 3.99] and Kinderman protocol during a maximal graduated exercise test. The Statistical Package for Social Science (SPSS 20.0, Illinois, USA) was used for the following analyses. VO₂max comparisons were made using a one-way ANOVA analysis with Bonferroni sequential correction for multiple comparisons.

Results: The average VO₂max (mL . kg⁻¹ . min⁻¹) was 49.89 ± 2.18 in the total of the players. GK's VO₂max = 49.29 ± 2.14 mL . kg⁻¹ . min⁻¹, DF's VO₂max = 49.72 ± 2.15 mL . kg⁻¹ . min⁻¹, MF's VO₂max = 50.95 ± 2.19 mL . kg⁻¹ . min⁻¹ and FW's VO₂max = 49.01 ± 2.18 mL . kg⁻¹ . min⁻¹. No significant VO₂max differences were found among evaluated players (p= 0.177).

Discussion: There are currently no reference data on the special characteristics of Mexican professional female soccer players, both global and by position. Most of the available evidence in soccer is described in male population, but due to the high participation of women in this sport, there is an increase number of studies focused on physiology of female soccer along with injuries, sports performance and physical tests. Of the results obtained in the present study, although the VO₂max is within the parameters reported worldwide, they are in the lower limit. There is no significant differences in the values of VO₂max per position in the field. It is striking the homogeneity of values between positions, which could indicate lack of personalized training per play position.

Conclusion: Despite no significant VO₂max differences were found in female Mexican professional soccer players in the different positions evaluated, it is necessary to maintain or even increase this values for a better sports performance. Furthermore, it will be necessary to continue measuring VO₂max parameters and continue evaluating this type of athletes, as well as increasing the sample size.

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MOST PREVALENT MEDICAL DEMANDS IN ARTISTIC SWIMMING ATHLETES AT A MULTI-SPORT CLUB IN SÃO PAULO – BRAZIL

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Introduction and Purpose: Synchronized swimming is a unique aquatic sport that combines endurance, flexibility, strength, power, acrobatic skill, and performance skills. It has important static and dynamic component characteristics, but the literature still lacks objective data about the most prevalent clinical and orthopedic demands, especially the incidence of injuries. The objective of the present study is to report the most prevalent injuries diagnosed in a sports medicine first aid post, which attend the athletes of the artistic swimming of a sports club of São Paulo – Brazil.

Material and Methods: We analyzed all the records of medical consultations during a year of attendance in a multisport medical club, which has a first aid post functioning every day during all the training schedules of the athletes of the artistic swimming, supposedly attending all the interferences.

Results: Doctors attended 11 female athletes, with the mean age of 14,8, all of them practicing 10 or more hours of training per week. While some of them went to the doctor as soon as they got hurt, others appeared at the ambulatory after 1, 30 or 60 days – average time of 8,36 days. Eight of the eleven consultants were orthopedic complaints: one low back pain, four muscle spasm, one nose fracture, one glenohumeral dislocation and one 5th metatarsal fracture. The other three were clinical complaints: one depressive mood – part of the RED-S (Relative Energy Deficiency Syndrome) – one episode of migraine and one viral conjunctivitis.

Discussion: The components of an artistic swimmer's training include aerobic and anaerobic fitness, strength, power, endurance, flexibility, sport specific skill perfection, artistic expression, and performance skill. Balancing these components to maximize output without producing overuse injuries is a major task for all National Team coaches, in consultation and conjunction with their respective sport science specialists. Artistic swimming was once thought of as a noncontact sport, where its injuries were acquired from either outside the sport or from repetitive chronic overuse injuries. With the recent advances in high-risk boosts and throws, there is an increase in the incidence of traumatic injuries. To throw or support the athlete above the water, the teammates closely stack under the water, thereby increasing the potential for acute hematomas, contusions, sprains, disc herniations, and fractures. The International Olympic Committee at the 2008 Beijing Olympic Games completed an injury prevalence study, which found injury incidence for artistic swimming was 1.9% in comparison with the overall injury incidence for all athletes at the Games of 9.6% (8). The three most common musculoskeletal overuse injuries encountered in clinical practice among elite and recreational synchronized swimmers are shoulder instability problems, lumbar strains, and patellofemoral syndrome. In addition to the musculoskeletal injuries listed previously, there are also specific medical issues that are common, although not exclusive, to synchronized swimmers: hypoxia, eating disorders, female athlete triad, iron deficiency anemia and otitis Externa and Dermatitis. It's not this study's goal to explain clinical disorders, so these will not be detailed for now.

Conclusion: Artistic swimming is a complex, physically demanding sport. There is opportunity for involvement in program development and in the treatment of medical illness and injury. There is also great potential for clinical research in artistic swimming because of the paucity of published literature. Although this study may not show many similarities between the injuries attended and those described in literature, probably related to the small number of athletes and queries, it's an incipient study that may be continued later and provide more data about the theme.

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RELATIONSHIP BETWEEN DETERMINED CARDIORESPIRATORY VARIABLES IN ERGOSPIROMETRIC TEST AND STRENGTH INTENSITY OF A SESSION OF ZUMBA®

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Introduction and Purpose: The present study had as objective to analyze the relationship between the cardiorespiratory variables in ergospirometric test and the intensity of effort of a session of Zumba®.

Material and Methods: The research was composed of a sample of 08 individuals, male, physically active (age: 22,12 ± 2,85 years old, weight: 72,66 ± 7,83 kg and height: 178,12 ± 7,79 cm). The volunteers were submitted to the physical tests separated in two visits: a) ergospirometric evaluation in treadmill to determine the variables related to the capacity (LV1 e LV2) and aerobic power (VO2max); b) performed a Zumba® class (session), where the heart rate was monitored during the session for later comparison with the variables determined in the ergospirometric test.

Results: The found results show that the heart rate averages determined at the end of each song did not differ during the class, the only difference found was in relation to resting heart rate; a HR-average of a Zumba® session was statistically lower than the other HRs determined in the ergospirometric test and that the HRmax determined in the test was statistically higher than HR-peak of the Zumba® and HR-LV1 classes, and found a negative correlation between mean HR of the Zumba class and vVO2max.

Discussion: A negative correlation was also observed between the peak HR of the Zumba class with vVO2max and the velocity associated with LV2, respectively.

Conclusion: Based on these data, it is concluded that a Zumba® session, although it can achieve moderate to high intensity in specific moments, can usually be characterized as low intensity and may result in few cardiovascular adaptations.

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EPICARDIAL FAT NECROSIS, A CASE REPORT

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Introduction and Purpose: Epicardial Fat Necrosis (EFN) is a benign and self-limited condition, with less than 50 cases in the literature, and still has uncertain pathophysiology. Its typical presentation is the sudden onset of pleuritic pain and the diagnosis is due to the typical Computed Tomography (CT) scan and, in some cases, paracardiac opacification can be observed in the common radiography. 1,2,3 **Objective:** to present a case of EFN in a 48-year-old woman athlete, started after physical exercise, and to approach the topic with updated information from the medical literature.

Material and Methods: We collected the data from the medical records in the emergency department, as well we reviewed the existing medical literature about the subject.

Results: A 48-year-old amateur street runner (half-marathon) was admitted to the tertiary care prompt service due to a 24-hour chest pain, worsening with inspiration and lateral decubitus, initiated 30 min after anaerobic activity of high intensity, without nausea, pallor or sweating. There was a regular rate and rhythm without any murmurs and the following vital signs: BP 130 X 80 mm Hg, HR 80 bpm. At baseline, the patient had normal electrocardiogram (figure 1) and cardiac enzymes in physiological limits. She was submitted to an echocardiogram that was normal and Thorax CT (figures 2) showed densification of anterior mediastinal adipose planes to the right, with areas of fat that may be associated with EFN.

Discussion: EFN was first reported in 1957 by Jackson et al.1 and subsequent reports have shown that the disease is self-limiting and benign.4 It has uncertain pathophysiology and some authors propose the torsion of a vascular pedicle as the main determinant of its condition. 2-3 Furthermore, it was assumed that strength or weight lifting could cause sudden changes in intravascular pressure associated with the Valsalva maneuver, causing hemorrhage in the adipose tissue weakly attached to the pericardium, pathophysiology that is included in the presented clinical case, since the patient underwent physical strength training moments before the onset of the pain.4 Acute pleuritic chest pain that may be associated with vertigo, syncope, dyspnea, tachycardia, or sweating with a normal physical examination is the most common clinical presentation. The clinical picture lasts a few days but may persist for weeks and recur in intermittent episodes. Laboratory exams such as total CK, CK-MB and troponin, as well as D-Dimer and cardiological exams, such as electrocardiogram or echocardiogram, are classically normal and may rarely present findings suggesting the presence of pericarditis in the resolution. Treatment became conservative and symptomatic after the first case of this successful treatment as early as 2005.3 On chest CT, the typical finding is a rounded encapsulated lesion containing fat, filaments in light or pronounced epicardial fat. Pericardial thickening and ipsilateral pleural effusion may also be present. When faced with a compatible clinical picture and having ruled out other causes, these findings should lead physicians to consider necrosis of epicardial fat as the cause of pain.8

Conclusion: EFN is probably a condition that may be related to physical effort representing an important differential diagnosis of chest pain in athletes and amateur athletes. The literature data supports the conservative conduct with the prescription of symptomatic medications and follow-up of based on the evolution of the symptoms. Our patient presented clinical improvement with symptomatic medications and resolution of the condition within a few days.

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EVALUATION OF THE CARDIORESPIRATORY CAPACITY OF BOYS AND GIRLS OF PRIMARY EDUCATION IN THE CITY OF GRÃO PARÁ - SANTA CATARINA

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Introduction and Purpose: The evolution of technology has diminished to the practice of activities, including in people's free time. Studies show that the relationship between the risk of incidence of chronic degenerative diseases and lack of movement is positive. Nowadays even leisure has become sedentary. We rarely see children gathered running or playing ball in the corners, what we have seen are hours in front of computers and electronic games. The lack of regular exercise has led to an exponential increase in overweight/obesity, which is now considered a major public health problem, and it is directly linked to the absence of moderate to high intensity activities that improve the capacity of the respiratory system. This study aimed to evaluate the students of the Child Labor Eradication Program (CLEP) who regularly attend school in relation to one of the components of physical fitness related to health: cardiorespiratory fitness.

Material and Methods: This field research had a descriptive character. The sample consisted of 32 children and adolescents between 10 and 15 years old, of the lower middle class, of extremely poor families. The test used was the 20 meter back and forth created by Luc and Lambert (1982), which aims to determine the maximum cardiorespiratory capacity indirectly, through maximum and progressive field test. The data were tabulated and analyzed through basic statistics and classified according to the Human Motricity Manual of the Technical University of Lisbon (FITNESSGRAM).

Results: Among the students who participated in the test, 69% were able to achieve the result proposed by the reference, of these 47% within the healthy physical fitness zone, 13% exceeded the expected level for the age group and 9% are in the critical range. The boys presented more laps than the girls, who in general achieved a result of very low cardiorespiratory fitness. When comparing the results of the girls who practiced some physical activity, with the sedentary ones, it was observed that the physically active ones have better aerobic conditioning. Among the boys this comparison is also true, however in this genre the difference is not significant. Aerobic capacity tends to improve with increasing age.

Discussion: There seems to be a clear difference in this age group between the cardiorespiratory capacity of boys and girls. We can infer that boys being physically more active on a daily basis can have better aerobic physical fitness. The lack of a minimum cardiorespiratory capacity for 31% of the population investigated is worrisome. There is clearly a need for greater stimulation of this population to practice regular physical exercises, especially with bias directed towards the prevention of chronic diseases in the future. As expected, those who practiced regular physical exercises showed a better pattern of cardiorespiratory fitness, which leads us to believe that aerobic performance can be improved by exercising since adolescence and still has the chance to create such an important routine for life adult.

Conclusion: These results suggest the immediate need for an improvement in the aerobic capacity of schoolchildren, especially the stimulation in the school environment, as well as alert for health professionals the importance of stimulating active lifestyles from childhood to reduce the comorbidities of aging, and cardiorespiratory capacity is a fundamental aptitude for a healthy life.

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CORRELATION BETWEEN ANXIETY/DEPRESSION LEVEL, AEROBIC CAPACITY AND RECOVERY OF HEART RATE IN SUBJECTS UNDERGOING CARDIOPULMONARY TEST

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Introduction and Purpose: The role of physical exercise in improving symptoms of anxiety and depression (AeD) is already well known. However, less is known about the magnitude of AeD symptoms and cardiorespiratory fitness parameters as% of maximal VO₂ (% VO₂) and post-effort heart rate recovery (RFC). Objectives: To correlate a score and AeD with VO₂ and RFC in submitted to the cardiopulmonary test (TCP).

Material and Methods: Cohort of patients undergoing maximum TCP ($R > 1.05$). Only patients with sinus rhythm, normal systolic function, without beta-blockers and no chronotropic deficit were included in the study. Before the test, auto patients completed the Portuguese version of the HAD Scale for evaluation of AeD symptoms. Data were categorized according to the result in three groups (G): G1: Improbable ($n = 11$); G2: Possible ($n = 5$); G3: Probable ($n = 14$). The mean of the VO₂% and the RFC in the first (RFC1), second (RFC2) and in the fifth minute (RFC5) passive recovery was compared between the groups. In addition, the correlation between the score and the% VO₂ and RFC values was performed.

Results: Thirty patients (age 46.7 ± 10 years, 63.6% men) were evaluated. The% VO₂ was $115 \pm 26\%$; $92 \pm 11\%$ and $79 \pm 21\%$, respectively, for G1, G2 and G3 ($p = 0.002$). Bonferroni's post hoc analysis shows that the difference is effectively between G1 and G3 ($p = 0.001$). Already the RFC1 was 27 ± 9 ; 25.4 ± 8 and 20.2 ± 9 bpm, respectively, for G1, G2 and G3 ($p = 0.14$). RFC2 was 53.2 ± 12 ; 45.4 ± 13 and 42.8 ± 15 bpm, respectively, for G1, G2 and G3 ($p = 0.2$). RFC5 was 71.7 ± 16 ; 60.6 ± 11 and 61.9 ± 15 bpm, respectively, for G1, G2 and G3 ($p = 0.2$). Only% VO₂ correlated with the value of the obtained score ($r = 0.567$, $p = 0.001$).

Discussion: AeD is one of the most complex problems in this social medical interface. Treated as a lesser evil for a long time ("do not worry, it's just anxiety!") Its association with other health problems are increasingly being punctuated. The intolerance to exercise thus the difficulty of staying in physical fitness programs due to courtship of AeD. On the other hand, evidence of the clinical benefit of exercise programs for patients with AeD is numerous.

Conclusion: In this small sample, AeD symptoms were related only to the% VO₂ maximum obtained and not to the autonomic response of the HR in the recovery.

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KINETICS OF VO₂ AND VCO₂ DURING A CARDIAC REHABILITATION PROGRAM

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Introduction and Purpose: Cardiac rehabilitation programs (CRHP) based on programmed exercises improve the functional capacity, survival and quality of life of patients with heart failure. Prior to the start of the CRHP it is important to know the working capacity of the patient, but it is also essential to know the physiological behavior during the CRHP sessions. This can provide objective data to correctly prescribe the exercise and monitor the effectiveness of the program. The aim was to study the behavior of oxygen consumption (VO₂) and the production of carbon dioxide (VCO₂) in a CRHP session of patients with dilated cardiomyopathy (DCMP).

Material and Methods: The design was observational, cross sectional and its level of analysis was analytical relational. The sample consisted of 10 male patients with DCMP, with moderate to severe impairment of left ventricular systolic, evaluated in the city of Morón, Buenos Aires during 2018. An initial assessment was made by a maximum ergometric test and then each patient was evaluated during a session of the CRHP. The maximum oxygen consumption (VO₂max) was evaluated by means of a portable gas analyzer Medgraphics® VO₂2000. The test was incremental in treadmill using the modified Bruce protocol. The CRHP session consisted of a warm-up on a fixed bicycle with increasing load. Then, exercises were carried out in a circuit with an interval type methodology (step, minitramp, stairs). The muscle strength was worked with dumbbells for biceps and shoulders, quadriceps on a stretcher and dorsal in machine. VO₂max (ml/kg/min) and VCO₂ (ml/kg/min) were evaluated and the respiratory exchange rate (RER) was calculated. The study respected Resolution 1480/11 of the Ministry of Public Health of Argentina: Guide for Investigations with Human Beings. Informed consent was requested.

Results: Age (years) 57.4 ± 14.6 , Weight (Kg) 91.4 ± 22.2 , Height (cm) 168.1 ± 6.2 , Relative VO₂max (ml/kg/min) 21.8 ± 7.3 , RER 1.05 ± 0.09 , Ventilated Volume 65.7 ± 18.5 , Heart rate (in VO₂max) 127.8 ± 23.8 . The CRHP session lasted (min) 37.5 ± 10 , and the VO₂peak was 14.6 ± 3 which represents 69.9 ± 16.7 of the VO₂max. The correlation analysis was performed obtaining the coefficient (Pearson) between: VO₂max and time in RC with VO₂ <50% VO₂max (min) = 0.662 ($p = 0.037$), VO₂peak in CRHP and time in RER between 0.85-1 (min) = 0.787 ($P = 0.007$).

Discussion: Patients with chronic heart failure usually have low VO₂peak values, less than 25 ml/kg/min and those with moderate or severe left ventricular dysfunction may have lower values. In this study it is observed that the VO₂max of a group of this type of patients is positively correlated with the variable time of CRHP with VO₂ <50% VO₂max, implying that when the VO₂max increases also does the minutes that patients exercised in the session at a level less than 50% of VO₂max. The patients with better fitness exercised in low intensity zone. On the other hand, the variable VO₂peak in CRHP is positively correlated with the variable time of session of CRHP with a RER between 0.85-1, that is with substrate use between 50 and 100% of carbohydrates, or where it begins to lose the prominence of free fatty acids as the main fuel. It implies that increasing the effort increases the minutes when you are at a moderate intensity. Talk about the need for the patient to exercise at the right intensity in the session.

Conclusion: Patients with chronic heart failure and limited VO₂peak can benefit from an exercise program. But this therapeutic opportunity must be optimized in terms of its planning to achieve a correct prescription of intensity, volume and frequency. As with a drug, little can be innocuous and a lot can be counterproductive. Exercise prescription needs adequate knowledge to be effective.

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PREVALENCE OF THE FEMOROACETABULAR IMPINGEMENT IN PROFESSIONAL SOCCER PLAYERS**Autores:** MATHEUS, D L R, Canali, J, Pedrinelli, A, Dorileo, C G, Hernandez, A J, Almeida, A M**Instituições:** Universidade de São Paulo - São Paulo - Sao Paulo - Brasil

Introduction and Purpose: Femoro-Acetabular Impingement (FAI) is a bone morphological variation in the coxofemoral joint that causes a collision between the femoral neck and the acetabulum, which may be a cause of one of the most frequent complaints of soccer players, pubalgia. This abnormal contact between the femoral head and the acetabular border is observed in approximately 20% of the population and, by itself, is not considered a pathology, but is a risk factor for osteoarthritis of the hip. There are three types of FAI: cam, pincer and mixed. The cam type deformity refers to the morphological alteration of the femoral neck caused by the increase of this region resulting in friction at the hip joint mainly during flexion. Pincer-like deformation occurs when there is excessive coverage of the femoral head through the acetabulum. A combination of both is more common than any single deformity. In any one of them, trauma caused by repetitive hip flexion damages the articular cartilage of the acetabulum. The present study proposes to analyze the prevalence of femoroacetabular impingement in professional soccer players of the A1, A2 and A3 series of the Paulista championship and to correlate findings of the physical examination with radiographic changes.

Material and Methods: The analysis of medical records of 95 soccer players from the A1, A2 and A3 series of the São Paulo championship, who performed their pre-participation evaluations at the Movement Study Laboratory of the Orthopedics and Traumatology Institute of HCFMUSP in the months of November and December of 2017. In the pre - participation evaluation routine, the athletes underwent clinical evaluation and those who presented alterations to the physical - pain examination and / or limitation of the internal and / or external rotation of the hip performed X - ray in the anteroposterior areas of the basin, Dunn profile and false profile of Lequesne to attest to the presence or not of the FAI. This review of medical records aimed to analyze the presence or not of IFA in athletes and also if there is radiographic alteration compatible with FAI in the patients who had alteration in the clinical examination. Athletes with acetabular alteration (Pincer), femoral neck (Cam) or with both changes to hip radiography will be considered with the diagnosis of FAI. Those charts that do not contain all the information required by the study (altered clinical examination and hip radiography) were excluded from the study.

Results: Among the 95 players evaluate (mean of age is 25 years and 8 months \pm 4 years and 2 months, weight is 77,71kg \pm 7,67kg and height 1,80m \pm 0,06m) we obtained six athletes with alteration to physical examination (6%). Of these six alterations in the physical examination, we obtained four athletes (4% of total sample) with movement restriction (being between 10-25deg in internal rotation) and two (2%) with rotation pain (just availed if have or not pain), all of them related to internal rotation assessed by manual test (knee and hip in 90-degree flexion, performing internal and external rotation evaluating the range of motion and the presence or not of pain, comparing to the contralateral limb). Still, five of the six athletes had hip X-Ray changes with presence of FAI. The mean age of the players with hip changes was 25 years and 9 months. The present study is descriptive, so, no statistics were applied.

Discussion: The prevalence of FAI found in this study was 5.2%, which is similar to that of other studies, which revolve around 6%, showing the importance of valuing a clinical examination.

Conclusion: The concordance between the alteration of the clinical examination and the radiological finding compatible with FAI in 83% of these athletes shows the importance of valuing a clinical examination, and with that, to identify at an early stage those who can benefit from preventive measures avoiding future complications that performance and health of players.

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DO AS I SAY, DO AS I DO! ASSOCIATION BETWEEN EXERCISE WEEKLY LOAD AND THE RECOMMENDATIONS FOR FIGHTING INACTIVITY**Autores:** DOMECC, F S L V, MEIRA, D T

Introduction and Purpose: The World Health Organization (WHO) recommends as a weekly "target dose" 150 minutes of moderate or 75 minutes of intense exercise. Public health policies have prioritized the practice of exercise as a strategy for disease prevention and health promotion, with health professionals as their main promoters. Analyze the interaction between the exercise weekly and the Knowledge of Recommendations to Fight Sedentary Lifestyle (KRFSL) among participants of a cardiology congress.

Material and Methods: Participants in the Congress of Cardiology Society of Rio de Janeiro's State in 2017 were interviewed. The KRFSL was evaluated by asking: "How much weekly physical exercise is recommended by WHO?" The responders were stratified by the declared weekly exercise load. A multivariate logistic model was created to determine independent predictors of KRFSL.

Results: 426 participants were interviewed (45.5% men, median age 31 years, 37.8% were physicians, 65.8% of the physicians were cardiologists). The overall KRFSL level was 44.6%, being 38.1%, 52.7% and 56.6% for non-physicians, non-cardiologists and cardiologists, respectively ($p = 0.002$). Regarding exercise, 21.8% were inactive (IN), 15% were low active(LA), 34.7% were moderately active (MA) and 28.4% were very active (VA). The KRFSL was 30.1%, 42%, 48% and 52.9% respectively for IN, LA, MA and VA ($p < 0.0001$). In the multivariate analysis, be VA (OR = 2.25, IC95%, 1.238 - 4.089), be MA (OR = 1.93, IC 95% 1.105 - 3.39) and be cardiologist (OR = 2.01, IC 95% 1.243 - 3,267) were predictors of KRFSL.

Discussion: In our study, 30.4% of physicians and 38.2% of cardiologists were inactive or minimally active. The results regarding the knowledge of the weekly recommendation of exercise recommended by the WHO among the physicians (55.2%) was very similar to that found by Patra et al. in Indian physicians (51.4%). There was a linear association between the level of physical activity measured by their domains of intensity, frequency and duration and the knowledge of the exercise recommendation. The practice of intense physical activity more than doubled the chance to know the recommendation of weekly exercise, besides being the best predictor of knowledge among the variables studied. In addition, the interaction between being a cardiologist and practicing intense exercises further enhanced the effect, producing a more than 4-fold increase in the chances of knowing the dose of exercise advocated by the WHO. A cross-sectional study carried out within a medical congress and that proposes to evaluate knowledge has an important selection bias, since it theoretically interviews people who are closer to a process of continuing education, that is, outside this environment the lack of knowledge must still be bigger. The heart rate measure, although it was made at the last moment of contact between interviewer and interviewee, did not use the methodology of other studies where the interviewee was 10 minutes ago at rest, which could have led to higher values being found and consequent underestimation of the aerobic condition of the individuals. However, every care was taken in order to obtain the lowest possible value. Still, it can not be said that the mere fact of knowing the recommendation of weekly physical exercise is equal to effectively recommending regular practice of physical exercise for all patients, an attitude expected of a conscious physician. It should be emphasized that the interviewees of this sample were not asked about in what or how many opportunities were recommended or directed by their physicians about physical activity.

Conclusion: There was a linear association between exercise load and KRFSL. Policies to stimulate the practice of exercise among health professionals can positively impact campaigns for reducing sedentary lifestyle in the general population.

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EXERCISE MAY DECREASE SYNCOPE SECONDARY TO POSTURAL CHANGE IN FEMALES WITH RA: PILOT STUDY**Autores:** Rensburg, P C J v, Ker, P J, Grant, D C, Fletcher, D L**Instituições:** University of Pretoria, África do Sul.

Introduction and Purpose: The autonomic nervous system (ANS) regulates the heart rate via sympathetic and parasympathetic influences. Literature has shown that rheumatoid arthritis (RA) patients suffer from autonomic dysfunction. This may consequently lead to syncope with possible falls after posture change i.e. rising from supine to the standing position. Previous research has shown general improvement of the ANS after exercise, but not in specific relation with posture change. HRV represents the changes in instantaneous heart rate over a segment or the full length of an RR interval recording (tachogram), as controlled by the sympathetic and parasympathetic branches of the autonomic nervous system (ANS). In this respect HRV analysis is used as a non-invasive indicator of ANS function and window on the clinical or training status of patients and athletes. To determine the effect of exercise on posture change (supine to standing position) in females with RA as measured by short-term heart rate variability (ANS function).

Material and Methods: Patients with confirmed RA were randomly selected to a control group (RAC) or an exercise group (RAE). The RAE group (n=19) trained two to three times per week under supervision. The RAC group (n=18) continued with their current sedentary lifestyle. The medium intensity exercise programme lasted for 12 weeks. No change in medication was allowed during this time. ANS function and balance were determined by quantification of the variability of the inter-beat interval detected with the Polar 810i heart rate monitor system. Frequency domain analyses were used for quantification, including Low frequency power (LF) – indicating mainly sympathetic influence, High frequency power (HF) – indicating parasympathetic influence, and LF/HF – indicator of autonomic balance.

Results: The two groups matched regarding baseline demographic data (age, sex, disease activity, disease duration). Due to small sample sizes and variables not following a normal distribution, non-parametric Mann Whitney U analyses were performed on the heart rate variability parameters. Comparing posture change (i.e. standing value minus supine value) from pre- to post intervention, all frequency domain parameters changed as anticipated (i.e. vagal withdrawal and increased sympathetic influence) for the RAE group. For the RAC group the measurements deteriorated. • Low frequency power (LF in ms²): RAE -1.03 to 22.03 (stronger sympathetic influence); RAC 43.45 to -31.21 (weaker sympathetic influence) • High frequency power (HF in ms²): RAE -24.03 to -33.34 (better vagal withdrawal); RAC -191.7 to -114.1 (less vagal withdrawal) • LF/HF: RAE 10.57 to 15.04; RAC 2.9 to 7.6

Discussion: Participants in the exercise group (RAE) showed increased responsiveness (indicated by increased sympathetic activity and vagal withdrawal) to the orthostatic challenge. These results can be explained by the fact that the maintenance of blood pressure in standing up from the supine position is dependent on increased sympathetic activity and vagal withdrawal, while the supine position is marked by vagal activation with sympathetic withdrawal.

Conclusion: From these preliminary results it appear that exercise may indeed improve autonomic function in RA patients, in such a way that posture change will not be an added burden for falls in an already otherwise compromised population.

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DIFFERENT PROTOCOLS OF RESISTANCE TRAINING PROMOTE INCREASE OF STRENGTH WITHOUT CARDIAC AND SKELETAL MORPHOLOGY ADAPTATIONS**Autores:** Leopoldo, A P L, Damiani, A P L, Caldas, L C, Melo, A B, Contreiro, C D, Estevam, W M, Nogueira, B V, Ferreira, L G, Leopoldo, A S**Instituições:** Universidade Federal do Espírito Santo - Vitória - Espírito Santo - Brasil

Introduction and Purpose: Chronic physical training is a useful tool to promote cardiac and musculoskeletal adaptations. These adaptations occur progressively as the training is performed systematically and regularly, a condition that contributes to the improvement of performance. Among the types of training, resistance training (RT) have been related to increased protein synthesis and cardiac and musculoskeletal muscle hypertrophy. In the myocardium, RT develops morphological adaptations that resulting in the improvement of cardiac contractility. In addition, there is an improvement in functional capacity at musculoskeletal, as well as the damage caused by aging, such as sarcopenia. However, the effectiveness of this training modality on the cardiac and skeletal systems still needs to be clarified. The purpose of study was to investigate the effect of RT protocols on cardiac and skeletal structure and morphology in trained rats.

Material and Methods: Wistar rats (n=28) were randomized into four experimental groups: sedentary animals (C); rats trained by RT protocol developed by Hornberg & Farrar (RT1); rats trained adapted from RT Hornberg & Farrar with 3x/week (RT2) and 4-5 series; rats trained adapted from Hornberg & Farrar RT protocol with 5x/week and 4-5 series of progressive intensities of 50%, 75%, 90% and 100% of the maximum load. If the 4th grade is completed, the animals were submitted to the 5th climb with 100% + 30g. Nutritional profile, cardiac and skeletal morphological analysis, as well as histological evaluation (cross sectional area and collagen) were performed. The level of significance was 5%.

Results: RT protocols did not generate adaptations in cardiac and musculoskeletal structure and morphology in relation to C, nor was it able to reduce body weight and adipose fat pads in animals. However, the RT protocols promoted absolute and relative strength gain, visualized by the greater strength of the trained groups (RT1, RT2 and RT3) when compared to the sedentary group (C), highlighting the functional capacity from different RT protocols, independent of the weekly frequency. Furthermore, RT protocols performed for 9 weeks did not alter the cardiac and musculoskeletal structure and collagen fraction.

Discussion: RT protocols used in the current study did not lead to changes in body adiposity, since no changes were observed in body weight, weight gain, epididymal fat, retroperitoneal and visceral fat pads of adipose tissue, total body fat and adiposity index. In fact, studies with humans using TF, without association of caloric restricted diet prescription, indicate that this tool alone can not promote significant reductions in body weight. After the end of RT training, the groups submitted to the RT presented greater strength gain in relation to the sedentary group as observed in other studies (Damian, 2017). The literature stresses that the force gain is guided by the neural and/or structural adaptations that occur in the musculoskeletal (BARROSO et al., 2005), evidenced by the development of intra and intermuscular coordination with consequent greater recruitment of fibers or still visualized by the increase of the cross-sectional area and quantity of myofibrils. In the literature, it is well recognized that regular physical exercise is able to improve muscular strength and physical fitness, resulting in improved functional capacity. Adaptations observed in the myocardium through physical exercise is eccentric and concentric cardiac hypertrophy. However, this physiological adaptation depends on the type of training, duration and intensity of training.

Conclusion: Different RT protocols, regardless of weekly frequency, lead to increased muscle strength without cardiac and skeletal structural adaptations. These findings suggest that the intensity and frequency of different resistance training protocols were not sufficient to generate adaptations in the evaluated tissues.

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HYPERBARIC OXYGEN THERAPY AS TREATMENT FOR BILATERAL ARM COMPARTMENT SYNDROME AFTER CROSSFIT

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Introduction and Purpose: CrossFit is a physical fitness program characterized by sessions that utilize a variety of exercises, from running and rowing to Olympic lifting and gymnastics movements, which currently has many adherents in the physically active population. The workouts are performed at high intensity, quickly, in successive repetitions, with limited or no recovery time. The practice of intense exercise, however, may be associated with serious injuries. Despite the benefits of intense physical fitness programs, there is concern about the rate of injury of its practitioners. We describe the case of a CrossFit practitioner who developed progressive symptoms of rhabdomyolysis and bilateral ACS of the arm, successfully treated with hyperbaric oxygen therapy.

Material and Methods: Along with the case description we developed a narrative review of the medical literature, the PubMed database, using the terms acute compartment syndrome, delayed onset muscle soreness, Crossfit, and hyperbaric oxygen therapy.

Results: A male patient, a 29-year-old lawyer, engages in regular physical activity. He had no history of anabolics use or previous upper limb injuries, and has been practicing CrossFit for six months. He participated in a CrossFit class that included high-intensity movements and many repetitions for upper limbs. He said that he felt fatigue in the upper limbs after the session, without pain. After 24 hours, he noticed the onset of swelling in the arms, combined with discomfort upon extension and a darkening of the urine. After 48 hours, he observed a worsening of the edema, with great pain in extending the elbows. His urine remained dark, without other symptoms.. Test Results - Physical exam: edema in the arms, with pain on palpation; pain in passive extension of the elbows (VAS 9+/10+); range of motion (ROM) in elbow flexion 130, extension -45. Circumferences of the arms (measured at the middle to distal third transition): right (R) = 39.5 cm; left (L) = 39 cm. laboratory tests: myoglobinuria (3+/3+); total creatine kinase (CK) = 40,000 U/L (Ref. -35 to 232 U/L); serum creatinine = 1.1 mg/mL (Ref. 0.8 to 1.2 mg/mL). Imaging exams: radiographs without signs of fractures; magnetic resonance imaging (MRI) of the arms show hypersignal on T2 in the arms

Discussion: Acute compartment syndrome (ACS) in the upper limbs is a rare entity, usually traumatic and related to forearm bone fractures, but it may occur after intense physical exercise. ACS is frequently associated with rhabdomyolysis, which requires immediate treatment due to the risk of severe renal repercussions. The usual treatment of ACS is surgical, through fasciotomy of the affected limb. Aynardi reported a patient with intense pain in both arms after vigorous cross-training, which developed over the course of three days, who was diagnosed with post-exercise rhabdomyolysis plus ACS of the arms, and who underwent surgical treatment with bilateral fasciotomy. Hyperbaric oxygen (HBO2) therapy is a treatment described in the medical literature as an adjunct in cases of compartment syndromes, since the combination of fasciotomy and HBO2 reduces the edema and necrosis of the muscle tissue. There are no descriptions regarding the use of HBO2 as the principal therapy for the treatment of ACS.

Conclusion: ACS in the arms after intense physical exercise is a rare occurrence. However, it should be suspected by practitioners of physical activity who experience intense, disproportionate, and progressive pain. We describe the case of a CrossFit practitioner who, after an intense training session, progressed with rhabdomyolysis and ACS of the arms, successfully treated with primary HBO2, without the need for fasciotomy.

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PRE-WEIGHT DEHYDRATION IN MMA

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Introduction and Purpose: Before MMA, some Wrestling and Boxing athletes (Reljic et al, 2013; Lambert et al, 2010; Smith et al, 2001) found that losing about 5-10% of the usual weight dehydrated quickly, in order to recover the as much as possible in the interval between weighing and fighting, would imply a clear advantage over the opponent (Pettersen et al, 2013;). Today athletes of various fighting modalities lose weight with very restricted diets and dehydration as described in the literature (Reljic et al, 2013, Jetton et al, 2013, Pettersen et al, 2014). It is thought that dehydration as a strategy for RWL is common in MMA (Coswig et al, 2015), but no objective data are available. Knowing better the problem makes it possible to imagine the courses that this sports modality can take with regard to the safety and health of its athletes in the short and long term.

Material and Methods: The research consists of a questionnaire with objective answers applied to MMA athletes who had at least one professional bout. The questions were elaborated in a research site, where a link was generated to the questionnaire in Portuguese and another one in English. The link with the questions was sent by WhatsApp and Facebook to the athletes, starting from a known athlete who linked us to his training partners.

Results: The questionnaire was answered by a total of 80 athletes. The vast majority of them aged between 20 and 35 years. They lose up to 10 kg for weighing that precedes each fight, being an average of 1-3 per year. Of the 10Kg lost part happens via dehydration, and most report loss of up to 10% of body weight via sweating. The most frequent symptoms reported by them were headache and weakness not exceeding 24h period. After the weighing, the recovery happens with water consumption, oral hydration soro, coconut water, isotonic with the sensation described by the athletes of 80-99% recovery, being more than half considered moderate or strong the relationship between recovery and performance.

Discussion: The estimated prevalence of dehydration as a strategy for RWL in MMA athletes is 80 cases of which 100% reported weight loss before each fight, with 90% of them using dehydration. Regarding the symptoms presented during the process, 93% indicated at least one option. World Anti-Doping Agency to date does not include in its avoid list the RWL, this procedure which is widely performed by combat athletes is even quoted in the WADA documents. According to the WADA Code, to be considered as doping the procedure / drug must fit into at least two of the three criteria: (10). • Medical / scientific evidence of substance or method, isolated or combined, leading to performance advantage; • Medical / scientific evidence of substance or method that represents actual or potential health risk to the athlete; • Determination of WADA that uses substance or method that violates the sporting spirit described in the introduction of the code.

Conclusion: Dehydration as a strategy for RWL among MMA athletes has not been studied and discussed by the responsible bodies despite the serious cases of health compromises reported by the athletes. This conduct has not even been discussed by WADA and continues to be practiced on a large scale by fighters around the world. As long as responsible organizations abstain from the responsibility of monitoring their fighters' weight and while there is a gap of many hours between gauging weight and fighting, RWL dehydration will continue to endanger the lives of many athletes.

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COSTAL GRADIENT FRACTURE IN AMATEUR GOLFER: A CASE REPORT

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Introduction and Purpose: Golf has enjoyed increasing popularity. Currently there are approximately 60 million practitioners in more than 32,000 camps around the world. This fact has also increased the demand for medical care due to injuries. Previous studies have generally focused on the clinical aspects of golf-related injuries. A portion of the literature focuses on the traumatic mechanism. Some studies limit their focus to a particular body region. This case report proposes to talk about a costal bow injury related to golf practice in an amateur athlete.

Material and Methods: A descriptive case report T.P.T., female, 36 years old, asian, denied diabetes, hypertension and osteoporosis and did not use medication. Practice Golf 2 times a week, Muay Thai 2 times a week and weight training 3 times a week. The symptoms began in March 2018 and were characterized by pain in the left hemithorax, worsening by coughing, sneezing and supine position. There was a delay for his diagnosis because the pain was not related to trauma, sensation of crepitations and was thus confused with a muscle contraction. The patient made use of anti-inflammatories, analgesics and injectable corticosteroids, but did not interrupt the physical activities and did not obtain improvement of the pain. She searched medical assistance where was made a computed tomography scan of the chest and a fracture of the posterior portion of the 5th, 6th, 7th and 8th ribs on the left was found. After the examination, the patient was submitted to resting an immobilizer for 30 days.

Results: After submission to computed tomography examination, fracture of the posterior portion of the 5th, 6th, 7th and 8th left costal arcs was observed, with no significant misalignment with absence of pulmonary and cardiac alterations.

Discussion: The seriousness of musculoskeletal problems in golf is underlined by the fact that almost one-fourth of reported injuries were major ones causing absence from the golf course for more than 1 month, a fact that might surprise those unfamiliar with the game. Overuse proved to be the most important factor resulting in golf injuries. For back and upper extremity injuries, with the exception of the wrist, overuse was blamed for more than 90% of reported golf injuries. Our results indicate a significant increase in injury prevalence if golfers played 4 or more rounds per week or hit at least 200 range balls per week. These numbers are without a doubt different for every golfer; still, they emphasize the fact that too much golf does result in more injuries. Golfers can also suffer thoracic back pain from stress fractures of the ribs. In one study, 18 cases occurred in novice golfers (average length of play, 8 weeks). All fractures were on the posterolateral aspect of the ribs, and most involved the fourth to the sixth ribs. Fifteen were on the golfer's leading side, 3 on the trailing side, and 1 was bilateral. Weakness in the serratus anterior muscle on the leading side is believed to cause muscle fatigue that eventually leads to stress fracture. This injury can be related to a dramatic increase of playing and/or practice times, but may also be due to the constant activation of the (leading) serratus anterior muscle, producing extra stress to the ribs and possibly leading to fracture. This is certainly plausible, since the leading serratus anterior is nearly constantly active throughout the golf swing and thus may be subject to fatigue producing extra stress to the ribs and possibly leading to fracture. Diagnosis is relatively straightforward, with either plain radiographs or a bone scan. Treatment is similar to other stress fractures, including relative rest, NSAIDs, and scapular muscle rehabilitation.

Conclusion: The exposed case report suggests that the practitioner was not prepared to prevent injuries. Among the golf injury prevention practices can be mentioned the development of the swing technique, this act decreases the tension.

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SPIRULINA PLATENSIS PREVENTS CHANGES IN UTERINE REACTIVITY INDUCED BY STRENGTH TRAINING IN RAT

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Introduction and Purpose: Strength training induces ischemia/reperfusion events that may be associated with increased production of reactive species, causing oxidative stress that damages cell membrane and macromolecules and has been related to problems in the female reproductive system, such as alterations in the menstrual cycle, endometriosis, polyps and abortion. In this context, *Spirulina platensis* (SP), an algae with antioxidant potential, promoted beneficial effects on rat aorta, reversed the damage on the contractile reactivity of rat ileum and prevented damage on erectile function. Thus, the aim was to evaluate a possible protective effect of SP on exercise induced changes in contraction reactivity of rat uterus.

Material and Methods: Virgin female Wistar rats (150-250 g) were divided into control group (CG), trained (TG) and trained and orally supplemented with SP lyophilized powder dissolved in saline solution (NaCl 0.9%) at doses of 50 (TG50) and 100 mg/kg (TG100). After a week of adaptation to strength training, rats underwent for eight weeks of a progressive strength training (ST) and were orally supplemented with SP. CG was not submitted to an exercise program and supplementation, only acclimation, which were wet at the same place that the exercised animals. Twenty four hours prior to eutanásia (48 h after the last session of exercise), they were administered with diethylstilbestrol (1 mg/kg, s.c.) for estrus induction. Then, uterus was removed and monitored for muscle reactivity. Results were expressed as the mean and standard error of the mean (S.E.M.) and analyzed by one way ANOVA followed by Tukey's post-test ($p < 0.05$). All procedures were approved by the Ethical Committee on Animal Use/UFPA (0211/14).

Results: strength training increased the contractile efficacy and reduced the potency of KCl ($E_{max} = 172.7 \pm 8.1\%$; $pEC_{50} = 1.0 \pm 0.03$) compared to CG ($E_{max} = 100.0$; $pEC_{50} = 2.0 \pm 0.07$). The supplementation with SP in TG50 ($E_{max} = 83.8 \pm 8.8\%$; $pEC_{50} = 1.6 \pm 0.04$) and TG100 ($E_{max} = 119.7 \pm 9.2\%$; $pEC_{50} = 2.1 \pm 0.05$) prevented the increase of efficacy and reduction of the potency of KCl. Similarly, the exercise increased the contractile efficacy and reduced the potency of oxytocin ($E_{max} = 202.0 \pm 21.0\%$; $pEC_{50} = 1.0 \pm 0.03$), compared to CG ($E_{max} = 100.0$; $pEC_{50} = 3.4 \pm 0.1$) and the supplementation in TG50 ($E_{max} = 181.0 \pm 11.2\%$; $pEC_{50} = 3.5 \pm 0.1$) and TG100 ($E_{max} = 177.2 \pm 13.8\%$; $pEC_{50} = 3.6 \pm 0.09$) partially prevented the increase of efficacy and reduction of potency of this agonist.

Discussion: The practice of exercise by women causes a deviation of the cardiac output to the active skeletal muscle and to the skin, causing ischemia in the pelvic region, eventually causing oxidative stress during reperfusion in the recovery period, and the production of reactive oxygen species, mainly the superoxide radical, which increase the contractile reactivity. Moreover, the chronic exercise increases the production of oxytocin and mRNA for oxytocin receptors leading to a greater contractile response of the uterus to this agonist. Thus, these data could explain the alterations in contractile reactivity observed in this study. In addition, food supplementation with SP was effective in preventing exercise-induced changes in the uterus of rats similar to that observed in other organs such as rat ileum, aorta and the corpus cavernosum.

Conclusion: the results demonstrated that the food supplementation with *Spirulina platensis* prevents contractile changes induced by strength training, and can be used to prevent cases associated with uterine muscular dysregulation induced by exercise such as dysmenorrhea, endometriosis and abortion.

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SPORTS DENTISTRY FOR SPORTS PERFORMANCE

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Introduction and Purpose: For us as a practitioner in sports medicine, the goal of our daily working is to, prevent diseases, to treat in short time, and if it's possible without practice losses. The influence between dental occlusion, dental health, and body muscular activities was very important for us and for player's performance. My approach focused on sports dentistry exams and how can we use the clinical information to prevent muscular and articular injury.

Material and Methods: The dental exams need to become a systemic exam in sports medicine. This exam can give us much important information about the player health. In same time, with the analysis of this information we can perform the physical capacities of players. With more than one hundred professional players in my data, I expose to my colleagues the didactic approach to introduce the dental exams in their practice: "how a football physician can analyze the dental record, and what is the benefit for him and for the player"

Results: the same approach is also used in other sports, not only in football. And after using this new clinical and technological analysis, from more than 24 months, we conclude that for more than 60% of the players we can prevent the muscular injuries when we introduce a precise dental record in our precompetitions assessment. For our group of 55 football players. More than 60% need an digital picture records. That's mean they present a dental and occlusal troubles. More than 30% of the group of players need a Cone Beam imaging radiography. This group of athletes present also many no contact muscular injury. What is the relation between dental diseases and muscular injuries.

Discussion: Our clinical approach, permit us to diagnosis the dental origin of the femoro-patella pain syndrome!! isn't true ? yes and we give you the clinical approach to introduce this concept in your daily practice. In same time we show you, a diaporamma of our clinical results and why we believe that sports medicine in team working approach can also serve to winning. For the first time, we present to you our clinical protocol to elaborate a precise diagnosis of dental origin in sports diseases.

Conclusion: The future of sports medicine is in the field of precision medicine, and sports dentistry is one of the more precise medical speciality. After this workshop, I'm sure, my colleagues will change their opinion about the fact that "Sports dentistry contribute also to performance"

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ALTERED RELAXING REACTIVITY OF RAT UTERUS BY STRENGTH TRAINING IS PREVENTED BY FOOD SUPPLEMENTATION WITH SPIRULINA PLATENSIS

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Introduction and Purpose: Physical exercise is employed as a treatment for several diseases and its practice is known to promote a general well-being to the body, modifying homeostasis, generating immediate or late adaptations, including changes in the relaxing reactivity of different organs, as the female reproductive system. *S. platensis* (SP) has been described to produce beneficial effects for health and to prevent alterations in contractility of rat aorta and ileum. Thus, we decided to investigate a possible preventive effect of SP on exercise induced changes in relaxation reactivity of rat uterus.

Material and Methods: Virgin female Wistar rats (150-250 g) were submitted to strength training performed through a jumping program along 8 weeks after a week of adaptation. Rats were euthanized and the uterus removed for evaluation of smooth muscle relaxant reactivity to isoprenaline and nifedipine. The evaluation of relaxing response of uterus was carried out in rats submitted to adaptation period (CG), exercise sessions (TG) and both trained and supplemented with SP lyophilized powder dissolved in saline solution (NaCl 0.9%) for 8 weeks, at 50 (TG50) and 100 mg/kg (TG100). Twenty four hours prior to euthanasia (48 h after exercise), rats were administered with diethylstilbestrol (1 mg/kg, s.c.) for estrus induction. Data were expressed as the mean and standard error of the mean (e.p.m.) and analyzed by one way ANOVA followed by Tukey's post test ($p < 0.05$). All procedures were approved by Ethical Committee on Animal Use of UFPB (CEUA/UFPB 0211/14).

Results: Isoprenaline relaxed rat uterus pre contracted with oxytocin 10-2 IU/mL, in a concentration dependent manner, with the same efficacy in CG ($E_{max} = 100.0\%$), TG ($E_{max} = 100\%$), TG50 ($E_{max} = 100\%$) and TG100 ($E_{max} = 100\%$), but had its potency reduced in the TG ($pEC_{50} = 9.8 \pm 0.3$), compared to CG ($pEC_{50} = 12.2 \pm 0.2$); food supplementation with SP at both doses prevented this reduction ($pEC_{50} = 11.6 \pm 0.3$ and 11.2 ± 0.4). However, there was not any alteration in both the efficacy and potency of nifedipine in TG ($E_{max} = 100.0\%$; $pEC_{50} = 11.0 \pm 0.2$) compared to CG ($E_{max} = 100.0\%$; $pEC_{50} = 10.6 \pm 0.08$). Similarly, nifedipine relaxed rat uterus pre contracted with KCl 60 mM, in a concentration dependent manner, and had not its efficacy altered ($E_{max} = 100.0\%$ for all groups). Additionally, the training did not modified the potency of nifedipine ($pEC_{50} = 11.0 \pm 0.2$); meantime, in TG50 ($pEC_{50} = 8.8 \pm 0.2$) and TG100 ($pEC_{50} = 8.6 \pm 0.2$), its potency was decreased, compared to CG ($pEC_{50} = 10.6 \pm 0.08$).

Discussion: Strength training selectively acts in the pharmacomechanical coupling of relaxation, but not in the electromechanical, indicating a probable negative modulation on β_2 receptors, and SP appears to prevent this process. Additionally, the algae somehow positively modulate voltage sensitive Ca^{2+} channels, which may be related with a possible compensatory mechanism. Furthermore, it is known that intense physical exercise induces events of ischemia and reperfusion, which lead to an increase in the production of reactive oxygen species, mainly the superoxide radical, which increase the contractile reactivity and decrease the relaxing reactivity. Thus, this event could explain the data obtained.

Conclusion: sessions of strength training altered only the pharmacomechanical coupling of uterine relaxation, demonstrating that uterus is a target for alterations, for a short and long term, promoted by strength exercise, while *S. platensis* positively modulate the pharmacomechanical and negatively the electromechanical coupling of uterine relaxation, preventing alterations produced by strength training.

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THE RELATIONSHIP BETWEEN CHANGES OF ORGAN-TISSUE MASS AND SLEEPING ENERGY EXPENDITURE FOLLOWING EXERCISE TRAINING

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Introduction and Purpose: It has been well known that resting energy expenditure (REE) for the whole body is the sum of REE for each organ-tissue in young and middle-aged healthy adults. Moreover, in the case of male college Sumo wrestlers with high REE (i.e. about 2300 kcal/day), this REE can also be attributed to a larger absolute amount of low and high metabolically active tissue including skeletal muscle (SM), liver and kidney. In addition, our recent study demonstrated that aerobic endurance training does not result in a chronic elevation in the organ-tissue metabolic rate (kcal/kg/day) in cases with VO_2peak of approximately 60 ml/min/kg. Based on the previous studies, although it is speculated that REE changes with commensurate gain and the reduction in each organ-tissue metabolic rate (e.g. 13 kcal/kg/day for SM; 440 kcal/kg/day for kidney), it is unclear whether this phenomenon occurs at the present time. Thus, we aimed to assess the relationship between change of organ-tissue mass and sleeping energy expenditure (SEE) following exercise training. Although SEE is generally slightly lower than REE in the lying position, the inter-individual variability in SEE is reported to be small due to the accuracy of using an indirect human calorimeter (IHC) for measurement.

Material and Methods: A total of 16 male college Sumo wrestlers were assigned to 2 groups according to the increase (SEE+; $n = 8$) and decrease (SEE-; $n = 8$) in SEE following exercise training (mean duration between measurements: ~2 years). Magnetic resonance imaging measurements were used to determine the volume of SM, liver and kidney, and IHC was used to determine SEE before and after exercise training.

Results: There was no difference in mean change of subject characteristics, SM mass and liver mass between SEE+ (pre: 2221 ± 99 , post: 2384 ± 177 , difference: 164 ± 131) and SEE- (pre: 2391 ± 206 , post: 2101 ± 164 , difference: -289 ± 199) groups. The change in kidney mass for SEE+ group was significantly different from that in SEE- group. The change in SEE was not significantly correlated with the change in SMM ($r = 0.35$, $p = 0.18$) or liver mass ($r = 0.30$, $p = 0.26$) in all subjects, however, the exercise training-induced change in kidney mass significantly correlated with that in SEE for all subjects ($r = 0.50$, $p < 0.05$).

Discussion: According to the previous studies, it has been revealed that the masses of internal organs, such as the liver and kidney, changed due to diet and exercise. The most recent previous study with a diet and exercise weight-loss intervention found decreases in SM, liver and kidney masses (approximately 1.0 kg, 0.1 kg and 0.01 kg, respectively) after a 6.2 kg weight reduction. Moreover, in a longitudinal study for collegiate male American football players, liver and kidney masses after 1 year of overfeeding and physical training increased by 0.2 kg and 0.04 kg, respectively. Based on the results of previous studies and the present study, internal organ would increase and decrease following exercise training.

Conclusion: These results suggest that the change of kidney mass might be a key factor for a change of SEE following exercise training.

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INFLUENCE OF INTERVALED AEROBIC EXERCISE ON GLYCEMIC RESPONSE IN INDIVIDUALS WITH DIABETES MELLITUS TYPE 1

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Introduction and Purpose: It is indisputable that the practice of physical exercise has great benefits for the general population. With diabetics there is no difference, this practice is also effective in controlling blood glucose and several other risk factors. However, there are not much scientific evidences showing the advantages for patients with Type 1 Diabetes Mellitus (DM1), especially when it comes to interval aerobic exercise. Thus, we decided to investigate the check glycemia behavior in individuals with Diabetes Mellitus (DM) 24 hours after a video game session active (VGA), and to compare the laboratory PBG values with capillary PBG values.

Material and Methods: consists of an experimental study, with the participation of five volunteers of both sexes, aged between 12 and 37 years. These individuals underwent a VGA session (Xbox 360°), in which they played three types of games (River Rush, Reflex Ridge and Rallyball), with different characteristics and levels, each type with ten minutes duration, and oscillations at the moment of game, causing this guy's cardiac frequency (FC) to swing. With the intention of verifying if the capillary PBG values have external validity in comparison to the laboratory, before the session, the PBG was collected in the laboratory Marcelo Magalhães, repeating the collection 24h after the session, both in the laboratory, as well as through the glycosimeter of the Accu-Chek Active model.

Results: showed that there was no significant difference in PBG before and after the VGA session, as can be observed in the mean and standard deviation values (Mean: 223.8 and Deviation: 79.4) and post-session (Mean: 204.2 and Deviation: 49) (TestT = 0.338). However, with respect to the validity of the glycosimeter, it was verified that there is also no difference between the PBGs collected in the laboratory (Mean: 204.2 and Deviation: 49) and PBGs collected in the apparatus (Mean: 203.2 and Deviation: 76, 9) (TestT: 0.961).

Discussion: The results show that, in an acute way, the interval exercise characterized by VGA, does not have significant effect on the improvement of the PBG of the DM1. TANAKA et al (2013) shows that a low-intensity protocol (50% of VO_2max) applied during 12 weeks in elderly patients with DM presents improvement over glycemic control, considering the similarity of the intensity adopted in our study with this study, we can conjecture that perhaps an acute VGA session may not be enough to help the glycemic response. Other factors that can be considered are the type of the game applied and the low number of participants in the sample, which may have contributed to this result being significant, and it is necessary to continue this investigation. Still about our results it was possible to verify in a practical way that the glucose values obtained by the glucometer were similar to the laboratory values, indicating that there is good external validity for that DM1 patients who use it have a safe and reliable device in their daily life for the measurement of daily blood glucose.

Conclusion: In short, the results obtained in this study demonstrated that, through the above data, the GPP does not suffer alteration 24h after a VGA session, and that the glucometer has the same validity in the measurement of the PBG as the PBG test done in the laboratory.

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FIT-TRANS: FITNESS IMPACT OF HORMONAL THERAPY IN TRANSGENDER FEMALES

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Introduction and Purpose: Currently, there more than 25million of people with Gender Identity Disorder(GID) and it is increasing due to recent interest of media and the widespread access to cross-hormonal therapy(CHT).The extent at which CHT induce body modifications is not yet fully elucidated and insertion of female transgender(FT) into elite sports has raised questions.Are there advantages over the cis population(CP)?Is androgen blockade enough to bring equality?Is the serum testosterone(ST) cut-off defined by International Olympic Committee(IOC) fair?There speculations that puberty exposure to endogenous testosterone may give rise to performance advantages. However,there is a paucity of studies evaluating the physical impact of CHT in FT under adequate control according the Endocrine Society(ES) criteria.Objective:To evaluate the physical fitness(PF),body composition,strength and flexibility of FT currently on CHT in comparison to cisgender women(CW)

Material and Methods: The FIT-TRANS trial is a cohort study that will evaluate the PF impact of CHT in FT using validated tests by American College of Sports Medicine:Aerobic condition:cardiopulmonary testing on treadmill(Super ATL,Imbramed)/cycle ergometer(CG-04,Imbramed),with ramp protocols individualized($RI=(pPOT_{max}-POT_{in})/\Delta T$ by pVO_{2max}).Muscle strength:hand-grip dynamometer for upper limbs(JAMAR)and vertical jumping recorded by a uniaxial accelerometer(Vert)for lower limb power. Flexibility:sit-and-reach test at Wells bench(Instant Flex Sanny).Body composition:bioelectrical impedance(InBody 770).Physical activity:self administered questionnaire own developed.Sample:50 FT in regular follow-up at the Dysphoria Outpatient of public clinic,treated according to GID ES guidelines 2017.Inclusion:18 to 45 years;onset of CHT after puberty;more than 1 year of regular CTH and ST below 50ng/dL in last year.Data analysis:Descriptive,with measures of central tendency and dispersion of the unidentified samples.The effect of CHT on the variables of PF will be evaluated through multiple regression models,for each components of the PF evaluated:explanatory variables the hormonal control;level of physical activity;occurrence of sex reassignment surgery and hormone therapy time

Results: The current poster aims will be inform the scientific community of the protocol used in this research.

Discussion: Currently,the ST limit defined by the IOC for the participation of FT athletes in the female category change to 10nmol/L for less than 5nmol/L.Even this new threshold is still a matter of debate as it is not evidence-based. This value is more than criteria of adequacy of therapy by ES clinical practice guideline, which is bellow 1.7nmol/L.Studies have mentioned that FT athletes that have made their transition reported feeling weaker and in fact,their ST tended to be below average of CW.Hence questions have been raised as to whether the ST is in fact a determinant of athletic performance as well as if it is a reliable marker of gender segregation.Karkazis K et al suggested that there is no evidence that ST as single parameter is an effective predictor of athletic performance since the response to hormonal stimulation varies individually in terms of physical development.There are currently insufficient data to determine the reference range that defines FT individuals to be physiologically comparable with CP in order to enable them to compete without advantages in the categories of gender identity.Until now Harper et al was the only study to explore the relationship between CHT-PF in a small FT athletes sample.Apparently not there were as ensure superiority of PF in the sample. Studies demonstrated the loss of muscle mass as a result of CHT which may ultimately negatively impact athletic performance but is still an indirect measure

Conclusion: Currently as far as we know there are no studies evaluating the performance impact of CHT comparing FT with matched controls

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TESTOSTERONE DETERMINES ERYTHROPOIESIS AND CHANGES IN HEMOGLOBIN MASS DURING ADOLESCENCE

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Introduction and Purpose: In the prepubertal stage, the total hemoglobin mass (tHb) is similar in boys and girls. With the beginning of puberty, tHb increases significantly in men, while in women it tends to stabilize. This situation could be explained by the increase in androgen production in men. There is enough evidence that androgenic hormones act as a strong stimulant of erythropoiesis. However, this has not been studied in children and adolescents. Therefore, the present study seeks to determine whether testosterone is a determinant factor of erythropoiesis and the differences in tHb between men and women during adolescence.

Material and Methods: Transversal study. Participants were 313 children and adolescents of both sexes, Tanner I-V on the scale of sexual maturation, trained in endurance sports (T) and untrained controls (UT), residents at two different altitudes: low altitude (LA, <1000 m) and moderate altitude (MA, 2500 -3000 m). Two phases were developed. In the first, comparisons were made between men (n = 123) and women (n = 94). In the second phase, analyses were performed only on a male population (n = 219). tHb, blood volume (BV), erythrocyte volume (EV) and plasma volume (PV) were determined by the optimized CO rebreathing method. Hemoglobin concentration [Hb], hematocrit (Hct), testosterone, ferritin, erythropoietin (EPO) and body composition parameters were measured.

Results: The statistical analysis was carried out through linear regressions and classification and regression trees (CART). The men had 2.31 ng/mL ($p < 0.001$) more of testosterone than the women and the highest values were evidenced from stage III maturation according to the Tanner scale. The concentration of testosterone was dependent on the stage of maturation in men. A strong correlation was found between testosterone and tHb ($r = 0.8$, $p < 0.001$) and between testosterone and tHb relative to body mass (tHb/kg) ($r = 0.6$, $p < 0.001$) in both men and women. In men, the change of 1 ng/mL in testosterone was associated with an increase of 34.2 g of Hb ($p < 0.001$). tHb values greater than 13 g/kg were associated with concentrations of 1.2 ng/mL of testosterone. In MA, high tHb/kg values were associated with a testosterone concentration greater than 4.9 ng/ml. The importance of the effect of testosterone on tHb was 45%, against 34.4% of the effect of biological maturation, 16.0% of training and 5.0% of altitude. A strong correlation of testosterone with EV and BV was found ($r = 0.7$, $p < 0.001$). There was no correlation between testosterone and EPO ($r = 0.04$, $p = 0.5$)

Discussion: The stimulatory effect of testosterone on erythropoiesis is well known in animal and adult human models. Evidence in children and adolescents is non-existent. The effect of testosterone on tHb and BV during and after puberty is unknown. The existing studies only show the effects on [Hb], Hct and EV. The traditional measurements of [Hb] and the value of the Hct, have a direct influence of the volume of plasma in which they are "dissolved", their value depends on the fluctuations that may occur in the PV; therefore, the measurement of tHb is a more objective determination for the study of the hematological variables of hemoglobin content, EV, PV and BV. Our study is the first to analyze the effects of testosterone on tHb, EV and BV in adolescents. Our findings confirm that testosterone is an erythropoietic factor that determines the increase in tHb, EV and BV in men, during and after puberty and, therefore, explains the difference with women.

Conclusion: Women present low levels of testosterone and in men there is a significant increase from stage III of Tanner, which determines an increase in erythropoiesis. The above explains the differences in tHb, EV and BV between men and women from the beginning of puberty. The increase in the production of testosterone during adolescence is the determining factor of the increase in tHb, EV and BV in men.

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ANALYSIS OF THE MAIN INTERCURRENCES IN ATHLETES PRACTICING SOCCER IN WHEELCHAIRS.

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Introduction and Purpose: Introduction: Wheelchair Football (WCF) is a collective sportive modality, known worldwide as Power Soccer or Powerchair Football, practiced by athletes of both genders and ages, created in the late 1970s in France and Canada in parallel, for the insertion of young people with severe types of disability in the sporting environment. As soccer is a world passion, this modality has been growing and attracting many fans around the world. Although Brazil is recognized as the country of football, until 2010, there was no initiative to insert this modality in our paradesportive. In 2011, the WCF entered the Brazilian National scene, and in 2014 the first Brazilian National Team was created. Those athletes who was practicing this modality competed with motorized wheelchairs, made with some adaptations, so that there is no physical contact between them, and they are classified functionally. The rules for these adaptations and especially the speed control are regulated by the Federation Internationale of Powerchair Football Association - FIPFA. The WCF represents one of the few sports practice options for individuals with severe injuries. However, their insertion into the sports environment is a major concern. The severity of the complications present in these athletes and the lack of consistent scientific studies in the area are factors that need special attention. Objective: To analyze the main intercurrences in athletes practicing wheelchair football in order to trace preventive measures.

Material and Methods: Materials and Methods: A cross sectional, quantitative and descriptive epidemiological study was carried out with data collected in the last Brazilian and South American Cup of the modality, held in 2017, in Rio de Janeiro. Twenty-three male athletes, and two female athletes, aged 12 to 56 years, with Duchenne Muscular Dystrophy, Arthrogyrosis, Spinal Amyotrophy, Cerebral Palsy, Cervical Spinal Cord Injury, Poliomyelitis and Myelomeningocele, were the participants. All intercurrences were caled by the local medical team registared in a specific medical file.

Results: Results: In the three days of competition there was no interurrence of ventilatory order. Twelve traumatic-orthopedic intercurrent were recorded: neck pain 43%, low back pain 30%, muscular contractures in the trapezius region and supraspinatus 27%. Regarding the severity of the injuries, all were grade I, allowing athlete to return to training in less than 7 days. In order to reduce pain, the physiotherapeutical manual therapies were used: myofascial release in 70% of cases, joint mobilization in 20% of the cases and Infra Red Laser Therapy EC (DMC Importação eExportação de Equipamentos LTDA, São Paulo, SP, Brazil), in 10% of cases.

Discussion: Discussion: Although the WCF is practiced by athletes with serious pathologies, who present significant ventilatory deficits, no athlete has decompensated ventilatorily in these Championships. Only 1 athlete with Duchenne Muscular Dystrophy, who requires 24-hour non-invasive mechanical ventilation, made several changes to his portable mechanical ventilator battery, allowing him to participate safely in all games without loss and / or performance loss. Due to the lack of studies related to the subject in question, we could not compare our results with other studies.

Conclusion: Conclusion: The knowledge of the sports sign of the WCF, is extremely important, also the ergonomic evaluation of motorized wheelchairs used for the game and, mainly, of the sequels and / or dysfunctions existing in these athletes and the possible intercurrences to draw emergency preventive measures with appropriate medical support. Further studies are needed on this topic.

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A 12-MONTH PROSPECTIVE STUDY OF FUNCTIONAL AND MORPHOLOGICAL CHARACTERISTICS IN MILD-TO-MODERATE HIP OSTEOARTHRITIS PATIENTS

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Introduction and Purpose: It is uncertain if individuals with mild-to-moderate hip osteoarthritis (OA) experience reduction in muscle strength and muscle volume in earlier stages of the disease. The primary purpose of this case control study was to evaluate changes in function through lower limb muscle strength and/or morphology through hip and knee muscle volume in the affected limb of individuals with unilateral hip OA, the most affected limb of persons with bilateral hip OA compared to healthy controls. Purpose: To prospectively evaluate changes in muscle strength, and muscle, bone and fat characteristics in individuals with mild-to-moderate hip osteoarthritis (OA) and healthy aged-matched controls

Material and Methods: Maximal voluntary isometric strength of the hip and knee flexors and extensors, and the hip adductors and abductors were assessed using an isokinetic dynamometer, and muscle, bone and fat characteristics were assessed via dual-energy x-ray absorptiometry and peripheral quantitative computed tomography, at baseline and at 12-month follow-up.

Results: Knee extension, hip flexion, hip extension, and hip abduction strength were significantly lower in the hip OA compared to control group at baseline and follow-up ($P < 0.05$). The hip OA group had significantly lower thigh lean mass, femoral neck bone mineral density, thigh muscle area and thigh muscle density compared to controls at both time points ($P < 0.05$). Knee flexion, knee extension, hip flexion, and hip abduction strength significantly declined in the hip OA group over the follow-up period ($P < 0.05$). No changes in muscle, bone or fat characteristics were detectable over the follow-up period within either group.

Discussion: This is the first known investigation to assess longitudinal changes in muscle, bone and fat characteristics over 12-months in individuals with mild-moderate hip OA relative to healthy age-matched controls. Eligibility for both participant groups were based on radiographic and symptomatic criteria, which minimized the risk of participant misclassification. Although differences in muscle strength, and muscle, bone and fat characteristics were evident between the hip OA and control groups at baseline and follow-up, between-group differences at baseline were not significantly increased over the 12-month follow-up period. However, consistent with our hypothesis, muscle strength declined over the follow-up period in the hip OA group but not in the control group. The declines in muscle strength in participants with hip OA occurred in muscle groups surrounding both the hip and knee. Findings suggest that lower limb muscle weakness is a defining feature of mild-to-moderate hip OA and reinforce the potential of targeted interventions to mitigate lower limb strength deficits in individuals with mild-to-moderate hip OA.

Conclusion: Pre-existing deficits in hip and knee muscle strength in individuals with mild-to-moderate hip OA were exacerbated over 12-months. Interventions to prevent or slow declines in strength may be relevant in the management of mild-to-moderate radiographic and symptomatic hip OA.

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EXPERIMENTAL MODELS OF MUSCLE ATROPHY IN ANIMALS: LITERATURE REVIEW

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Introduction and Purpose: Understanding deregulation of inflammatory mechanisms is important for acknowledging the pathophysiology of muscular atrophy, as chronic and systemic inflammation establishes intimate relation with the acute loss of cellular mass, by numerous molecular mechanisms and diverse pathways that interact with each other. Its main example is the interaction through positive feedback between oxidative stress and NADPH oxidase enzymatic complex, responsible for deregulating various cellular systems, such as the NF- κ proteins, p38 and the ubiquitin proteasome system for the regulation of protein synthesis; and the role of endothelium on oxidative metabolism regulation, through production of nitric oxide (NO). Objective: Perform a review of scientific knowledge about muscular atrophy models in animals.

Material and Methods: This research was made on MEDLINE, LILACS e SCIELO databases, using the following descriptors: Models, Animal, Animal Models, Model Animals, Experimental Animal Models, Laboratory Animal Models, Atrophy, Muscular, Muscular Atrophy, Neurogenic Muscular Atrophy, Sports Medicine, and Sports Medicine, in which we found 11 articles made on the last five years, after accessing their abstract, 3 articles were excluded for not being related to the purposes of the research; After that, using PubMed's "similar articles" tool, another nine useful articles were found. Results: 16 useful articles were found, using mainly Wistar and Wistar-Kyoto rats as muscular atrophy model.

Results: 16 useful articles were found, using mainly Wistar and Wistar-Kyoto rats as muscular atrophy model.

Discussion: Diverse atrophy models were found, all of them based on chronic disease or chronic inflammation. First, there is the peripheral muscular atrophy model induced by congestive heart failure on Wistar rats; To accomplish this model, it was made a unilateral left thoracotomy and exteriorization of heart, followed by ligation of left anterior descending coronary artery using absorbable suture and atraumatic needle; In this technique, it's possible to collect inflammatory markers, as cytokines, enzymatic activity and metabolites data, as well as cardiac activity, pulmonary oedema, muscle transectional area and the effects of exercise on these infos. There were plenty of models involving genetic knockout, for example: spontaneously hypertensive rats, with vessel's muscle atrophy; LGMD2B lineage, presenting limb-girdle atrophy and dysferlinopathy; op/op lineage, with macrophage proliferation and differentiation into satellite cells impairment; mdx lineage, model of Duchenne muscular dystrophy. Last, we've got the rotator cuff tendon release in sheep, accomplished by an incision 2 cm rear scapula spine and greater tuberosity osteotomy with an oscillating saw, with posterior attachment of tendon to bone through 2 figure of 8 sutures.

Conclusion: It was found that Aerobic training is the most present in the literature due to its greater effectiveness against muscular atrophy in a live animal model.

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PHOTOTHERAPY ASSOCIATED TO COMBINED TRAINING IS NOT SUPERIOR TO TRAINING ALONE ON VASCULAR ENDOTHELIAL GROWTH: RANDOMIZED PLACEBO-CONTROLLED TRIAL

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Introduction and Purpose: Phototherapy is shown to have acute effects on performance and to accelerate recovery by decreasing muscle fatigue. It is thought to increase protein synthesis, muscle hypertrophy and angiogenesis. Also, a clinical trial suggested a possible systemic effect by decrease of pyruvate reductase in the heart muscle of rats submitted to exercise and phototherapy. However, the physiological outcomes, in humans, are still unclear. The vascular endothelial growth factor (VEGF) is a cytokine that mediates angiogenesis patterns marked by differences in branching of new vessels. Its regulation is critical to tissue neovascularization under physiological and pathological conditions. Therefore, the aim of this study was to analyze the effects of phototherapy associated to a combined training on vascular endothelial growth measured by VEGF.

Material and Methods: This was a randomized placebo-controlled trial with a stratified sample of 39 healthy male participants performing a 12-week (24 sessions) training program divided in two phases. The first, consisted of six weeks of combined training with sprints and squats for all participants. After that, the participants were stratified based on adaptation capacity and randomly allocated into three groups: phototherapy, placebo and non-treatment control. The second phase consisted of a six-week training adjusted by load associated with recovery strategy between sprints and squats. Phototherapy (low-level laser therapy – LLLT and light-emitting diode therapy – LEDT – 30J) was applied bilaterally in six sites of the quadriceps. The VEGF was assessed on baseline, six and 12-weeks post-training. For that, it was collected 10 ml of blood and the plasma from this sample was stored at -80°C for later analysis. The plasma concentration of VEGF was analyzed in triplicate using the ELISA method (enzyme-linked immunosorbent assays) following the manufacturer's instructions (R&D Systems, Minneapolis, GA, USA). Statistical analysis was conducted in SPSS. The ANOVA repeated measures (Greenhouse-Geisser corrections when required) with Bonferroni's post-hoc was used. Significance level was stipulated as $p < 0.05$.

Results: The results of the study showed clinically relevant increases in vascular growth within all groups after 12 weeks of training ($P < 0.01$; $ES = 0.559$). This indicates that the training program has the capacity of increasing angiogenesis, independently of the recovery intervention used. Also, there was no statistical difference in the group ($P = 0.49$; $ES = 0.040$) and interaction effect (time x group) ($P = 0.62$; $ES = 0.038$).

Discussion: The findings of this study suggested that all recovery strategies (including non-treatment control) presented significant increase in vascular endothelial growth. Based on these results it is possible to infer that the phototherapy does not have effects on angiogenesis measured by the concentration of VEGF collected from the blood stream. One of the phototherapy theories is that this resource is capable of promoting systemic effects when applied as a recovery strategy. However, in this study, its application on quadriceps did not show any systemic or cumulative effects after 6 weeks.

Conclusion: In conclusion, phototherapy associated to combined training is not superior to training alone on vascular endothelial growth.

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CARDIORESPIRATORY FITNESS IN MEN AND WOMEN FROM 11 TO 45 YEARS OF AGE IN CURITIBA CITY - A RETROSPECTIVE STUDY

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Introduction and Purpose: Several studies describe changes on maximal oxygen consumption (VO₂max) through ageing in males and females (Shephard et al. 1968; Hawkins, Wiswell et al. 2003; Bortz et al. 1996). Bortz et al. (1996) suggest that VO₂max declines 10% for every decade of life, independent of being active or sedentary. There is some evidence that VO₂max decline through lifespan is different between genders and that women are less efficient in limiting this decline (Hawkins e Wiswell et al. 2003). Despite such evidence, studying different populations may favour the gain in knowledge related to this subject. The main objectives of this study are to determine reference values and to compare maximal oxygen consumption in both genders in different ages from people from the city of Curitiba, Paraná State, Brazil.

Material and Methods: 8977 healthy adults from both genders, with ages between 11 e 45 years participated in the study (3482 women and 5495 men, 33.12 ± 7.95 e 32.45 ± 8.81 years, respectively). The subjects underwent a cardiopulmonary exercise test on a treadmill, using ramp protocol, with speed increasing continuously until volitional exhaustion, with a 1% inclination. Oxygen consumption was measured directly with a gas analyzer Metalyzer II and software Metasoft (Cortex Leipzig, Germany), using also for ECG (eletrocardiogram) analysis the software Ergo PC Elite (Micromed Brasília, Brazil). Subjects from both genders were divided in age-groups. TWO-WAY variance analysis was used to verify differences between genders and age-groups, and post-hoc Bonferroni test was used for multiple comparisons (p < .05). All analysis were done using SPSS version 25.0.

Results: VO₂max mean values on both genders on age-groups from 11 to 15, 16 to 20, 21 to 25, 26 to 30, 31 to 35, 36 to 40 and 41 to 45 years were respectively: 38.79 ± 6.73; 35.55 ± 6.80; 34.92 ± 6.63; 35.48 ± 7.25; 34.66 ± 7.53; 33.29 ± 7.65; 31.93 ± 7.22 ml.kg.min⁻¹ for women and 48.26 ± 8.15; 47.28 ± 8.84; 43.78 ± 8.63; 44.04 ± 8.92; 42.48 ± 8.84; 41.06 ± 8.64 e 39.94 ± 8.56 ml.kg.min⁻¹ for men. There were identified significant differences on VO₂max values between genders (F1 = 1665.52; p = 0.001; η² = 0.157), age-groups (F6 = 75.40; p = 0.001; η² = 0.048) and between genders and age-groups (F6 = 4.69; p = 0.001; η² = 0.003). On women, the decline on VO₂max values was significant between age-groups 11-15 to 16-20 years (p = 0.018), 31-35 to 36-40 years (p = 0.018) and 36-40 to 41-45 years (p = 0.028). On men, the decline was significant between ages 16-20 to 21-25 years (p = 0.001), 26-30 to 31-35 years (p = 0.001), 31-35 to 36-40 years (p = 0.001) and 36-40 to 41-45 years (p = 0.017). Additionally it can be verified that male gender has higher mean levels of VO₂max when compared to female gender in every age-group studied (p = 0.001).

Discussion: Our results show that significant VO₂max decline occurs earlier in men when compared to women. Those different VO₂max declines may be related to diverse health-prevention and exercise habits between genders.

Conclusion: Declines on VO₂max occurred early on men when compared to women. Male gender presents higher VO₂max values on every age-group studied, confirming other studies.

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DOES HIGH SPEED INCREASE THE RISK OF MUSCLE LESIONS IN FASTER SOCCER PLAYERS?

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Introduction and Purpose: High speed is an important characteristic for the physical performance in soccer, also associated to the greater risk of muscular injury in sports, although little is known about this reality in professional soccer. The aim of the present study was to examine subsequent injury risk in soccer players divided into two groups based on maximum velocity: faster vs. slower

Material and Methods: Fifty elite male soccer players (mean ± SD age, 25 ± 3 years; height, 175 ± 6 cm; body mass, 80 ± 8 kg and maximal oxygen uptake (VO₂max) 53,7±5,4 VO₂ ml.kg.min⁻¹) from two professional soccer teams (1st and 2nd division of the Brazilian soccer league) were divided into two groups based on maximum speed: (1) faster and, (2) slower. Data were collected using GPS technology sampling at 10 Hz (Polar Team System Pro, Finland), which provided information on the movement demands of players across the full seasons (2017-2018) – physical training and evaluations, and soccer matches. The medical staff also diagnosed and monitored the development of muscle injuries during the seasons. Muscle lesions were categorized under 4 degrees of severity (based on the number of days' absence): minimal (1-3 days), light (4-7 days), moderate (8-28 days) and major (> 28 days). Data were analysed using SPSS 24.0 (SPSS Inc., Chicago, IL, USA). Differences between the group faster and group slower were determined using independent sample t-tests. The significance level was set at P < 0,05. The relative risk (RR) and odds ratios (OR) were calculated to determine the injury risk between groups. When an OR was greater than 1, an increased risk of injury was reported (OR = 1.50 is indicative of a 50% increased risk). Descriptive statistic was used to characterize the absence and severity of injury.

Results: The average speed of all athletes was 33,49±2,18 km.h⁻¹. The maximum running speed of the group faster was significantly higher than the group slower (35,01±1,57 vs. 31,78±1,36 km.h⁻¹; P<0,001). The relative risk (RR) and Odds Ratio (OR) of developing muscle lesions was greater for faster players (RR: 1.81 - 95%CI: 0,96–3,39; p=0,05); (OR: 3,18 - 95%CI: 0,99 – 10,1; p=0,06). In the group slower, soccer players injuries caused 225 days of absence and severity was distributed in: Minimal (zero), Light (9%), Moderate (72,7%) and Major (18,1%). In the group faster, soccer players injuries caused 153 days of absence and severity was distributed in: Minimal (11,7%), Light (35,2%) Moderate (52,9%) and Major (zero).

Discussion: The results shown that are different risks of developing muscle injury in Brazilian soccer players, related with how fast or slow they are. As we can see, the risk of the injury is greatest for the fastest players. This scenario reflects during the season, since speed is an essential factor for the performance in soccer, as well as the distance by muscular injuries. With these results, we can suggest that fast players should be monitored differently by the coaching staff.

Conclusion: Fast soccer players are at greater risk of developing muscle injury.

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EFFECT OF INTENSIVE TRAINING ON THE CARDIOVASCULAR SYSTEM OF YOUNG SOCCER PLAYERS IN TWO DIFERENT AGE GROUPS

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Introduction and Purpose: Intensive long-term training induces structural and functional changes of the heart, with left ventricle (LV) hypertrophy being the most common. Different types of training (endurance vs. combination of endurance and power) leads to distinct changes in the body. The aim of this study was to compare anthropometric and echocardiographic parameters between two selected group of soccer (endurance) players of different age.

Material and Methods: Soccer players (n=30) were divided in two groups: a younger group (Y) (n1 = 18, aged 16.22 ± 0.35 years, body height 180 ± 5.09 cm, body weight 71.23 ± 5.96 kg, BMI 21.96 ± 1.18kg/m², body fat percen 8.79 ± 1.97%) and an older group (O) (n2=12, aged 18.14 ± 0.21 years, body height 180.58 ± 5.02 cm, body weight 74.42 ± 7.03 kg, BMI 22.78 ± 1.38kg/m², body fat percen 10.15 ± 1.91%). All players play soccer more then 9 years (Y 9.06 ± 1.22 vs. O 11.58 ± 1.19years) and more then 10 hours per week (Y 10.89 ± 1.73 vs. O 13.17 ± 3.41 hours per week). This research was conducted in the laboratory for functional diagnostics. Subjects underwent physical exam, body fat assessment (In Body 370), echocardiography and maximal progressive ergospirometry test on a treadmill (Treadmill T200 Cosmed) and on a device for direct measurement of the gas fractions in exhaled air (Quark b2 Breath by breath Pulmonary Gas Exchange (VO₂max, VO₂ max/kg) was used in order to complete the examinations of the cardio - respiratory system). Student's T-test was used for comparison of measured parameters.

Results: Younger (Y) and older (O) soccer players differed in ascending aortic root diameter (Y 25.28 ± 1.56mm vs. O 26.75 ± 2.20mm), left ventricular EF (ejection fraction) (Y 61.66 ± 3.76% vs. O 64.5 ± 1.98%), posterior wall of left ventricular (Y 8.94 ± 0.66mm vs. O 9.54 ± 0.52mm)(p<0.05 for all), descending aortic root diameter (Y 17.5 ± 1.12mm vs. O 19.42 ± 1.32mm), LP/AO (Y 1.33 ± 0.06mm vs. O 1.25 ± 0.08mm), left ventricular FS (fraction shortening) (Y 33.44 ± 3.65% vs. O 36.00 ± 1.73%)(p<0.01 for all). In all other echocardiography parameters we didn't notice any significant differences. After indexing for BSA we not found any difference.

Discussion: Older soccer player have bigger body fat percent, ascending aortic root diameter, left ventricular EF, posterior wall of left ventricular, descending aortic root diameter and left ventricular FS. All of measured values are still within normal limits. That suggested that training stimulus well adapted to age players.

Conclusion: Soccer induce changes in heart structure with increase of left ventricular volumes to the upper limits of normal. Training process is influenced by the fact that hart of soccer players develop adaptive changes (especially the left ventricle), or the measured values are still within normal limits. Analysis of the data leads to the conclusion that the changes probably occurred before the age of 16 and therefore there is no greater difference between sixteen and eighteen and that the training stimulus well adapted to age players.

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NON-COMPACT MYOCARDIAL CARDIOMYOPATHY : A CASE REPORT OF A JUVENILE SOCCER PLAYER

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Introduction and Purpose: This article aims to report a case of noncompacted cardiomyopathy in a 17-year-old athlete, a soccer player under 18 in a professional soccer club in Curitiba – PR, Brazil. Seeks to discuss ways of diagnosing this clinical condition and its risk stratification, with the determination of eligibility for competitive sports.

Material and Methods: Review of clinical examination and complementary exams of the pre-participation sports evaluation and analysis of bibliography related to the NCM.

Results: Non-compact myocardial is a rare, genetically determined disease in which myocardial compaction does not occur during the embryonic period, which determines myocardial trabeculations with intertrabecular recess and myocardial thickening in two distinct layers (compacted and non-compacted). Patients may be asymptomatic or present with dyspnea, heart failure, chest pain and arrhythmias. This is a case report of a male patient, 17 years old, who presented episode syncope during exhaustive physical training. Review of the tests performed in the competitive sports pre-participation evaluation (electrocardiogram, two-dimensional transthoracic echocardiogram with Doppler and cardiopulmonary exercise test) did not show pathological alterations. Research after syncope revealed characteristics compatible with NCM at magnetic resonance imaging (MRI).

Discussion: Sudden death is the leading cause of death in high-performance athletes during sport, and its prevalence in young athletes is estimated to be between 1: 100,000 and 1: 50,000. Already among NSCLC, a study showed that approximately 60% suffered sudden death or underwent heart transplantation within 6 years after diagnosis. In another analysis with 34 adults, 47% died or underwent cardiac transplantation in a period of 44 ± 39 months. The prevalence of NCM has not yet been determined, but one study reported a prevalence of 0.05% among all echocardiograms in an institution.² Of the patients with NCM, more than 85% had abnormal electrocardiogram (ECG) and 58% to 82%, left ventricular systolic dysfunction. The European Society of Cardiology (ESC) prescribes an initial examination consisting of family history, physical examination and ECG for pre-participation evaluation between individuals aged 12-35 years. The International Federation of Football Association (FIFA) indicates the achievement in all those who want entering a competitive physical exercise program. The American Heart Association (AHA), based on the 36th Bethesda Conference, does not recommend the use of an ECG or echocardiogram in the pre-participation evaluation of this category. In Brazil, in many institutions where athletes are evaluated, their performance is mandatory, which varies according to their economic condition.

Conclusion: The literature is controversial as to the form of pre-participation evaluation for detecting changes that may lead to sudden death, since it is a rare event considering only the athletes group, even though it is the leading cause of death among them. However, among patients with NCM, sudden death is no longer a rare event, but this is not a concern in population terms, since the prevalence of the disease is low. These data make it questionable to use other exams, such as MRI, for the diagnosis of rare diseases, such as NCM, because the majority of patients with this cardiomyopathy would present alterations in basic pre-participation evaluation tests, unlike the patient reported. Therefore, the accomplishment or not of complementary examinations in the pre-participation evaluation is at the discretion of each institution, according to its structure and financial condition.

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ASYMPTOMATIC SPORTSMAN WITH SERIOUS CORONARY ARTERIAL DISEASE: IMPORTANCE OF THE VARIABLES OF THE TREADMILL TEST

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Introduction and Purpose: Treadmill test (TT) is a low complexity and low cost examination for the diagnosis of cardiovascular disease, also useful in prognostic evaluation, therapeutic response, exercise tolerance measurement, and arrhythmia-compatible symptoms during exercise. In this case, the importance of the multivariate interpretation of TT is evident. Despite the absence of symptoms, late-stage recovery changes associated with hemodynamic changes, which in turn already translate left ventricular dysfunction and correlation with CAD, when associated with multivariate analyzes could readily indicate an angiographic study without additional costs.

Material and Methods: LCS 41 years old, male, in pre-participation exercise evaluation. Previous consultations with Treadmill test (TT) and normal echocardiogram, asymptomatic, having as only risk factor for LDL cholesterol of 184mg / dL, with no family history of early CAD and performing regular exercises. New TT reaching 16.3 MET, presenting in the late recovery phase the ST low-voltage up to 1.0mm, tending horizontally between the 4th and 6th minute, which alone did not allow to eliminate myocardial ischemia. Still in the exam in question there was a decrease in systolic blood pressure at the peak of exercise and a paradoxical response in the recovery phase, with no symptoms.

Results: Due to the hemodynamic changes presented, he underwent myocardial perfusion scintigraphy with physical stress, with ST alterations in the final phase of recovery. In the analysis of the perfusion study and ventricular function, transient hypocaptation was observed in the septal, anterior (apical and middle) and left ventricular apex, compatible with ischemic load of 28%, as well as a decrease in the ejection fraction and dilatation the ventricular cavity in the post-exertion images. Coronary angiography was performed and severe multiarterial disease was evidenced and myocardial revascularization surgery was performed.

Discussion: In this case, it is possible to discuss the high cardiorespiratory fitness as a variable that differs from the picture. We show that the TT, when interpreted correctly, always considering Bayesian and multivariate analyzes, has good accuracy in the diagnosis of CAD, often avoiding additional tests, which can delay the diagnosis and increase its cost.

Conclusion: This case report emphasizes the cost-effective and diagnostic importance of the Treadmill test when analyzed in its multiple variables.

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PHYSICAL TRAINING EFFECTS IN THE CEREBELLUM OF DIABETIC RATS

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Introduction and Purpose: The impact of diabetes mellitus on Central Nervous System function has been demonstrated at neurochemical, electrophysiological, structural and behavioral levels. The present study investigated the role of swimming training on cerebral metabolism on Insulin-like Growth Factor-1 (IGF-1) concentrations in cerebellum and to analyse qualitatively the cerebellar tissue of trained diabetic rats and controls by the Hematoxylin Eosin (HE) method.

Material and Methods: Forty Male Wistar (75-days-old) rats were divided in four groups: sedentary control (SC), trained control (TC), sedentary diabetic (SD), and trained diabetic (TD). Diabetes was induced by Alloxan (32 mg Kg b.w.), single dose injection. The mean blood glucose of diabetic groups was 367±40 mg/dl. Training program consisted in swimming 5 days/week, 1h/day, 8 weeks, supporting a workload corresponding to 90% of maximal lactate steady state (MLSS). At the end of experimental period, the rats were sacrificed 48hs after their last exercise bout by decapitation. After sacrifice of rats, the cerebellum was weighted and the IGF-1 peptide supernatant concentration was measured by Immunoradiometric assay (IRMA). For the Histological Analyses the cuts of brains were made in the coronal plane, 4.80 - 5.30 mm in relation to Bregma, the experimental protocol was HE method. All dependent variables were analyzed by one-way analysis of variance (ANOVA) and a significance level of $P < 0.05$ was used for all comparisons.

Results: IGF-1 concentrations in cerebellum were not different between groups. We found some differences in the cerebellar tissue of trained diabetic rats and controls when analyzed qualitatively by the HE method. In the control groups may be noted higher amounts of fat cells and minor amounts of cell bodies compared to the trained groups. The large Purkinje cells correspond to the effector pathway or the cerebellar cortex output and are most abundant in the trained groups.

Discussion: The first objective of the study was to investigate the role of swimming training on cerebral metabolism on IGF-1 concentrations in cerebellum. Differences have not been found on IGF-1 concentrations in cerebellum of diabetic rats after 8 weeks of aerobic training. Recent studies showed that Physical training recovered liver glycogen and increased serum and cerebellum IGF-1 peptide in diabetic rats. However, the sample was composed for Male Wistar rats (38-days-old), different from the present study in which the sample was composed of Male Wistar rats (75-days-old). Thus, non difference in the levels of IGF-1 in the cerebellum of the trained groups in this study may be related to the different factors that interfere on the levels of Growth Hormone (GH) and IGF-1, among them the age or stage of the organism development can be highlighted. Another objective of the study was to analyse qualitatively the cerebellar tissue of trained diabetic rats and controls by the HE method. As known, the molecular layer contains stellate cells located superficially and dendrites of Purkinje cells. The Purkinje cell layer contains cells in basket shape, called the cerebellum piriform cells of Purkinje cells, which occur exclusively in the cerebellum. The results of this study showed the Purkinje cells stand out when analyzed by HE method, and apparently, there are greater quantities of granular cells, which may be indicative of the protective effects of physical exercise.

Conclusion: It was concluded that in diabetic rats, aerobic training does not induce alterations on cerebellum IGF-1 but changed some metabolic functions. After 8 weeks of aerobic training was possible to observe qualitative differences in cerebellar tissue of diabetic rats.

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WEIGHT BEARING ABILITY AFTER ANKLE SPRAIN IN ATHLETES

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Introduction and Purpose: The main symptoms of ankle sprains are pain, edema, inability of full weight bearing and restriction of motion. The aim of this study was to evaluate the correlation between the severity of ankle pain, ankle edema, weight bearing ability and restriction in range of motion.

Material and Methods: Sevent-eight athletes, 18-52 years old, suffering first and second degree acute ankle sprain participated in this study. We evaluated the pain level of the sprained ankle during weight bearing with VAS, the difference in edema between the healthy and the sprained ankle with the figure of eight method, the ability of weight bearing of both legs with a pressure platform and the restriction of passive ankle motion between the healthy and the sprained ankle with a universal goniometer. From pressure-time graphs, both static and dynamic weight bearing ability and the flatfoot time during walking were evaluated. Further, ankle sprain severity was clinically categorized as first or second degree. We correlated the above measurements using Pearson Correlation test.

Results: The ankle sprain degree was strongly correlated with pain (0,647, $p=0,000$), ankle edema (0,691, $p=0,000$), restriction of passive range of motion (0,524, $p=0,000$), static difference in weight bearing ability (0,318, $p=0,005$) and flatfoot time during walking between healthy and sprained ankle with the sprain degree (0,282, $p=0,012$). The static difference in weight bearing ability was correlated with pain level (0,235, $p=0,038$), but did not correlate with difference in edema (0,047, $p=0,686$) and the restriction of passive ankle motion 0,166, ($p=0,146$). The dynamic difference in weight bearing ability was not correlated with the ankle sprain severity ($p=0,195$), pain ($p=0,129$), edema ($p=0,135$) and restriction in passive range of motion ($p=0,378$). There was also a correlation in flatfoot time during walking between the healthy and the sprained ankle with pain (0,224, $p=0,048$).

Discussion: It is well known that the main symptoms of ankle sprains are pain, edema, inability of full weight bearing and restriction of motion. The severity of an ankle sprain depends of severity of these symptoms. So they can be used for the evaluation of ankle sprain severity.

Conclusion: Static weight bearing ability assessment can be used for the evaluation of ankle sprain severity while dynamic assessment is less useful. There is a strong correlation between the main symptoms of ankle sprains but not with the weight bearing ability.

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EXPERIMENTAL MODELS OF OSTEOARTHRITIS INDUCTION IN RATS - LITERATURE REVIEW

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Introduction and Purpose: Osteoarthritis (OA), the most common type of arthritis, is one of the leading causes of work-related disability in world. In United States, 23% of adults have some type of arthritis, which represents 54 million people and an annual expense of more than 81 billion dollars, as well as significant loss of workforce, considering that 60% of accomited are in productive age (18-64 years old). OA's pathogenesis isn't fully understood, mainly its initial phases, what makes early diagnosis mechanisms development difficult as well as therapeutic and prevention. In order to overcome these limitations, animal disease models, which allow initial phases' and disease progression study as well as make feasible testing of new therapeutics. Thus, numerous animal models have poppen up on various different species. However, until now there is no such thing as a gold standard model. Difficulty in establishing such model lies on the fact that OA in humans is a multifactorial disease. Facing the facts, McCoy (2015) pointed out the most commonly used animals are rodents, representing both majority and most recent studies. So, this study aims comparing different osteoarthritis induction model methods, in order to provide better conditions of choosing the right one for the purpose of each study.

Material and Methods: A systematic search was performed on Pubmed/Medline and Lilacs databases, with the following combination of descriptors: "osteoarthritis" and ("animal models" or "rats"). Was included all articles published in the last 5 years (the exception of one article, of 2007 with high relevance), in Portuguese or English, that had the following information: quantity and sample characteristics, induced ligament, anesthesia used, model of induction and euthanasia. Was excluded from the search all articles that presented other animals than rats and mice and that were incomplete in their induction method.

Results: 15 articles were considered eligible. Five types of induction were found: 7 articles with induction by mono-iodoacetate (MIA) (46,6%), 2 articles by anterior cruciate ligament transection (ACLT) (13,3%), 3 by medial meniscus resection (MMx) (20%), 2 by collagenase (13,3%) and 1 by ACLT and MMx (6,6%). In those, were used only male rats, being 73,3% from the species *Rattus norvegicus*, Sprague-Dowley pedigree, and average weight of 219,6g. The main application site were the patellar ligament.

Discussion: Knee joint selection, in particular patellar ligament, occurred due to biomechanical similarities between humans and rats. Clear preference for MIA model is related to its possibility of approach the pain aspect in OA, besides its extensive articular degradation, in addition to its characteristic of quick induction and reproducibility, being contraindicated in cases of sintomathologic drugs experimentation and OA Modifying Drugs (DMOA), because of its physiopathology being different from the occurred by natural causes. The option for induction by surgical means (MMx, ACLT, ACLT+MMx) is due to the fact that most of animal models have cartilaginous discs that don't close completely during their lives, thus allowing an effective and fast induction, restricted to the ligaments, with controlled adverse effects and also the methodology bias low risk. Though, there are differences between animal models and human, joint density and histological composition, in addition, the methods above mentioned show. Thus, genetic mutation models allowed slow and gradual disease evolution, with better reliability to human pathophysiology and its diverse features to be approached according to its respective study purpose.

Conclusion: It is noticed predominance of mono-iodoacetate induction method, in view of its greater speed and ease, being not only more used, but also the most suitable for research on small animals in rats. So, the induction by MIA could be considered as a gold standard.

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ACHILLES TENDON RECONSTRUCTION RESULTS WITH SEMITENDINOSUS BY MODIFIED MAFFULLI TECHNIQUE

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Introduction and Purpose: The Achilles tendon is the most commonly ruptured tendon in the human body. Complete rupture of the Achilles tendon can be experienced both by sedentary patients and athletes. It is especially common in middle-aged men who occasionally participate in sport. The management of chronic ruptures of tendo Achillis is usually different from that of acute rupture, as the tendon ends normally will have retracted. The blood supply to this area is poor, and the tendon ends have to be freshened to allow healing. Despite ease in their diagnosis, their negligence rates reach 25%. Chronic injury to this tendon is characterized by amorphous formation and incompetent tissue in rupture region, muscular unit elongates, causing important strength loss and functional capacity. Traditionally, aggressive techniques based on large incisions and muscle transfers were used in an attempt to reestablish plantar flexion quality. However, many are associated with high operative wound dehiscence rates and, in addition, present donor muscle loss disadvantage. In recent years, less invasive techniques that rely on free graft use have received more attention. Our study aims to describe a modification result of this technique described by Maffulli for Achilles tendon reconstruction.

Material and Methods: A retrospective study was carried out in which 21 patients, who were followed up at hospital outpatient clinics linked to our institution, underwent surgical treatment for chronic calcaneal tendon lesion, with a gap greater than 6 cm, by Modified Maffulli technique. Surgery consists of Achilles tendon reconstruction by autologous semitendinosus graft use, which was obtained posteriorly with patient in horizontal ventral decubitus. Access to proximal stump and fixation area was performed through transverse incisions in the leg. Graft was passed through proximal stump and sutured to it for reinforcement and then attached to calcaneus tuberosity with an interference screw. Outcomes evaluated were Visual Pain Scale (EVA), American Foot and Ankle Society Score (AOFAS) translated and validated for Portuguese-BR, applied in pre and postoperative periods. Mean follow-up was 30 months.

Results: EVA showed improvement on average from 6.1 to 2.1, varying from 1.1 to 3.5. AOFAS presented an average evolution from 55 to 89 points, ranging from 72 to 100. All patients were able to perform 20 monopodial elevations. Only 2 minor complications were reported.

Discussion: Chronic injuries to calcaneus tendon are not uncommon and cause great functional deficit to patients affected by this condition. Traditional techniques have high complication rates, in addition to common disadvantages of donor tendon loss and residual weakness.

Conclusion: Achilles tendon Reconstruction with semitendinosus graft, used in its chronic ruptures, revealed good results in terms of pain and function, in addition to a low rate of complications. This technique can become a good alternative in managing this difficult condition.

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DO ASSOCIATION-FOOTBALL REFEREES AND THEIR ASSISTANTS MAINTAIN HIGH ATTENTIONAL CONTROL AFTER AN ACUTE BOUT OF EXERCISE?

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Introduction and Purpose: The Fédération Internationale de Football Association (FIFA) is the governing body of association football. Referees and assistant referees (ARs) are submitted to high physical stress during the matches. Pressure to make decisions in a brief time may cause psychological stress. These two stressors can impair attention executive control (AEC), depending on physical fitness and individual vulnerability or resilience to situational pressure. Although previous studies have suggested that soccer referees and ARs should take cognitive assessments, they are only required by FIFA to take fitness tests. Annually, they must pass the FIFA-fitness-test. This study aimed to assess AEC in referees and ARs before and after the mandatory FIFA-test. It is hypothesized that the high physical demands associated with the pressure to pass the fitness test would interfere with AEC.

Material and Methods: Fifty-three subjects (33 referees, 20 ARs) participated in the study. The attention test consisted of a 15-minute Go/No-go task. Before the FIFA-TEST all participants performed the attention task. Those who succeed both the FIFA-TEST and the first attention test were submitted to the second attention test. It started 3 to 7 minutes after the end of the FIFA-fitness-test. All the procedures were done at the Newton Santos Olympic Stadium in Rio de Janeiro, during the 2017 official physical evaluation of soccer referees and assistants (FIFA-TEST).

Results: Those who succeeded both the FIFA-TEST and the first attention test were submitted to the second attention test (n=34, 19 referees, and 15 assistant referees). Among those that passed both the FIFA-TEST and the baseline attention task, 44% (6 assistant referees and 9 referees) exhibited attention deficits after the FIFA-TEST, based on the expected values of the population. In addition, the descriptive statistics based on the mean values of the CVAT parameters indicated that the referees and their assistants exhibited a decrease in the executive attention subdomain after the FIFA-TEST, except for the number of commission errors. A satisfactory performance in the baseline attention test predicted the success in the FIFA-TEST. The variability of reaction time (VRT) parameter was significantly affected on the second attention test in referees and assistant referees who were approved in the FIFA-TEST and did not exhibited attention deficits at rest.

Discussion: At rest, the finding that the percentage of attention problems is higher than the expected normal ratio may reflect the contextual stress associated with the pressure to pass the FIFA-TEST. As expected, this psychological stress might be responsible for the observed significant deficit in the executive attention performance exhibited by 32% of the participants. The present results also indicated that a normal baseline attentional performance at rest (before the FIFA-TEST) predicted the later success in the FIFA-TEST. Assuming that the FIFA-TEST distinguishes who are in a better physical condition (succeeded the FIFA-TEST) from the ones with the worse physical condition (failed the FIFA-TEST), this may indicate that the more highly fit approved participants exhibited better cognitive performance at rest than those who failed the FIFA-TEST. Our findings support that the individual response to the situational stress (the mandatory test) may affect executive attention control after the physical stress caused by the FIFA-TEST.

Conclusion: We conclude that a good physical preparation is necessary but not sufficient to help them to cope with the physical and contextual stresses associated with the mandatory FIFA-fitness-test. These data suggest that part of soccer referees and their assistants who were considered physically able to referee matches may not be mentally prepared for the AEC demands of soccer matches.

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RE-INJURIES IN YOUNG PROFESSIONAL FOOTBALL: AN EPIDEMIOLOGIC PROFILE

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Introduction and Purpose: Re-injuries are lesions of the same type and spot in a short period of time. Classified as early recurrence (≤ 2 months), late (2-12 months) and delayed (> 12 months), after the return to play. The severity of the injury is based on the number of days of absence after injury, divided in: minimal (0-1 days), mild (≤ 7 days), moderate (8-28 days) and severe (> 28 days). Most recurrent lesions are: hamstring, adductor, quadriceps, calf muscle, etc. The injuries with the most burden (time lost) are: hamstring injuries, knee cartilage lesions, adductor injury etc. The objective of this study was to investigate the prevalence/incidence and nature of re-lesions in a homogeneous group of young soccer players from São Paulo Futebol Clube and compare it with

Material and Methods: The study involved 144 male athletes aged 13-20 years who play in the base categories of a professional soccer team in the city of São Paulo who had been training for ≥ 3 years, 5x/week. Data was collected during one year (2017/18) from both the medical team, which consists in 1 sports medicine doctor and 3 orthopedics doctors, and 5 sports physiotherapists. Classifying all the re-lesion types, and timing using the FIFA (Federation International Football Association) classification. Which consists in spot of lesion, re-lesions, time-out, type of lesion, treatment taken, severity. After that tables were created based in all this data and recorded in the internal system of the club.

Results: Total re-injuries were 22 (8.4%) out of 262 lesions, divided into 5 groups (sub14 - sub20), where the highest re-injuries rate was in the sub14 (31.81%). Among the most frequent lesions are low back pain (18.18%) and pubalgias (18.18%) of the total lesions and structural muscle injuries (13.63%). Overload injuries account for 72.72% of all injuries, which presented the greatest burden, in descending order muscle structural damage (thigh); low back pain; pubalgia. By category sub14 shows the longest off-field time, followed by sub20. Moderate and mild lesions represented the majority of lesions with 31.81% each. The early recurrences were 77.27%. Overload lesions presented the highest rate of early recurrence, while the traumatic lesions varied within the classification. Pubalgia and 3 of 4 cases of low back pain were found in early recurrence. Out-of-field / severity of injury time was not related a late or early recurrence factor in the categories. Among the 22 injuries that occurred only 2 injuries (9%) were in official games, both traumatic. Injuries during training were 19 injuries (86.46%)

Discussion: The overall recurrence rate is around 17% in top-level clubs, 25% in smaller clubs and 35% in amateur soccer, this is due to the structure of the club, which has medical and physiotherapeutic staff available for early attendance and follow-up. Our overall recurrence rate is 8.4%, which we attribute to the same factors related by the author. Our lower rate of recurrence may be due to the fact that our $n = 144$ players vs the study cohort above $n=72$ teams, for several seasons. The characteristics of our recurrences of lesions did not correspond to the ranking of the five major, hamstring lesions (22.7%), adductor lesion (11.6%), quadriceps lesion (6.4%), calf muscle injury (1%) and lateral sprains of the ankle (6.0%). Our results show the main lesions as low back pain ($n = 2$, 18% each), pubalgia ($n = 2$, 18% each), structural muscle injuries (13.63%) and patellar chondropathy (9%). Quadriceps lesions present 1 hamstring injury, 1 quadriceps lesion and 1 adductor lesion. This may be due to the fact that we deal with players of different ages, and the changes of puberty and growth may contribute to the appearance of different lesions.

Conclusion: Knowing the profile of re-injuries to avoid further recurrences is important and may impact Brazilian professional football in the future, which can generate lower monetary costs, absence of players and better results.

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MUSCULAR INJURY ON YOUNG ATHLETES OF A BRAZILIAN SOCCER TEAM

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Introduction and Purpose: Injuries are a substantial problem for soccer players and their teams. Studies as Lewin et Al mention percentages such as 65-91% of professional soccer players undergoing injuries each season. Deepening the knowledge about the most common injuries would enable the creation of effective programs of prevention and rehabilitation, especially when they are incorporated in a professional context that demands faster results. [passos] Among the injuries, muscle injuries seems to be a central element in that context but very little has changed of it's general knowledge, classification and methods of treatment on the last years. This study aims to comprehend better that kind of injury on younger football categories.

Material and Methods: Medical records of athletes of two younger categories of a Brazilian soccer club in the period between March 2015 and August 2017 were analyzed. Lesions with recovery on less than 3 days were disregarded, as well as lesions with no change on palpation on the physical exam. As inclusion criteria, athletes had to present all the criteria: diagnosis by at least 2 physicians of the club's medical department, regular monitoring of the injury on the medical department and to be properly associated with the evaluated sports institution.

Results: Analyzing the medical records 30 injuries were found in 27 juvenile players and 26 injuries in 21 junior players. That way there was a total 85,7% of primary lesions and a total of 14,3% relapses. Most of the injuries were on the thigh muscles, with only 2 athletes having a lesion on other part of the lower limb. Out of the 56 injuries the most common muscular group affected was the hamstring group with 23 lesions followed by the adductors with 16 athletes. Anterior thigh groupings are the third most prevalent.

Discussion: Muscular injuries are a central element on football injuries but little has changed in the last years in how to understand, classify, and to treat them. The main criteria used for the athlete to return for their practice are still the isolated comparison of the muscle strength of the injured limb with the contralateral limb; the combination of pain scale assessment and the degree of confidence of the patient. That way most of the criteria are extremely subjective. In general, conservative treatment results in good prognosis. However, the consequences of treatment failure can be dramatic, delaying return to physical activity for weeks or even months. High injuries are the most prevalent during soccer-related activities, among them the hamstrings, possibly because of the leg extension and knee flexion. Sprinting and kicking the ball movements requires that the hamstring muscles stretch against resistance in order to modulate the movement, making an eccentric contraction. When the antagonist hamstring is not able to resist the agonist force of the quadriceps it gets injured.

Conclusion: Particularly in elite athletes, for whom decisions regarding return to the field have significant financial value, there is an enormous interest in optimizing the therapeutic process of diagnosis and rehabilitation after muscular injuries, in order to minimize absence in sports and to reduce rates of recurrence. However, there is little information available in the international and national literature on definitions and classification of muscle injury. Without this, the treatment and the prevention of it's recurrence is difficult.

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IMPACTS OF PHYSICAL TRAINING IN KIDNEYS FUNCTION OF MACAÉ SOCCER CLUB ATHLETES

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Introduction and Purpose: The renal function changes according to body demands and water intake. Therefore, unexpected changes on the increase of osmolality and in the urinary protein excretion due to the increase of glomerular pressure can lead to kidney damage. The kidney gets about 20% of the cardiac output which makes it very sensitive to physical effort. Many studies in the field of Exercise Physiology report changes in the urinary composition of elite athletes due to high intensity exercises. Also, there are studies showing changes in the urinary composition of ordinary people who practices moderate and low intensity exercises. The purpose of this study is to characterize the changes in renal function of Macaé Soccer Club athletes before season of State Championship and 6 months after the beginning of the season.

Material and Methods: Thirty-five athletes were selected for 24 hour urine collection and blood sample collection. In these samples the concentrations of sodium, glucose, albumin, osmolality, urea, proteins, chloride and creatinine were determined. The collection was performed in the beginning and at the end of the season. The kidney's functional profile was determined using the clearance of the solutes mentioned above. The Shapiro-Wilk test was performed for testing the normality of data. All analyses were processed by Student t-test using the statistical analysis software (GraphPad Prism 4.0, GraphPad Software Inc., San Diego, USA). The confidence interval is 95%. Values of $P < 0.05$ were considered significant. The data were represented as Mean \pm SEM.

Results: The post-season Glomerular Filtration Rate (GFR) results (230.6 ± 36.74 mL/min, $p < 0.05$) increased when compared to the pre-season results (87.11 ± 6.146 mL/min). Post season protein clearance and sodium clearance also increased (0.003878 ± 0.0005531 mL/min/kg and 0.8090 ± 0.1420 mL/min/kg, respectively) when compared with the pre-season results (0.002007 ± 0.0003298 mL/min/kg and 0.5126 ± 0.04391 mL/min/kg, respectively). The post-season urea clearance (0.5895 ± 0.05433 mL/min/kg, $p < 0.05$) showed a significant reduction when compared to the pre-season results (1.041 ± 0.1062 mL/min/kg). The post-season albumin clearance (0.2529 ± 0.02497 mL / min) also showed a significant reduction when compared to the pre-season results (0.6000 ± 0.08323 mL / min). Changes also showed in osmolality, indicate an increase in urinary concentration after season (1.099 ± 0.07643 mOsm/kg and 0.8331 ± 0.09709 mOsm/kg, respectively). It was not possible to observe significant changes in glucose and chloride clearances.

Discussion: Post exercise hypotension and vasodilatation effects already shown by literature associated with the increase of osmolality and GFR showed in results suggest that there is a counter-regulatory mechanism that may be involved in trying to avoid the renal sodium and water loss. It has been suggested in the literature that the increase of GFR in athletes is related to angiotensin II activity that induces constriction of afferent arterioles. Athletes show predominantly high urea plasma concentrations at rest as results of a continuous training. Urea plasma concentrations can remain elevated for 24 to 40 hours after exercise. Despite of the high RFG found in this study, the results also showed the hypothesis that urea has effect in water reabsorption and excretion control, since it constitutes about 40% to 50% of urinary osmolality.

Conclusion: These results show that physical training of soccer athletes changes significantly the biochemical parameters indicative of kidney function. Moreover, the increase of renal urea reabsorption is the main maneuver responsible of prevent an even worse dehydration in athletes.

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IN VITRO EFFECT OF LOW-LEVEL LASER THERAPY ON THE FIBROBLASTS PROLIFERATIVE MODULATION AND INFLAMMATORY MARKERS STRESS-INDUCED

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Introduction and Purpose: The skin is organized by keratinocytes of the epidermis and fibroblasts in the dermis and is subject to the action of intrinsic and extrinsic factors being the lifestyle are associated with both. Cutaneous integrity is regulated by fibroblasts and the decrease in their metabolic functions causes tissue changes which can lead to inflammatory processes or difficulty in regenerating the tissue after an injury, for example. The intense motor action, contact and skin exposure in athletes causes constant damage to their layers leading to a mechanical and metabolic overload that affects the protection of basal tissues such as muscles. Low-level laser therapy (LLLT) can be useful in recovery processes since it stimulates metabolic pathways of the cell and can act as a prophylactic measure to the damage or aggravation resulting from the practice of sport. Objective: To evaluate in vitro the effect of LLLT on the modulation of proliferation and inflammatory markers of fibroblasts exposed to stressor-induced.

Material and Methods: HFF-1 cell line were maintained in controlled conditions and exposed to different concentrations of hydrogen peroxide (H₂O₂): 1, 10, 25, 50 and 100 μ M, that triggered effect on proliferative and inflammatory parameters. Fibroblasts were laser irradiated until 2 hours after cell to be H₂O₂ exposure. Cells not exposed to H₂O₂ were also irradiated as a laser control group. A laser (660nm) was used as the irradiation source with 35mW output power and 16Hz frequency in punctual continuous wave mode. The delivered dose for each irradiated set was 3, 4, 5, 6 and 8 Joules(J)/cm² with respective exposure times 10s, 14s, 16s, 20s and 28s. Cellular proliferation was performed by flow cytometry using propidium iodide (PI) and protein quantification of follow markers involving in inflammatory response interleukin IL-1 β , IL-6, IL-10 using an immunoassay kit immune assays.

Results: H₂O₂ decreased fibroblast proliferative rate and increased the levels of proinflammatory cytokines (IL-1 β , IL-6), whereas decreased the anti-inflammatory (IL-10) in a concentration-dependent way. LLLT exposure also modulated cytokine levels mainly in higher doses (6 and 8J) that presented higher levels of IL-1 β , IL-6 and lower levels of IL-10. Fibroblast H₂O₂ plus LLLT exposed at 4J doses presented partial increased of cell proliferative and IL-10 levels with partially decreased of inflammatory cytokines.

Discussion: Cells were previously H₂O₂ exposed LLLT action on fibroblast was more pronounced since this treatment was able to increase the proliferative rate analyzed by cell cycle and anti-inflammatory markers (IL-10), whereas the inflammatory markers reduced (IL-1 and IL-6). These results are important to point once that just H₂O₂ in low and controlled concentrations is a regulatory signaling molecule that has several actions including regulation of proliferative states of some cells. Besides that, just LLLT show positive and negative effects in a dose-dependent way.

Conclusion: Despite the methodological limitations associated with in vitro protocols, LLLT exposure on fibroblast without any stressor is relatively safe and innocuous considering its potential inflammatory and proliferative effects. On the other hand, in fibroblast H₂O₂-injured, LLLT presented an important protective and proliferative effect, reverting partially negative effects triggering by H₂O₂. In these terms, it is possible infer that, in some dose range LLLT could to present some tissue restoring properties.

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EFFECT OF SERRAPEPTASE ON PAIN AND EDEMA OF ANKLE SPRAINS

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Introduction and Purpose: Ankle sprains constitute very common injuries and the most common type is due to an inversion trauma. The main symptoms are pain and edema. The commonest treatment is the RICE protocol (rest, ice, compression, elevation). The aim of this study was to compare the effect of RICE protocol with the combination of RICE protocol with the use serrapeptase in the reduction of pain and acute edema of ankle sprains.

Material and Methods: Eighty patients, 18 to 52 years old, with severe acute ankle sprain were randomized in two groups. All were treated with the same treatment protocol (RICE). Group A athletes (40) used serrapeptase capsules (tab Terraflam®) twice a day for the first 10 days. The athletes of the group B (40) used only paracetamol for pain relief. Six athletes were lost to follow up. We compared the pain with the VAScale and the edema of the ankle joint with a volumetric method at arrival, at the forth and at the tenth posttraumatic day between the two groups.

Results: The two groups had no significant differences concerning their baseline values ($p>0,05$). The ankle joint edema was decreased significantly in both groups at the third day and at the tenth day ($p<0,001$). The edema was significantly more in the group B than in group A at the third and tenth posttraumatic day ($p<0,05$). The pain level was not significant different between groups the third and the tenth posttraumatic day ($p>0,05$).

Discussion: Serrapeptase is an immunologically active enzyme. It can bind itself to the alpha 2 macroglobulin in our plasma where it is shielded from the immune system while retaining its enzymatic activity, and in this way, it is transferred to the sites where the body needs it. Serrapeptase is widely used in Europe as a supplement for traumatic injury (such as sprains and torn ligaments), as well as the swelling associated with post-surgical patients.

Conclusion: According to these results serrapeptase offer a better effect on acute ankle edema reduction after ankle sprains

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ACUTE TREATMENT WITH NANDROLONE DECANOATE (DECA-DURABOLIN®) PROMOTES THE CHANGE OF BARORREFLEX SENSITIVITY IN FEMALE RATS

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Introduction and Purpose: The abusive and indiscriminate use of androgenic-anabolic steroids (AAS) has increased in recent years, in both sexes, leading to cardiovascular changes, such as cardiac hypertrophy, pathological hypertension, heart failure and even sudden death. Nandrolone decanoate (ND), a well known AAS, has an increased anabolic capacity and reduced androgenic effects, which explains its excessive use, commonly associated with physical exercise. In addition, it was proven that an increased blood pressure was performed by increased sympathetic activity and reduced vagal activity, impairing the baroreflex. It is well known that baroreflex exerts a fine control on the blood pressure of each heart beat, regulating pressure variations by means of afferent nerves that project to the nucleus of the solitary tract, triggering the reflex response in heart rate (HR) and vascular alterations, but little is known about baroreflex in females.

Material and Methods: For this study, Wistar rats (*Rattus norvegicus*) were used, with procedures according to the ethical principles of animal experimentation. The animals were separated into 4 experimental groups: C - animals treated with peanut oil (intramuscular, I.M.), and not submitted to physical exercise; EC - animals treated with peanut oil (intramuscular, I.M.), and submitted to the resistance exercise protocol; ND - animals treated with nandrolone Decanoate (DN), not submitted to resisted physical exercise; NDE - animals treated with DN, and submitted to resisted physical exercise. For the analysis of the mean arterial pressure and heart rate (evaluation of the baroreflex), the catheterization of the femoral artery and vein and the use of vasoactive drugs, Phenylephrine and Sodium Nitroprussiate were performed. In addition, the heart was collected for histological analysis and reports of collagen deposition. After evaluation of contractility in the left ventricle, the animals were euthanized by decapitation.

Results: In the animals treated with ND, it was observed cardiac hypertrophy associated with collagen deposition, having increased the contractility of the left ventricle (LV) and LV systolic pressure elevation, without changing the mean arterial pressure and heart rate. Baroreflex sensitivity was impaired by the treatment with ND, yet, its membership in the physical exercise was able to reduce its loss.

Discussion: In the present study it was verified that the acute use of DN caused a reduction in baroreflex sensitivity, since there was a replacement of the type III collagen present physiologically in the tunica media of the large caliber arteries by type I collagen, especially in the aortic arch, attributing to this artery a more rigid feature. Thus, the baroreceptor, which is a mechanoreceptor sensitive to variations in fiber distensibility, due to the circumferential tension generated by the pulse wave exerted by the blood, has its function of keeping blood pressure at normal physiological levels, impaired.

Conclusion: In conclusion, the data suggest that DN and resistance exercise in female rats for a period of four weeks were able to promote changes in baroreflex sensitivity and cardiac trophy, so it is reasonable that these evaluations are investigated with chronic use, since the prolongation effects may lead to cardiac complications. The work is inserted in the area of Medical Clinic, being a Completed Research.

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ACUTE MYOCARDIAL INFARCTION IN ANABOLIC STEROID USER

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Introduction and Purpose: Kennedy MC in 1995, already drew attention to the misuse of anabolic steroids and their cardiovascular effects, being considered a Public Health problem. The objective of this job is present a case report of a patient anabolic steroid users, who presented acute myocardial infarction with electrocardiographic abnormalities and normal coronary angiography.

Material and Methods: Case Report : A.C.S, 27 years old, male, bodybuilder, anabolic steroid user (Equifort) at 1 year ago. The patient in question was admitted to the emergency room of the hospital with oppressive sternal retro pain radiating to the upper left limb and accompanied by a sensation of airflow, nausea and vomiting.

Results: The electrocardiogram showed changes compatible with myocardial infarction in inferior and anterolateral walls. There were alterations in cardiac enzymes: CKMB and Troponin I. The Ecocardiografy in admission was normal. The coronary angiography showed a normal hemodynamic study. The search for metabolites for cocaine in urine was megative. The patient was treated clinically with coronary vasodilators and platelet anti-aggregation (nitrates, aspirine and clopdogrel) and showed good clinical evolution.

Discussion: The adverse cardiovascular effects to the use of anabolic steroids are still very debatable, and there are only hypotheses, formulated based on experimental data, which are: 1) Atherogenic effect; 2) Thrombotic effect; 3) Effect of myocardial injury; 4) Effect of decreased responsiveness to catecholamines; 5) Effect of coronary vasospasm.

Conclusion: This case report attempts to reinforce the hypothesis of coronary vasospasm in the pathogenesis of Acute Coronary Syndrome in Users of Anabolic Steroids.

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CHRONIC AEROBIC EXERCISE AND LOW-DOSE OF L-NAME ASSOCIATION PROMOTES CARDIAC HYPERTROPHY AND CONTRACTILE DYSFUNCTION WITH ALTERATIONS IN CA²⁺ HANDLING

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Introduction and Purpose: Nitric oxide (NO) is a soluble gas and its messenger capacity is extremely important, activating or inhibiting several target molecules involved in various physiological processes. The short and medium-term inhibition of NO production leads to a series of deleterious effects on the cardiovascular system. High doses (20-100 mg/kg) of NG-nitro-L-arginine methyl ester (L-NAME) promote arterial hypertension, increased myocardial collagen fraction with consequent elevation of fibrosis and necrosis, as well as functional impairment. However, low doses of L-NAME (0.5-10 mg/kg) appears to increase the activity of nitric oxide synthases (NOS) in the aorta and left ventricle (LV), reversing the increase in blood pressure (BP). These results suggest that low-dose of L-NAME can activate NO synthesis by negative feedback and, consequently, promote benefits to the cardiovascular system. Physical exercise is also associated to several cardioprotective effects, besides causing increased bioavailability of ON and expression and activity of endothelial nitric oxide synthase (eNOS). The aim of study was to evaluate the effects of association of chronic aerobic exercise and low-dose of L-NAME on the process of cardiac remodeling and contractile function of isolated cardiomyocytes.

Material and Methods: Wistar rats (n = 56) were randomly assigned into four groups: control (C), L-NAME (L), exercise (Ex), and exercise + L-NAME (ExL). The exercised groups performed aerobic physical training with progressive intensity increase (50 to 80% of maximum running speed) for 12 weeks. L-NAME was given daily by orogastric gavage at 1.5 mg/kg/day. Body adiposity, pressure profile, cardiac morphology, myocyte cross sectional area (CSA), myocardial collagen, cardiac contractility parameters and intracellular calcium handling were analyzed. Data were expressed as mean ± standard error of the mean. The level of significance considered was 5%.

Results: Association of chronic aerobic exercise and low-dose of L-NAME promoted in significantly increased systolic BP at week 8 in relation to L-NAME. In addition, the LV end-diastolic pressure (LVEDP) also enhanced in ExL after 12 weeks of experimental protocol when compared to L and Ex. ExL promoted elevation of heart/tibia length ratio and interstitial collagen fraction, and reduction in CSA in relation to L. Fractional shortening (ExL: 5.3 ± 1.2 vs. L: 7.1 ± 1.4%; p<0.001) and time to 50% shortening (ExL: 46 ± 4 vs. L: 54 ± 9 ms; p<0.001) were reduced in relation to L, as well as the time to 50% relaxation was lower than L and Ex rats (ExL: 150 ± 14 ms vs. Ex: 170 ± 15 and L: 248 ± 38 ms; p<0.05). Ca²⁺ transient amplitude (ExL: 0.45 ± 0.09 μM vs. L: 0.34 ± 0.01 p < 0.05) and the time to 50% peak Ca²⁺ were higher (ExL: 52 ± 19 vs. 27.5 ± 0.4 ms; p < 0.01).

Discussion: Association of chronic aerobic exercise and low-dose of L-NAME promoted cardiac remodeling . It seems that the moderate-intensity aerobic exercise protocol, used in our study, promotes cardiac overload, evidenced by the elevation of LVEDP. Thus, it influences the cardiac remodeling process, however, as the exercise is prolonged, the effects are evidenced by an increase in the synthesis of myocardial collagen. This type of remodeling is seen the increase in the amount of collagen fibers, which are able to influence the cardiac relaxation process by increasing the rigidity or reduction of the ventricular complacency with consequent diastolic dysfunction.

Conclusion: Association of chronic aerobic exercise and low-dose of L-NAME does not promote benefits to the cardiovascular system, since it causes cardiac remodeling with increase in the synthesis of collagen and LV end-diastolic-pressure, as well as contractile dysfunction evidenced by reduction of the percentage of shortening. The findings also indicate that this association promotes an increase in sensitivity to intracellular Ca²⁺.

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EFFECT OF WALKING EXERCISE ON BODY MASS INDEX IN ELDERLY PEOPLE: A RANDOMIZED CONTROLLED TRIAL

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Introduction and Purpose: Introduction: The science progress associated to the improvement in health conditions have direct impacts on increasing life expectancy. In Brazil, epidemiological studies indicate that the number of elderly people will quadruple in the future. Notably this scenario represents an achievement of humanity, however we know that the natural human aging process results in anthropometric changes, for example, a greater fraction of accumulated fat tissue, which can interfere directly in physical health, including in the heart. Studies report that the body mass index (BMI) is a low cost, effective indicator and easy to be used in patients with the goal of detecting cardiovascular risks. In addition, the predominantly aerobic exercise can enable fat rate reduction, simultaneously improving this indicative of health, BMI. Objective: To Analyze the effect of the walking exercise in the IMC in the elderly people.

Material and Methods: Material and Methods: The Ethics Committee of the Universidade Federal de São Paulo approved the research (05599/03). It was a multicenter study with elderly people of both genders, randomized in Training Group (TG) and Control Group (CG) aged 60 years or above. The TG went through 12 weeks of aerobic training with moderate to severe intensity from 50% to 75% of the maximum heart rate (HRMáx.) that was determined on a stress test conducted previously. The sessions were carried out three times a week with 30 minutes of continuous walking exercise, according to the American College of Sports Medicine (ACSM) guidelines. CG members were advised not to participate in systematized walking exercises in the same period of training of TG. BMI of the patients were calculated through the division of the body weight by the square height (kg/m²). After three months, TG and CG participated in a second BMI analysis. The study applied, for statistical analysis, the "student's t Test" for paired data, with $p \leq 0.05$ for significance level.

Results: Results: The BMI in GT did not present pre and post-training modifications [28.5 Kg/m² to 28.4 Kg/m² ($\Delta\%$ 0.3) ($p = 0.37$)]. As for CG, the BMI also did not result in substantial changes [27.3 Kg/m² to 27.3 Kg/m² ($\Delta\%$ 0.0) ($p = 0.88$)].

Discussion: Discussion: The main finding of this study was that a brief period of physical training with aerobics was effective in maintaining the BMI of patients, thus preventing over weight and being a viable strategy to control this cardiovascular risk indicator. In this sense, other studies have reported that walking exercise, when performed periodically among elderly people, is effective in controlling body weight and reducing the incidence of metabolic syndrome. In addition, walking exercise, for this specific population, can be a strategy to improve physical capability.

Conclusion: Conclusion: The predominantly aerobic physical training for a brief period and in a non-exhaustive intensity was effective in not increasing BMI in elderly people, avoiding an increase of this indicator of cardiovascular risk and contributing to maintain the quality of life in this population. A suggestion is to expand the frequency of the workouts to five times a week in the same intensity (50% to 75% of the HRMáx.) and a target of achieving 10.000 steps per session to a possible decrease in BMI.

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EFFECT OF RESISTANCE TRAINING ON CONTRACTILITY AND MYOCARDIAL CALCIUM HANDLING OF OBESE RATS

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Introduction and Purpose: Obesity is considered a chronic metabolic disease characterized by excessive accumulation of adipose tissue that can lead to cardiac damages. The functional alterations are related to the homeostatic imbalance of the proteins involved in calcium (Ca²⁺) handling, an important mechanism responsible for the regulation of contractility and relaxation of the heart. However, the relationship between obesity, resistance training (RT) and Ca²⁺ handling still needs to be clarified. The purpose of study was to evaluate the effect of RT on myocardial contractility and protein expression of Ca²⁺ handling in obese rats.

Material and Methods: This study was approved by University of Espírito Santo Ethics Committee in the Use of Animals (CEUA-UFES 16/2016). Wistar rats were randomized, induced and exposed to the condition of obesity. Afterwards, they were redistributed into four groups as the absence or presence of RT: control (C, n = 10), obese (Ob, n = 9), control submitted to resistance training (RT, n = 11) and obese submitted to resistance training (ObRT, n = 11). The ladder RT protocol lasted for 10 weeks and consisted of 4 to 5 high intensity series by 3 days/week. Nutritional, metabolic, hormonal and biochemical parameters were analyzed. The total weight of the heart, left and right ventricles, total atrium and their respective relationships with tibial length, as well as the cross sectional area, myocardial collagen, and protein regulatory expression of Ca²⁺ handling were analyzed. Myocardial contractility was assessed by isolated cardiomyocyte. Data were expressed as mean \pm standard deviation. For the comparisons between groups C, Ob, RT and ObRT two-way analysis of variance (ANOVA) was used. The level of significance considered was 5%.

Results: Obesity promoted higher final body weight, fats pads and adiposity index than C, as well as hypertriglyceridemia and hyperleptinemia. RT reduced significantly the final body weight, epididymal and visceral fats pads, body fat and adiposity index in relation to the Ob. In the process of cardiac remodeling, despite the absence of hypertrophy, obesity led to an increase in the deposition of myocardial collagen, but promoted lower expression of pPLBser16 (C: 1.0 ± 0.6 vs. Ob: 0.4 ± 0.1) and pPLB/PLB (C: 1.0 ± 0.5 vs. Ob: 0.35 ± 0.05) when compared to C rats. Isolated cardiomyocytes showed a significant difference for fractional shortening (C = $7\% \pm 3$; RT = 11 ± 4 , and ObRT = 9 ± 2) and maximum shortening velocity (C = 1.6 ± 0.7 , RT = 3.4 ± 1.3 , and ObRT = 2.5 ± 0.7 $\mu\text{m/s}$), being higher in the RT group compared to the C and ObRT, respectively. Furthermore, obesity caused contractile cardiac damage (shortening = Ob < C) and ObRT presented significantly higher values of shortening and maximum shortening velocity than Ob rats. In addition, ObRT presented significantly higher values for the velocity of Ca²⁺ release and recapture, as well as reduction of time to peak Ca²⁺ than Ob.

Discussion: The heart adapts mechanically, electrically and morphologically according to the type and duration of physical training. According to the literature, resistance training has been shown to be efficient in altering cardiac structure and improving the function of healthy hearts and in pathological conditions, contributing to a greater effort tolerance. The improvement in the ability of Ca²⁺ recapture by the sarcoplasmic reticulum seems to be an important mechanism to improve the inotropic reserves related to the increased expression of Serca2. Obesity has a direct and indirect effect on the myocardial injury caused by the increase of reactive oxygen species, compromising the cellular metabolic process, the function of contractile proteins and consequently impairing contractility.

Conclusion: Resistance training was able to reverse the contractile dysfunction in obese rats cardiomyocytes due to an improvement in intracellular Ca²⁺ handling.

IMPORTANCE OF A MEDICAL BODY COMPOSITION ANALYZER (MBCA) IN SPORTS MEDICINE**Autores:** Burckhardt, J L, Rauen, E C

Introduction and Purpose: The importance and benefits of MBCA in Sports Medicine are several among them: Optimized training control through differentiated body composition analysis. Quality control for physiotherapy and nutrition therapy. Better evaluation of fitness level. Accurate, precise results, validated by clinical studies. Easy operation ensures smooth integration in daily routines. Assists in closely monitoring changes in body composition during injury. Basis for rehabilitation therapy goals. Segmental analysis of muscles (arms, legs, trunk) helps to define specific physiotherapy treatment. Monitors body composition over time. The evaluation of fat and muscle mass is valuable before commencing competition training or pre-season training camps. Experienced sports physicians may define cut-off values for specific sports or certain positions in order to optimize performance capacity. Young trainees often lack skeletal muscle mass to be competitive. Custom-tailored muscle development trainings and nutrition therapies are applied. Increase of muscle mass should be regulated to prevent agility deficits. BIVA is the ideal tool for these purposes. Overtraining exhaustion. Turn exhaustion into recovery. Monitoring phase angle may evaluate overtraining and exhaustion. Insufficient recovery and inadequate supply of nutrients cause phase angle decrease.

Material and Methods: Case report : A 26 year-old professional footballer ruptured his Achilles tendon during a cup match. Following initial medical examinations, conservative rehabilitation with several weeks' rest was specified due to the severity of the injury. Subsequent physiotherapy and recovery training was monitored using the seca mBCA at regular intervals.

Results: The weight did not change significantly during the total lesion interval of 5 months. The relative body fat of the athlete increased during the period without training and at the therapy, is approaching its initial level. • Measurement 1 (Week 1): 10.30% • Measurement 2 (Week 5): 12.70% • Measurement 3 (Week 8): 17.60% • Measurement 4 (Week 13): 16% • Measurement 5 (Week 22): 12.40%

Discussion: The BCC provides an ideal check on progress as body composition changes. Decisions on further treatment were made on the basis of this. The five measurements show developments over a period of 21 weeks: The first measurement was taken directly after the injury in the course of the initial examinations. The second measuring point was recorded after 4 weeks, the third measuring point after a total of 7 weeks. An almost complete break was taken during this time, with only a few physiotherapy measures instigated. Due to the severely restricted training frequency the muscle mass decreased (measuring points move to the left) and fat mass slightly increased. Following this phase of rest, a comparatively long one for well looked-after sportsmen, specific recovery training was initiated. In the course of the next 5 weeks (measuring point 4) it was possible to reduce fat mass (displacement downwards) and build up muscle mass (displacement to the right). In the final phase, the load and volume of training were continuously increased: running training, training with the ball, reintegration to team training. The fifth measuring point was recorded after another 9 weeks. The player played his first match (substitution) following the injury after over 5 months. His body composition at this point was virtually at the same level as it was before the injury.

Conclusion: Summary Despite weight being virtually unchanged, measurement with SECA Medical Body Composition Analyzer (mBCA) clearly shows that fat mass increases in the course of the initial injury lay-off while muscle mass decreased. The changes more or less cancel one another out. As treatment continued, it was possible to monitor and occasionally also adapt the rehabilitation measures specified. It was possible to manage recovery training specifically by means of valid assessment of body composition.

COMPARATIVE EFFECT OF TRADITIONAL STRENGTH TRAINING AND OLYMPIC WEIGHTLIFTING TRAINING (OW) IN HANDBALL ATHLETES**Autores:** Slovak, B, Carvalho, L, Rodrigues, F, Amaral, P C, Palma, D D, Andrade, R M**Instituições:** 1- Universidade Anhembi Morumbi, Grupo de Pesquisa Esportes e Atividade Física - São Paulo - Sao Paulo - Brasil, 2 - Handebol Diadema – E.E. Fábio Eduardo Ramos Esquivel, Diadema, São Paulo, Brasil. - Diadema - Sao Paulo - Brasil

Introduction and Purpose: Olympic weightlifting (OW), snatch and clean & jerk has been adopted as alternatives to plyometric exercise, given the power gains (Wilk and Reinold, 2001) brought about by them. However we are not aware of the effect of OW training versus traditional strength training (TST), jumping, squatting and acceleration performance in youthful handball athletes, and this is the objective of the present study.

Material and Methods: 10 handball women athletes (age 17 ± 1 , height 1.63 ± 0.06 m, body mass 57.58 ± 10.93 kg) experienced (5 ± 2 years of practice in the modality) were evaluated. After 6 weeks of regular training, the athletes underwent 8 weeks of training specifically designed for the survey, with equivalence of the total volume of training (series x reps x load) and differences in the means used. The evaluations were performed after 6 weeks of regular training (baseline), after 4 weeks of TST and after 4 weeks of OW. In each moment, body mass, stature, Vertical Jump (VJ) and Vertical Power Jump (VPJ) tests (Johnson and Nelson, 1974), acceleration of 10 (10m), 20 (20m) and 30m (Coelho et al., 2011), and 1RM in squatting (1RM) (Kravitz et al., 2003) were quantified. Mean and standard deviation were adopted. Repeated-measures designs-General Linear Model was used for comparison between the moments and groups, and Bonferroni post-hoc when needed. The level of significance was 5%. Partial Eta-squared statistic (partial η^2) was used to identify the effect size (<0.059 small, between 0.059 and 0.138 medium, and greater than 0.138 large effect size).

Results:

	Baseline	TST	OW	partial η^2 10m (s)	2.21 (0.16)	2.26 (0.21)	2.15 (0.16)**	0.620 20m (s)	3.73 (0.33) 73
(0.27)	3.56 (0.29)#*	0.697 30m(s)	5.24 (0.31)	5.22 (0.38)	5.04 (0.35)#*	0.535 VPJ (m)	0.29 (0.05)	0.28 (0.04)	0.28 (0.05)
(m)	0.34 (0.04)	0.32 (0.04)	0.32 (0.05)	0.018 1RM (kg)	77.0 (5.8)	113.8 (7.8)#	143.5 (2.1)**	1.000	*compared to TST #compared to baseline

Discussion: It was observed an increase in acceleration and 1RM and it is possible to consider the relationship between these performances, like observed in order studies that reported significant correlations of 1RM and sprint performance of 5 and 10m (Wisloff et al., 2004). Andrade (2015) evidenced a great force increase applied in the ground (FPG) during the sprint in the first 20m, with smaller oscillation from this distance until the 80 meters. Also, percentage changes of FPG in the order of 20% in the first 5m, between 5 and 10% up to 20m, and less than 5% up to 80m were observed. This phenomenon signal that the larger the FPG the more easily the body inertia (Comfort et al., 2012), ratifying the need for high force production in acceleration tasks (Harris et al., 2008). Regarding the adaptations found in the jump tests, a possible explanation may lie in the mechanical distinctions between the OW and VJ and JV means, concerning joint coordination, time to peak activation of gastrocnemius, vastus lateralis, rectus femoris, biceps femoris and gluteus maximus, peak force and power and rate of force development (MacKenzie et al., 2014).

Conclusion: OW intervention results in an increased acceleration up to 30m and maximum force, but not in vertical jump performance in youthful handball athletes.

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BILATERAL TOTAL RUPTURE OF QUADRICEPS TENDONS IN VOLLEYBALL PLAYER

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Introduction and Purpose: Quadriceps tendon rupture is relatively rare and often overlooked in emergency, it is more common in males over 40. Systemic diseases, excessive sports activity, use of steroids, anabolics and some medications also facilitate these ruptures. The injury mechanism is generally indirect. Clinical findings typically include the triad of acute pain, impaired knee extension and a suprapatellar gap. Imaging studies are useful in confirming the diagnosis. Although physical exam is determinant, the initial assessment is frequently inaccurate and delayed diagnosis is common. The aim of this work is report a case of a patient who suffered a bilateral and simultaneous complete rupture of the quadriceps tendons during a volleyball match and was treated with transosseous suture.

Material and Methods: A descriptive case report R.B.C.O, 46, male, recreational volleyball practitioner, reported bilateral knee pain after a jump landing in volleyball game two weeks previously and since then lost active extension of both legs. Physical examination revealed edema in the knees with anterior gap in the upper patella pole. Past use of anabolic steroids at age 18 (25 mg decadurobolin) and protein supplements for the past three years. He was submitted to surgical treatment at the time of admission, in which a Krakow-type suture was performed with polyester number 5 and sutured through three vertical transpatellar bone tunnels. The physical therapy started only 40 days after surgery. By that time, he has recovered active extension (ROM of the right leg 0-45 and 0-30 in the left leg). At six-month follow-up, he recovered full ROM bilaterally, good muscular strength and normal radiographic patellar height. By those time he was discharged to return to sport.

Results: Clinical diagnosis of bilateral rupture of the quadriceps tendons, evolving with active extension and ROM recovery after surgery and return to recreational sports at 6 months.

Discussion: The mechanism of this injury involved a violent contraction of the quadriceps muscle with the foot fixed to the ground and the knee slightly flexed after jumping. In addition, the exercise paralleled with the age and the previous use of anabolics are risk factors because the use of anabolic steroids promotes an exaggerated increase of muscular mass without equivalent development of tendon tissue and cause their ruptures. The 14-day wait for the transfer to the specialized hospital in traumatology, led to a delay in his treatment. Despite this, a good clinical result was achieved. For this, transpatellar suture and Krakow suture were used. This technique consists of performing three vertical transpatellar bone tunnels equidistant from each other. The sutures cross these tunnels and are tied at the distal patella. A nonabsorbable polyester suture number 5 (Polyester) is used. Studies show that approximately 83% of patients return to their previous activities, including sports practices, even though in 53% of cases they cannot reach the force intensity prior to injury.

Conclusion: The surgical technique involving Krakow suture and transpatellar sutures shows good results in the treatment of bilateral acute quadriceps tendon ruptures even when performed late, enabling a return to sports activities.

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ELECTROCARDIOGRAPHIC EVALUATION OF PROFESSIONAL SOCCER PLAYERS FROM 2018 PAULISTA CHAMPIONSHIP

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Introduction and Purpose: Professional soccer players must be cardiologically evaluated before the season begin, aiming to avoid negative outcomes. The electrocardiogram is an indispensable tool in this context and should necessarily be part of this evaluation. An experienced and qualified professional physician is required to a proper interpretation of this exam because some particularities and patterns can appear on this population. Our goal was evaluate the prevalence of electrocardiographic alterations of professional soccer players evaluated on our service during the pre season of 2018 Paulista championship.

Material and Methods: One hundred and eight athletes from five different clubs did the basal electrocardiogram. The exam was done on the same equipment and all the medical reports was made by the same cardiologist. The statistical analysis was the percentage of the alterations found according to the total number of our sample.

Results: From the total of one hundred and eight evaluated athletes, sixteen percent(16%) did not show any alteration. The most prevalent alteration of our sample was left ventricular overload on fifty five percent(55%) according to Sokolow-Lyon criteria. Thirty six percent(36%) of the athletes shown right bundle branch delay and twenty four percent(24%) was detected with early repolarization. T wave inversion was found on thirteen percent(13%) of them. Other alterations on our population was long QT, diagnosed by 459 milliseconds, atrial overload diagnosed by 3 millimeters P wave and right bundle branch block, each one of this appearing one time. It is important to say that almost forty percent(39,8%) of our population has shown more than one of this alterations above on the exam.

Discussion: The electrocardiogram alone was determinant from the cardiologic point of view for our patients. On this sample, eighty three percent(83%) of them has shown some electrocardiographic alteration. However, our population was high performance professional soccer players. Most of this alterations was reported as physical exercise and training adaptations, a well known condition nowadays on this individuals. On twenty one athletes, the alterations did not obey patterns and criteria for this cardiologic adaptation of physical exercise and training, so we indicated to the respective clubs of these athletes a cardiologist consultation as fast as possible so with physical exam and anamnesis, proceed further and deeper investigation of these patients. Three of the twenty one players was completely withdrawn from the sports practice until the consultation occur because they electrocardiographic alterations related to risk of sudden cardiac death.

Conclusion: The electrocardiogram interpretation was essential to guide our conduct. The great number of alterations was expected on our evaluated population, but the negative predictive value and low cost of the exam justifies the realization since high investments of the clubs and the need to safely approve the high performance athlete to sports practice with security. It was also important that almost a fifth(19,4%) of the sample had the indication to proceed investigation only by the exam interpretation and although a small number of only two percent(2%) was completely withdrawal, Corrado et al has proved that cardiologic pre-participation screening on professional players is fundamental.

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RESISTANCE TRAINING AS TOOL TO ENHANCE OXIDATIVE CAPACITY THROUGH BETTER CLEARANCE OF LACTATE

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Introduction and Purpose: Lactate is one of the most remarkable metabolites found during exercise but in now days still consider as responsible for starting the muscle fatigue process that ends the practice of exercise. Lactate can consider likewise a key to achieve better physical performance in many different sports modalities. In muscle cells, during intense exercise, lactate is the end product of ATP production from glycolysis process, in anaerobic conditions, when a large part of pyruvate is reduced by lactate dehydrogenase enzyme. Lactate threshold (LT), also called anaerobic threshold, corresponds to the level that body can sustain lactate and H⁺ without accumulation, and the energetic-metabolic source switches from aerobic to anaerobic. Thus, LT is considered to the best performance predictor. Increased oxidative capacity causes a decrease in lactate formation, an effect classically found in the adaptive process in aerobic training. However, the same adaptive effect resulting from prolonged exercise in resistance training (RT) remains inconsistent. To solve that question we submitted male volunteers experience in RT (n=9) and 9 male physically active non-experience in RT (NRT) to aim to compare lactate level before, during and after running for 20 min on gas exchange threshold I (GET I) zone.

Material and Methods: The 18 male volunteers were recruited, 9 healthy NRT (24.56 ± 4.82 yr, 71.99 ± 6.86 kg, 23.69 ± 3.00 BMI, 49.71 ± 8.86 mL·kg⁻¹·min⁻¹ VO₂peak) and 9 at least 6 months of experience in RT (31.33 ± 8.12 yr, 76.90 ± 10.00 kg, 25.48 ± 3.48 BMI, 49.74 ± 7.63 mL·kg⁻¹·min⁻¹ VO₂peak). All volunteers performed 3 visits with 2 days washout periods between visits. During the 1st visit, volunteers were familiarized with the aerobic treadmill protocol. Participants were advised to fast for 8h and follow their normal exercise training but avoid intense exercise 24h prior the 2nd and 3rd. On the 2nd visit, the VO₂peak of each volunteer was evaluated using an indirect calorimeter. The GET I was determined using the V-slope method as the 1st disproportionate increase in CO₂ production (VCO₂) relative to the increase in VO₂, and subsequently verified by an increase in the ventilatory equivalent for VO₂ (VE/VO₂), with no increase in VE/VCO₂. On the third the experimental protocol was performed during 20 min at GET I zone. The test began with a 3 min warm-up at 40% of VO₂peak. We collected 25 ul of blood from subject's finger in order to measure lactate before, in the middle, right after, 5 and 10 min after the 3rd set of exercise. Pulp of the fingers were properly cleaned with ethanol and freed from sweat contamination. Room temperature was kept at 24 ± 2 °C. All procedures were approved by Health Science Center at Federal University of Rio de Janeiro (#64312616.5.00005257), institutional ethics committee for research in human, subjects signed a written consent form explaining all the risks before agreeing to participate in the study.

Results: As results from blood lactate collection during the test in the GET I zone, the lactate produced by NRT group during the treadmill test wasn't different before, in the middle (p = 0.99) and right after running test (p = 0.12) when compared to the RT group on the treadmill. The results also showed that the RT group had a lactate removal capacity after 5 min at the end of the exercise significantly higher (p = 0.37) than the NRT group, but their absolute production capacity was also lower immediately right after exercise (4.37 ± 2.22 vs 6.51 ± 2.71 mmol·L⁻¹).

Discussion: Through these results, we can suggest that resistance training is a good tool enhance the oxidative capacity through the less lactate formation and better clearance.

Conclusion: Our hypothesis to improvement lactate curve during and after five minutes of GET I zone in RT group is because of the increase of the area under curve (hypertrophy) of skeletal muscle results to prolonged RT programme.

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BODY COMPOSITION IN SWIMMING ATHLETES: SPRINTERS, MIDDLE DISTANCE AND LONG DISTANCE

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Introduction and Purpose: INTRODUCTION: Swimming is a sport that requires multiple skills and a specific body composition for the different kind of tests and styles. Athletes can be divided according to the chosen competitions. These differences in tests can be correlated to other variables in athletes' body composition. AIM: To analyze the difference of body composition in adolescents' swimmers of sprinters, half funders and funders.

Material and Methods: MATERIAL AND METHODS: The sample consisted of 16 athletes adolescents swimmers from a sports club in Rio de Janeiro. The definition to the main teste in sample competed proposit for the coach. Also, they were divided according to the tests: swimmers of sprinter (group S), middle-distance (group MD), and long-distance (group LD). Body weight (digital scale) and height (stadiometer) were measured and Body Mass Index (BMI) was calculated. The dual-energy X-ray absorptiometry (DXA) of all athletes was performed, usually in the morning, at the State University of Rio de Janeiro and generated body composition results. For the accomplishment of this examination it was necessary to observe the consumption of calcium in order to assure the study's reliability. Data were expressed as mean and standard deviation and analyzed by ANOVA.

Results: RESULTS: The group S presented the following averages weight 51,83kg (±8,39), age 14 (±0,95), height 1,57m (±0,03), BMI 20,89kg/m² (±3,17), total lean mass 36,6kg (±4,31), arm lean mass 38,25kg (±0,78), lean mass android 24,49kg (±0,14), leg lean mass 11,59kg (±1,98), trunk lean mass 52,59kg (±2,45), leg fat mass 55,84kg (±1,12) and gynoid fat mass 57,46kg (±0,31). Followed by the group MD with average weight 55,57kg (±13,62), age 13,45 (±1,80), height 1,62m (±0,14), BMI 20,59kg/m² (±2,11), total fat mass 97,52kg (±2,59), arm fat mass 11,82kg (±0,28), leg fat mass 39,37kg (±0,93) and gynoid fat mass 41,69kg (±0,19). For the group LD the averages were weight 60,4kg (±9,33), age 13, height 1,65m (±0,06), BMI 22,18kg/m² (±1,50), total lean mass 46,15kg (±4,50), arm lean mass 55,74kg (±0,32), leg lean mass 15,83kg (±2,14) android lean mass 21,40kg (±0,37), trunk lean mass 21,37kg (±1,88), total fat mass 12,37kg (±4,61), arm fat mass 14,97kg (±0,81), leg fat mass 51,40kg (±2,37). Regarding the statistical analyzes, significant differences were found between GROUP S and GROUP LD for total lean mass, arm lean mass, leg lean mass, androide lean mass, trunk lean mass. For the groups LD and group MD, significant differences were found in data referring total fat mass arm fat mass leg fat mass. Lastly, differences that show significance in group S and group MD were leg fat mass and ginoide fat mass.

Discussion: DISCUSSION: The LD group differs from the S group for lean mass analysis. This first group showed a superior enhancement of the expression of lean mass, which indicates a muscularity profile turned for resistance exercises. Between the MD group and the LD group, the difference is due to the amount of fat mass, with the dieters presenting a higher percentage. This indicates that LD has a great ability to metabolize fats giving the possibility of effort's prolongation, which is crucial for those who have to maintain a high intensity of swimming in a longer period of time.

Conclusion: CONCLUSION: It is possible to conclude that each tests profile demand different physiological characteristics in the body composition of athletes. Further studies on the area should be conducted for a better understanding of swimmers' body profile.

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IMPACT OF SCAPULAR DYSKINESIS IN THE EXPRESSION OF SHOULDER STRENGTH OF INDIVIDUALS TRAINED IN WEIGHTLIFTING

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Introduction and Purpose: During movements of the upper limbs, the scapula plays an essential role as a link between the trunk and the arms, transferring and increasing the energy and power of the lower extremities and trunk towards the mobile limb. To perform this task, the scapula must be at the correct position and all scapular muscles must be activated at the right time and contracted enough to allow the reaction forces of the ground to be transferred to the shoulder and finally to the hand. Scapular dyskinesis is an alteration of the position and movement of the scapula due to deficits of activation of different muscles that originate or insert in it. In particular, the researchers systematically demonstrated a decrease in anterior serratus strength, hyperreactivity and early activation of the upper trapezius (resulting in excessive shoulder shrug of the shoulder girdle during arm elevation) and hyporeactivity and late activation of the mid and lower trapezius. In general, identified deviations can be summarized as a lack of upward scapular rotation, posterior inclination and external rotation, increased elevation and clavicular retraction. These can be related or not with pain, soft tissue stiffness, fatigue or thoracic posture which, in association with the dysfunction in the activation or strength of the musculature predispose alterations of the kinematics of the scapula. This can interrupt the kinetic chain of the shoulder. Many studies investigating scapular dyskinesia related to shoulder pain have been performed in patients with impingement symptoms and rotator cuff pathology, especially in untrained patients. Thus, we performed this work with the objective to evaluate the impact of scapular dyskinesis in shoulder strength parameters in asymptomatic weightlifters.

Material and Methods: This was a cross-sectional study in which we included subjects with more than twelve months of continuous resistance training with no history of shoulder pain. Bilateral isokinetic dynamometry of the shoulders and clinical examination of the scapula's static and dynamics were performed, being considered positive for dyskinesis patients with static prominence of any scapular margin and / or anomalous scapular kinetics.

Results: In the group with scapular dyskinesis, the average power at a speed of 60° per second was reduced in internal rotation (29.3 vs 35.82), flexion (48.58 vs 54.08) and abduction (37.91 vs 47.31). At a speed of 180° per second, there was also a reduction in average power of internal rotation (48.55 vs 63.20), flexion (69.21 vs 79.88) and abduction (45.53 vs 63.21). These results were statistically significant ($p < 5\%$). There were no statistical differences in the movements of external rotation, extension and adduction variables.

Discussion: The average powers of abduction, flexion and internal rotation movements are decreased in individuals who present scapular dyskinesis on physical examination. Our data suggest that the presence of this alteration, even in asymptomatic individuals, impacts the expression of strength and, consequently, possibly affects the training capacity. These are preliminary data of a work in progress, so the incomplete sample does not confirm all the results, especially the negative ones.

Conclusion: Although the design of this study could not confirm this hypothesis, addressing scapular control in asymptomatic weightlifters with scapular dyskinesia may positively impact the performance of these individuals.

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CAN THE PRACTICE OF MIXED MARTIAL ARTS (MMA) LEAD TO MYOCARDIAL FIBROSIS?

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Introduction and Purpose: To achieve high performance in sports, athletes undergo intense physical training that results in cardiac physiological changes. The type, intensity, duration and frequency of physical training are determinants of cardiovascular adaptations as a result of eccentric ventricular hypertrophy and left chamber dilatation. In sports, anabolic androgenic steroids (AAS) are used to increase physical strength and muscle mass, however, can lead to ventricular hypertrophy and fibrosis. There are no concise reports in the literature on high intensity training and fibrosis, this study directs the research to this correlation in order to clarify the subject OBJECTIVE: To identify the presence of myocardial fibrosis through the presence of late enhancement in magnetic resonance imaging performed in an MMA athlete

Material and Methods: MRI of 22 professional MMA athletes averaged 26.8 years and mean training time of 8 hours / day. The MRI data were obtained using the Steady State Free Precession cine-resonance technique and anamnesis on the use of anabolic steroids. All of them were evaluated by extracting data related to the morphological study of the cardiac chambers, left ventricular systolic and diastolic diameters (VE), left atrial diameter (AE), interventricular septum and LV posterior wall thickness, shortening fraction, and diameter of the right ventricle. LV mass was calculated based on Devereaux's formula and corrected for body surface area (LVMI).

Results: 27% standard typical athlete's heart, 32% with left ventricular dilatation, and 14% with left ventricular hypertrophy. In addition, in 18% of the athletes, there was a mild to moderate late enhancement and 9% biventricular dilatation, 36% of the athletes reported using anabolic steroids.

Discussion: It was identified through magnetic resonance imaging that 82% of the athletes presented cardiological alterations. In this study, myocardial fibrosis was found in 18% of the cases.

Conclusion: These data show that intense resisted physical activity may be associated with myocardial fibrosis in athletes who are not under anabolic effect. According to the literature, even postmortem studies show such findings, but more research is needed

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DOPING AMONG ATHLETES WITH DISABILITIES - THE CHARACTER AND DOCUMENTED USE OF PROHIBITED SUBSTANCES

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Introduction and Purpose: The application of pharmacological substances in order to enhance performance has been known for over 100 years. Presently, the application of prohibited substances (PS) is common not only in professional sport. Similarly, together with an increase in competition, attempts at enhancing endurance capabilities by applying PS were made in sport for the disabled. The aim of this work is to present the phenomenon of doping among athletes with disabilities and to analyse the frequency of using PS on the basis of the available literature and International Paralympic Committee (IPC) reports from anti-doping tests carried out among disabled athletes.

Material and Methods: In order to present the extent of doping use among athletes with disabilities, mainly reports from the anti-doping controls carried out in the years 2007-2017 and presented on the IPC website were used. Moreover, the results of tests carried out during Paralympic Games (PG) in the years 1988-2016. The data obtained from the reports were presented separately in numbers and percentages and underwent descriptive analyses.

Results: The first anti-doping samples were taken from wheelchair athletes during the PG in Stoke Mandeville in 1984. The first case of using prohibited substances by paralympic athletes was noted during anti-doping tests at the PG in Seul 1988 (1 positive result was noted out). During PG (1984- 2016) 6815 anti-doping tests were carried out but only 37 were positive. Whereas in the reports of the IPC (2007-2017) 24 355 doping tests in paralympic sports and other disabled sports were carried out. In these years, 61 results were positive so the percentage is low (0.24%). The substances which were most often identified were anabolic androgenic steroids. Powerlifting competitors dominated among athletes who were suspended. The second biggest group of suspended athletes were athletics competitors. The analysis revealed that the number of anti-doping tests was growing. It was particularly visible in 2012, when the number of tests was doubled and reached 1082.

Discussion: From the available resources it is hard to establish when anti-doping tests for athletes with disabilities started to be used in particular countries. For example, in Germany, anti-doping tests for athletes with disabilities were established in 1992. In turn, in Poland, the first available results come from 2004. The review of literature dealing with the issue of doping among athletes with disabilities revealed a slight interest in this problem. Since 2007, on their website, the IPC has been publishing annual reports from the anti-doping tests carried out among disabled athletes doing paralympic and other sports. Moreover, what is significant, the IPC regularly publishes information concerning athletes violating anti-doping regulations and updated lists of suspended athletes. Rules regarding periods of suspension applied in the paralympic sports are stricter than in the Olympic sports. It should be noted that already in 2004, the IPC applied disqualification for life in the case of athletes who violated anti-doping regulations for the second time. The Olympic year 2016 has seen almost unprecedented controversy over doping. World Anti-Doping Agency confirmed the information that the Russian government supported pro-doping activities. IPC was more radical than IOC and excluded Russia from participating in the PG in Rio de Janeiro.

Conclusion: The prevalence of doping among athletes with disabilities should provoke anti-doping strategies based on more frequent anti-doping controls, especially educational interventions and informing about harmful effects of doping agents for human health.

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ACE I/D POLYMORPHISM AND MUSCLE INJURIES IN ITALIAN AND JAPANESE ELITE FOOTBALL PLAYERS

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Introduction and Purpose: A functional insertion (I)/deletion (D) polymorphism (rs4646944) in the angiotensin I-converting enzyme (ACE) gene has been associated with ACE activity. Different concentrations of circulatory creatine kinase (CK), which is a marker of exercise-induced muscle damage, between ACE I/D genotypes after eccentric exercise has also been observed: subjects with II genotype was higher than those with DD genotype. This finding suggests that the D-allele is associated with a lower susceptibility to muscle damage. Therefore, we hypothesized that the ACE I/D polymorphism could be associated with muscle injuries in elite football players, because it is possible that greater muscle damage following strenuous exercise leads to muscle injuries such as muscle strain. The aim of this study was to clarify the association between the ACE I/D polymorphism and muscle injuries in a large cohort of elite football players from two different countries.

Material and Methods: Five hundred thirty-six male elite football players from Italy (n=167, age 19.9±5yrs; height 178.1±7.1cm; weight 69.7±9.1kg) and Japan (n=369, age 20.8±1.4; height 174.1±6.2; weight 69.1±6.8) were recruited for the study. Genomic DNA was extracted from either buccal epithelium or saliva using a standard protocol. Structural-mechanical injuries and functional muscle disorders were collected during the period of 2009 to 2017 by medical doctors in Italian cohort and by questionnaire in Japanese cohort. ACE I/D genotype distributions were compared between cases (Italian injured football players, n=67; Japanese injured football players, n=37) and controls (Italian non-injured football players, n=100; Japanese non-injured football players, n=332) under D-dominant (DD+ID versus II), D-recessive (DD versus ID+II), and D-additive (DD versus ID versus II) models. A meta-analysis has been performed using Review Manager 5.3.5 (<http://tech.cochrane.org/revman>). Hardy-Weinberg and odds ratio (OR) analyses with a confidence intervals (CI) of 95% were also performed.

Results: The genotypes distribution related to the ACE I/D polymorphism were in Hardy-Weinberg equilibrium in both cohorts. In Japanese cohort, ACE I/D polymorphism was significantly associated with muscle injury under D-dominant model (OR: 0.48, 95% CI: 0.24-0.95, P=0.036). In Italian cohort, there was no significant association between ACE I/D polymorphism and muscle injury. However, the association had a same direction of effect as in Japanese cohort. Meta-analysis showed that in the pooled model (Italian and Japanese populations), genotype frequency of DD+ID was significantly lower in injured group than in non-injured group (OR: 0.48, 95% CI: 0.27-0.86, P=0.01) with low heterogeneity (I² = 0%).

Discussion: In the present study we found, for the first time, the association between ACE I/D polymorphism and muscle injury. The carriers of the D allele (ID+DD genotypes) were lower in injured group respect to the non-injured group in two different ethnicities. These results suggest a protective effect of the D allele in developing muscle injuries among football players regardless ethnicity, in contrast to athletic performance. The results of our study support previous finding that D-allele carriers could have a protective effect against muscle damage after eccentric exercise.

Conclusion: Our findings suggest that the ACE I/D polymorphism is one of the genetic variants that could influence the susceptibility to developing muscle injuries among football players. Further studies are needed to confirm these findings in other professional football player cohorts.

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THE CURRENT PANORAMA OF THE TRANSEXUAL ATHLETE: HIS INSERTION AND VISIBILITY ON SPORT

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Introduction and Purpose: The change in social views and laws about sexuality has meant an increasing number of cases of transgender and transsexual athletes in sport. This present study aims at to do a review about the level of competition equality between transgender athletes and the other ones. Besides that, the need to evaluate the process of inclusion of transsexual athletes in sports is relevant. Since most of these people face difficulties and prejudice.

Material and Methods: Were identified relevant articles from the peer reviewed scientific literature through searches of the PubMed/ Medline, OVID, SPORTDiscus, CINAHL, and Evidence Based Medicine Reviews databases. Keywords and phrases used during the searches included athletes, gender, performance, transgender, transsexual and prejudice. Searches were filtered to the English language.

Results: Analyzing researches into the advantage that transgender women could confront, Gooren and Bunck measured testosterone and hemoglobin levels in transgender women with a year of sex reassignment surgery. Was reported that the levels of testosterone and hemoglobin are in female range in transgender women. In other studies, realized by T'Sjoen, Weyers, Taes, Van Kesteren and Lips, low testosterone levels in male-to-female (MTF) transgenders under hormone replacement therapy (HRT) were reported. The antiandrogen hormone therapy had as consequence a loss of muscle mass, an increase in fat mass, and a decrease in bone mineral density. Significant changes in the MTF transgender are apparent in the first phase of HRT (from month 6 to month 12). These findings provide some evidence for the recommendations by the IOC to allow transgender women to compete assuming that controlling the levels of these hormones removes the vast majority of the advantage of having been male. Many young competitors have to face some challenges in the beginning of the sportist life and these challenges get harder when it comes to elite sports. Most of transgender people are at risk for teasing and harassment, what can definitely affect mental health and sport performance during their lives. At present, there are many kinds of policies to include transgenders in athletic associations, since schools till national olimpic organizations.

Discussion: The most recent decision on gender by the International Olympic Committee (IOC) came on January 24, 2016 when the IOC Executive Committee decided that to require surgical anatomical changes as a pre-condition to participation is not necessary to preserve fair competition. They decided that the eligibility criteria to compete in male and female competition was that those who transition from female to male are eligible to compete in the male category without restriction. According to IOC, those who transition from MTF are eligible to compete in the female category under some following conditions. The athlete has to declare her gender identity as female. Besides that, the athlete must demonstrate total testosterone serum level below 10 nmol/L for at least 12 months prior to her first dosage. The athlete's total testosterone level in serum must remain below 10 nmol/L throughout the period of desired eligibility to compete in the female category and compliance with these conditions may be monitored by testing.

Conclusion: Although the inclusion policies for transsexual athletes are advancing, it is still necessary to reflect on the difficulties and prejudices found by these athletes to consolidate themselves in the sporting environment. The discussion about their participation should continue, not only in International Committees but also at national and regional levels. This inclusion policies may be on the spectrum of least to most inclusive. It is fundamental for these people to know they will be accepted, trained and able to compete with no kind of judgment or injustice. That's why the IOC policy for the participation of transsexual / transgender athletes in olimpic events is a conquest.

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ANALYSIS OF PRECISION AND ACCURACY IN ANTHROPOMETRY: A COMPARATIVE STUDY BETWEEN DIFFERENT SKINFOLD CALIPERS

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Introduction and Purpose: The body composition analysis is a tool widely used by health and sports professionals to evaluate an intervention effects or predict risk and performance index. Currently, there are several models of skinfold calipers being marketed to measure skin folds. The present study aimed to evaluate the different skinfold calipers precision and accuracy.

Material and Methods: Nine different skinfold calipers were evaluate: Body Caliper (Valtro, Italy), Innovare (Cescorf, Brazil), Neo Prime (Prime, Brazil), Lange (Beta Inc, USA) and Slim Guide (Rosscraft, Canada) clinical models, Harpenden (Baty Int, England), Holtain (Crosswell, England), Premier (Cescorf, Brazil) e Digital (Cescorf, Brazil) scientific models. A load cells device been development to evaluate the different range by jaws: 10, 15, 20, 25, 30, 35, 40, 45 e 50 mm. Two measurements were performed in each range of motion by jaws, using the mean to calculate the precision (TEM-INTRA) and the accuracy (TEM-INTER) to the different skinfold calipers. The values of the Harpenden skinfold caliper were adopted as gold standard. Data are presented in mean and standard deviation, with significant TEM-INTRA > 1% and TEM-INTER > 5%.

Results: Satisfactory precision was observed in Holtain (0.35 ± 0.21), Harpenden (0.39 ± 0.35), Cescorf Digital (0.49 ± 0.39), Cescorf Premier (0.61 ± 0.52), Neo Prime (0.49 ± 0.39), Slim Guide (0.54 ± 0.41), Lange (0.75 ± 0.74) and Cescorf Innovare (0.83 ± 0.63) models. Only the model of the Body Caliper (3.93 ± 2.53) not have shown precision in measures. About accuracy solely, Cescorf Innovare (4.79 ± 3.89), Premier (3.61 ± 0.85) and Digital (4.44 ± 3.26) models shown acceptable levels. While the others skinfold calipers: Holtain (17.05 ± 4.30), Slim Guide (15.03 ± 7.99), Neo Prime (23.82 ± 10.35), Lange (57.88 ± 9.47) and Body Caliper (143.68 ± 33.03) not shown the same accuracy.

Discussion: In order to be reliable, it must comply with certain characteristics, such as constant spring tension (8-10 g/mm²) over the whole range (0-80 mm), spring angle to compensate for Hooke's Law and the distance of the pivot contact arms (152.4 mm). Misplacing these parts can compromise the precision and accuracy of a measurement. The investigated equipment exhibits different structural characteristics, such as the absence of vertical springs or springs. These characteristics may overestimate or underestimate the actual values due to lower or greater soft tissue compressibility.

Conclusion: The present data shows a large variability in between the skinfold calipers, which can compromise the reliability of the measured data and, consequently, the analysis of the body composition.

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MUSCLE-BONE INDEX: A NEW PARADIGM FOR THE MONITORING OF ATHLETES PERFORMANCE

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Introduction and Purpose: The growing interest in investigating the anthropometric profile of different athletes has provided a series of information that helps the technical team to select youngsters who present a biomechanical advantage for a given sport, to monitor the performance of their athletes and possible imbalances that may cause injury. Judo is an Olympic sport that follows an order by gender category and body mass. Admittedly, the strength production and muscle mass are decisive in Judo. However, there is no information on the muscular development that an athlete can reach, considering the ability to sustain greater traction. In this sense, the muscle-bone index emerges as an interesting tool to monitor the athletes' development, given their practicality and low cost. The present study aimed to evaluate the muscle-bone index in elite male judokas and to compare it with university students matched by body mass and age.

Material and Methods: The anthropometric profile of the Brazilian judo team and of male college students' was assessed according to ISAK recommendations. The five-component tissue analysis model was applied to predict adipose, bone, muscle, residual, and skin mass. Bone muscle index was evaluated dividing the muscle mass by the bone mass. The sample was composed of eight high-performance athletes from a men's judo team, from four categories: extra-lightweight (n = 2), half-lightweight (n = 1), lightweight (n = 3), and half-heavyweight (n = 2). Additionally, 45 male college students' were used to compose the control group. Data were analyzed in Graph-PAD Prism, using the Mann-Whitney test with 95% confidence (p<0.05). The Cohen's d effect size was used to determine the standardized difference. Values expressed in median [min - max].

Results: Judokas presented greater muscle mass (40.5 kg [33.4 - 56.5] vs 30.9 kg [23.2 - 46.1]; p<0.001), lower adipose tissue (15.8 kg [12.2 - 25.1] vs 21.1 kg [14.0 - 54.9]; p=0.019) and similar bone mass (8.7 kg [6.9 - 10.7] vs 9.1 kg [6.7 - 11.1]; p=0.494) than male students. The muscle-bone index was 4.96 [4.44 - 5.33] vs 3.50 kg [2.50 - 5.00] (p<0.001) in favor of athletes, indicating a very large effect size (d = 2.49).

Discussion: The muscles and bones development during childhood can be influenced by gravitational forces associated with body mass and physical activity levels. In this case, the imposed training load can also have an effect on the plastic component of athletes (muscle mass). However, it is believed that there may be a limit for the structural component (bone mass) to support this demand. Thus, it would be possible to visualize the muscular potential that an athlete can reach and its limit to avoid recurring injuries.

Conclusion: Male judokas have a higher muscle-bone index than matched university students by sex, age, and body mass. This index emerges with strong potential to monitor the athlete's muscular development and to indicate new training strategies.

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EFFECT OF AEROBIC EXERCISE TRAINING ON ELDERLY PEOPLE FUNCTIONAL CAPACITY: A RANDOMIZED CONTROLLED STUDY

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Introduction and Purpose: Introduction: The population of elderly people in the world has increased in recent decades. Aging causes loss of physical capacity, thus undermining elderly people's essential daily activities. Physical training can minimize the deleterious effects of aging, contributing to a better daily life autonomy. Walking is one of the forms of physical exercise, however there is a need for greater investigations on its effectiveness in improving functional capacity (FC) of elderly people. Objective: To analyze the effect of physical training in elderly people's FC.

Material and Methods: Methods and Material: Research with healthy elderly people randomly distributed into two groups, training group (TG) and control group (CG). Prior to the training sessions the patients answered the Protocol "Older Americans Resources and Services" (OARS) which analyses elderly people's FC in a multidimensional manner. The training for the TG was designed according to the American College Sport Medicine which consisted of a walk of 30 min., 3 times a week for 3 months with intensity from 50% to 75% of the HRpeak obtained on a previous maximum effort test. The CG was instructed not to engage in systematic walking exercise during TG training period. At the end of the 36th training session the patients underwent a second FC evaluation. The Ethics Committee of the Universidade Federal de São Paulo approved the research (05599/03). For statistical test Spearman Correlation with a significance level of p ≤ 0.05 was used.

Results: Results: The TG had 40 patients with a mean age of 68.2 (± 5.5) years, 67% were females, average body mass of 73 pounds (± 12.6), height of 1.61 cm (± 0.1 cm), BMI of 28.5 kg/m² (± 4.9 kg/m²). While in CG there were 29 patients, with mean age of 68.4 (± 4.5), 79% were females, BMI of 67.7 kg (± 14.6), height of 1.57 cm (± 0.1 cm), BMI of 27.3 kg/m² (± 4.5 kg/m²). The TG presented changes in functional capacity [OARS (unit) 2.3 to 1.2 (p = 0.002) Δ% of 47]. There was a weak correlation between physical capabilities analyzed by relative VO₂peak and functional capacities in the TG [VO₂peak and FC (r = 0.43; p = 0.005)]. While the GC showed no change in functional capacity [OARS (unit) 2.1 to 2.4 (p = 0.45) Δ% = -15]. The correlation between physical and functional capacities resulted in a weak and negative level in CG [VO₂peak and FC (r = -0.32; p = 0.09)].

Discussion: Discussion: The main result of this study was that a brief aerobic physical training: three times a week frequency during 30 minutes in non-strenuous intensity was effective in improving the functional capacity of patients, although there were not high correlations with the aerobic capacity analyzed by peak oxygen consumption. Researches involving diabetic patients with the same age and training profile, also reported improvements in functional capacity. In addition, other researchers have obtained as result improvements in functional capacity in elderly patients with trained with walking exercises, also contributing to physical rehabilitation.

Conclusion: Conclusion: The aerobic physical training increased functional capacity in elderly people, resulting in a better condition for performing in daily activities, physical autonomy and quality of life for patients.

MECHANISMS OF MUSCULOSKELETIC INJURIES IN CROSSFIT® PRATICANTS OF BELÉM-PA

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Introduction and Purpose: CrossFit® is a fitness standard created by Greg Glassman in 1995 and founded in 2000 in the United States. It is a fitness program that promotes strength and endurance. First, applied to military practices, it presented remarkable results, attracting, thus, part of the physically active population interested in the sport in ascension. The lack of defined patterns in CrossFit®, in the variety of daily exercises, does not fit well-known concepts for muscular development, when added to the reduced recovery time of high volume, can cause: premature fatigue, extra oxidative stress, exercise, greater perception of effort and decrease in technical competence during the execution of the movement, precipitating acute injuries. These data associate CrossFit® with the potential risk of injury. It should be noted that most of the lesions are musculoskeletal. The literature presents controversial data regarding the incidence of these lesions. Variations of 19.4% to 73.5% of the injuries in CrossFit® practitioners are observed. This work aims to define the main mechanisms of musculoskeletal injuries in CrossFit® practitioners in the metropolitan region of Belém-PA.

Material and Methods: Observational and analytical study. A total of 68 athletes ($\alpha < 0.05$) were evaluated in 5 CrossFit boxes accredited in the metropolitan area of Belém-PA, as a criterion for inclusion over 18 years old, who had at least one lesion during CrossFit practice - totaling 85 injuries -, and exclusion participants from boxes not accredited by the CrossFit® brand.

Results: The most prevalent injury mechanism was weight lifting ($n = 47, 55.3\%$). Other mechanisms were: ballistic gymnastics ($n = 17, 20.0\%$), jumps ($n = 6, 7.1\%$), equipment shock ($n = 6, 7.1\%$), falls ($n = 3, 3.5\%$), pitch / pitch ($n = 2, 2.3\%$).

Discussion: CrossFit® exercises involve snatch, clean and jerk, ballistic gymnastics movements (pull-ups, toes-to-bar, knees-to-elbows, lunges, muscleups, burpees, dips, gluteus-hamstring developer sit-ups, push-ups, rope climbs, handstand push-ups, squat pistols, deadlift, press / push press, bench press) and races. In Oliveira (2016), Cohen and Abdalla (2015), the authors affirm that one of the mechanisms triggering muscular injuries is the abrupt and / or excessive stretching in contraction of the musculature. Information that allows the understanding of the high prevalence of injuries with weightlifting (55.3%) found. It is worth mentioning that one of the most popular exercises in CrossFit® can exemplify such a mechanism of jerky muscle stretching associated with weight lifting, which is clean and jerk - consisting of a complex starting movement to place the exercise bar up to shoulder height, and then in a new, swift and powerful movement, move the bar until you extend your arms above your head.

Conclusion: From the study, the most prevalent injury mechanism was the snatch, clean and jerk, since it requires mobilization of various muscles and joints. Other determinants such as overtraining, poor physical fitness, and history of previous injuries are possible causes for these injuries.

THE PRACTICE OF PHYSICAL EXERCISE IN HIGH-RISK PREGNANT WOMEN: A SYSTEMATIC REVIEW

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Introduction and Purpose: Physical exercise is defined as a structured, methodical, and repetitive physical activity that aims to maintain or optimize conditioning. Since the 1950's, medical studies have associated exercise with numerous beneficial outcomes, and in recent years, there has been an escalation of adherents' to physical exercise practices, predominantly among the female populace, including pregnant women. This practice, previously discouraged for pregnant women, nowadays has recommendations well established by the ACOG (American College of Obstetricians and Gynaecologists), due to the several benefits. Conversely, there are pregnancies that have associated risk factors or that are affected through certain pathologies, known as the high-risk pregnancies and, for this unambiguous group, there is not enough evidence to prove risks and benefits of regular physical exercise. Therefore, this study aims to evaluate the effects of physical exercise on maternal-fetal health in high-risk pregnant women.

Material and Methods: A systematic review study conducted on the MEDLINE / PubMed, LILACS, SciELO and Cochrane search platforms without language or study period limitations. Six randomized clinical trials were analysed, using the regular and supervised practice of physical exercise plans as an intervention. Key words: exercise, pregnancy, high-risk.

Results: Six trials with 288 participants, who were exposed to various exercise interventions, showed that the practice of physical exercise was successful in the prevention and control of Gestational Diabetes Mellitus (GDM), but had divergent results concerning the prevention of gestational hypertensive disorders and with regard to favorable fetal outcomes.

Discussion: Regarding the prevention and control of GDM, three out of four studies were successful in the prevention and/or control of GDM, and the study that did not obtain positive outcomes had, as limitations, many withdrawals and lack of commitment to the exercise program. Regarding the prevention of hypertensive syndromes, two studies showed a decrease in blood pressure, but without expressive results in the prevention of hypertensive syndromes of pregnancy. However, studies that implemented yoga and stretching have shown to be effective in preventing these syndromes, suggesting the important role of antioxidants, which has greater expression in patients exposed to stretching protocols. Regarding fetal outcomes, children born to mothers who exercised had better Apgar scores and fewer newborns for gestational age, but with no difference in birth weight. In addition, there was no increase in the number of preterm births, miscarriages or other adverse events.

Conclusion: If supervised, the risks of physical exercise are minimal. The practice of supervised exercise is effective in the prevention and control of GDM in high-risk pregnant women. Stretching and yoga activities suggest to be more effective in preventing hypertensive syndromes, however, more clinical studies need to be done to better investigate the relationship between exercise in high-risk pregnant women and maternal-fetal outcomes.

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LÖFFLER'S SYNDROME IN A TRIATHLETE: A CASE REPORT

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Introduction and Purpose: Simple Eosinophilic Pneumonia was first described in 1932 by Wilhelm Löffler, being characterized by migratory pulmonary infiltrates and associated with high peripheral eosinophilia. It is usually caused by a hypersensitivity reaction to larvae such as *Ascaris lumbricoides* and hookworms, but is rarely present, especially in athletes. We present the case of a professional triathlete who evolved with respiratory symptoms (dyspnea and hemoptotic spasm) associated with migratory pulmonary infiltrates.

Material and Methods: The data related to this case report were collected directly from the patient and his medical record, as well as results of laboratory and image tests.

Results: A 17-year-old male, from the São Carlos, state of São Paulo, a professional triathlete, was referred to the Sports Pneumology Department of the Hospital das Clínicas da Faculdade de Medicina da Universidade de São Paulo in September 2016 to investigate dyspnea and hemoptotic sputum of 9 months of evolution, associated to a decrease in sports performance. He referred progressive dyspnea, dry cough and ventilator-dependent chest pain, with symptoms during and after training, resulting in withdrawal from the sport. He denied symptoms of upper airways, fever and weight loss, as well as pathological antecedents, smoking and alcoholism. He reported training on open lanes and pools, but some competitions took place in ponds without water quality control. He had chest tomography of the previous month, with a small peripheral consolidation in the lower right lobe (LID), and a hemogram with notorious eosinophilia (847 eosinophils/mm³ or 8%). As a complementary investigation, and to schedule a possible biopsy, the patient was submitted to a new chest tomography, which showed a sequelae alteration in LID, but with a new consolidation of similar characteristics, in the lower left lobe. Other tests were performed to rule out differential diagnoses. Bronchoscopy with bronchoalveolar lavage showed negative results for mycobacterial and fungal studies and cultures, with lymphocytosis. Transbronchial biopsy had nonspecific characteristics. And the protoparasitological stool examination was negative. Next, a transthoracic biopsy of the focus of the new pulmonary consolidation was performed, without larvae or eggs, yet with eosinophilic infiltrate, corroborating with the diagnosis of Löffler's Syndrome. Thus, the patient was treated with Ivermectin and evolved with remission of symptoms, eosinophilia and pulmonary consolidation, remaining asymptomatic after 12 months of follow-up and returning to usual training.

Discussion: Pulmonary involvement by protozoa and parasites comprises a broad spectrum of diseases of great morbidity, difficult to diagnose, and decreasing incidence after the establishment of better hygiene conditions in the world population. It is worth noting the report of this diagnosis in a patient with good socioeconomic and cultural condition, submitted to frequent medical evaluations, but submitted to exposure to sea water and ponds, where a correlation between levels of contamination and prevalence of infectious diseases is known.

Conclusion: Although pulmonary involvement by parasites is an uncommon event, it is of great morbidity, with nonspecific clinical and radiological manifestations, making the diagnosis more difficult. This case report demonstrates the importance of knowing the epidemiological aspects of this group of diseases, as well as the importance of adequate data exploration such as recent trips, hygiene habits, food intake and training site, in order to ensure that parasitic infestation part of the range of differential diagnoses, allowing to provide adequate and early treatment.

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CORRELATION BETWEEN SEXUAL AND TRAINING VARIABLES WITH BODY COMPOSITION OF FEMALE ATHLETES IN ADOLESCENCE

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Introduction and Purpose: Adolescence is the period of women's life most knowingly to occur hormonal and physical changes. The practice of sports and its variables, like the total time that athletes dedicates of their lives, during that phase can modify the development throughout this relation and impact responses like the delay of age of menarch. The study of those variables, support the understanding of significant factors that could impact on growth and development in a crucial age. The aim of the study is to observe the correlation between time of practicing sports before menarch (TPSBM) with the age of first menarch (AFM) and how it correlates with body composition (BC).

Material and Methods: Eighteen adolescents, with age between ten and nineteen, practitioners of three Olympic sports, were selected to be evaluated for anthropometric values, training time characteristics and menstruation cycle. For anthropometric values, were collected height (stadiometer) and weight (digital scale). They also performed a tetra polar bioimpedance exam that provided the percentage of body fat mass and body fat free mass. Training data was obtained using a specific questionnaire answered by all athletes. All data were spelled out in specific spreadsheet by trained students and the statistical analysis followed Pearson correlation. Results were exposed in mean and standard deviation for group characterization; "r" is used to show the strongest correlation results.

Results: The subjects' sample has mean and standard deviation respectively of age ($14,7 \pm 3,17$), TPSBM ($3,8 \pm 3,6$), AFM ($11,7 \pm 2$), total body mass ($53,0 \pm 7,3$), body fat mass percentage ($27,6 \pm 4,2$) and body fat free mass ($72,4 \pm 4,2$). Looking for Person Correlation results, TPSBM correlates with AFM ($r=0,67$); body fat mass percentage ($r=0,5623$) and with body fat free mass percentage ($r=-0,5623$) while AFM also correlates with body fat mass percentage ($r=0,6507$) and with body fat free mass percentage ($r=-0,6507$).

Discussion: Results indicates a way for understanding that sports can impact body composition by relation between TPSBM and AFM as a consequence of a possible delay of menarch. TPSBM has a positive correlation with AFM, indicating that athletes who start to practice sports earlier tends to have menarch later. Both TPSBM and AFM have a positive correlation with body composition variables, supporting that when athlete train earlier in life, has an impact on growing up the body fat mass percentage. The correlation suggests that early high performance exercise may retards AFM and taking to a higher fat mass and lower fat free mass in the future.

Conclusion: The study provides information that support the importance of performance training in an early age, and its relationship with physiological mechanisms. Changes of body composition are crucial for performance and understand how its relation happen is importante to try to modulate underirable outcomes during competitions. However, more studies are necessary for a thorough analysis.

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SCAT 3 ANALYSIS AT PRE-SEASON IN BRAZILIAN SOCCER ATHLETES IN 2017

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Introduction and Purpose: Cerebral concussion is defined by functional pathological changes in the brain without structural injury, caused by direct impact on the face, head or neck or indirect impact with transmission of force to the brain. Clinically, symptoms install quickly and usually resolve in a short period. It is frequently in contact sports, like soccer and American football. The clinical diagnosis is hampered by its wide clinical presentation and the absence, so far, of accessible imaging tests for its identification. The instrument SCAT 3™ (Sport Concussion Assessment Tool - 3rd Edition) has been created for evaluating athletes who have suffered concussion and can be used both during the sporting event as a predictor of concussion severity and for longitudinal evaluation of the athlete. The objective of this study is to evaluate the prevalence of concussion and its symptoms and cognitive tests in soccer players of the pre-season São Paulo championship.

Material and Methods: A retrospective cross-sectional study was carried out to review the medical records of 120 professional soccer players from November 2016 to February 2017, at the Centro de Traumatologia do Esporte (CETE) /Universidade Federal de São Paulo (UNIFESP). All individuals were evaluated by SCAT3 in Portuguese. The data were tabulated in an Excel® worksheet, and the presence or absence of concussion and its symptoms were plotted and the cognitive evaluation tests were counted. The tests consist of four domains: orientation, immediate memory, concentration, late memory. It was verified maximum, minimum and intermediate marks for each of the domains. After this process, an evaluation was made of the prevalence of concussion, its symptoms and the results of cognitive tests.

Results: Of the 120 questionnaires evaluated, 32 reports previous concussion were found, 0 cases of current concussion. The prevalence of concussion was 32%. As for symptomatology, there was 1 report of head pressure (1% prevalence), 4 neck pain (3%), 0 nausea or vomiting, 2 dizziness (2%), 2 blurred vision (2%), 3 problems of balance (3%), 6 of sensitivity to light (5%), 4 of sensitivity to noise (3%), 15 feeling slow (13%), something is wrong (4%), 7 low concentration (6%), 24 difficulty to remember (20%), 40 fatigue (33%), 1 confusion (1%), 28 drowsiness (18%), 17 feeling emotional (14%), 24 irritability (20%), 10 sadness (8%) and 29 nervous or anxious (24%). Cognitive tests are measured with a maximum score of 5 for orientation, concentration, and late memory, and 15 for immediate memory. The minimum grade is 0 for all and the intermediate grade consists of the values that permeate the maximum and the minimum. It was observed 91 maximum tests (76% prevalence), 29 intermediate tests (24%) and 0 minimum tests in the orientation domain. 76 maximum (63%), 44 intermediate (37%) and 0 minimum in the immediate memory domain; 16 (13%), 92 (77%) and 12 minimum (10%) in the concentration domain; 36 (30%), 83 (69%) and 1 (1%) in the late memory domain.

Discussion: In the study population, a higher frequency of "low concentration", "fatigue", "drowsiness", "sleep disturbance", "irritability" and "anxious" symptoms was observed and there were no athletes suffered concussion recently. As well as a high percentage of concentration tests and late memory were observed in intermediate values. SCAT 3™ is a tool for cross-evaluation of the individual, which makes it difficult to correlate these symptoms and tests with the concussion itself, since this condition is heterogeneous and can be confused with other situations. And being the study population, high performance athletes, these alterations may be present in the overtraining syndrome, being a confounding criterion for the evaluation of the data.

Conclusion: The altered symptoms and tests demonstrate this population needs further evaluation because these changes reflect these athletes need a more individualized evaluation for understanding.

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DESCRIPTION OF ECG FINDINGS IN COMPETITIVE CLUB ARTISTIC SWIMMING ATHLETES

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Introduction and Purpose: Considering that sudden death (SD) of non-traumatic cause in athletes has predominantly cardiac etiology, the pre-participation sports evaluation is used in order to reduce its incidence. Although not a frequent event, SD in this population is socially impacting and potentially preventable. In addition to anamnesis and physical examination, it is proposed to perform the electrocardiogram (ECG), which increases the sensitivity for detection of cardiac pathologies of risk for sports practice. For interpretation of the athletes' ECG, a doctor with experience in athletes is recommended, since there are physiological changes, derived from the training, that must be distinguished from potentially pathological alterations. The objective of this study was to identify and report the prevalence of physiological or pathological electrocardiographic alterations in athletes of artistic swimming of a competitive Brazilian multisport club.

Material and Methods: 12-lead ECGs were performed on all artistic swimming athletes of the competitive club as part of the annual pre-participation assessment. The electrocardiographic records were analyzed separately by two evaluators with extensive experience in athletes' ECGs, and the divergences were resolved by a third evaluator. The analyzes were performed according to Seattle criteria recommendations.

Results: 40 athletes were evaluated, with a mean age of 12.3, 95% of them are women. Seventeen ECGs with abnormalities were observed: sinus arrhythmia (11), sinus bradycardia (2), atrial ectopic rhythm (4). Three athletes presented a left axis deviation. As for the PR interval, there were two altered records, a short PR and a 1st degree atrioventricular block (AVB). Analyzing the QRS complex, there were 11 incomplete right bundle branch block. Ventricular repolarization demonstrated two athletes with early repolarization, 18 with T-wave inversion in V1-V2 and one in V1-V3.

Discussion: Regular sporting practice generates morphological and electrical changes in the athlete's heart so that he becomes able to maintain adequate cardiac output during sports. The findings of sinus bradycardia, sinus arrhythmia, ectopic atrial rhythm, 1st degree AVB, incomplete right bundle branch block and early ST segment repolarization are compatible with the athlete's ECG, not indicating withdrawal from the sport or diagnostic investigation. Thus, this study demonstrated physiological adaptations in 42.2% of athletes of artistic swimming of a competitive club. The most common findings were sinus arrhythmia and incomplete right bundle branch block (27.5%). In addition, 45% of the athletes presented T wave inversion in the first precordial leads. The T wave inversion is not considered abnormal in V1 and is considered altered if found in two or more leads from V2 to V6. Only one athlete in the sample (2.5%) had T-wave inversion considered altered, but his complementary investigation was normal, which may be justified as juvenile pattern of T-wave inversion, since the patient was ten years old.

Conclusion: As expected, no athlete in the present study was diagnosed with cardiac alterations that impede sports practice, even after a complementary investigation. Our data corroborate with the literature, which presents a low prevalence of these pathologies.

EFFECTS OF AEROBIC AND ANAEROBIC EXERCISE ON STROMAL COMPONENTS AND TRANSFORMING GROWTH FACTOR-B IN THE VENTRAL PROSTATE OF RATS

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Introduction and Purpose: The prostate is an androgen dependent organ and exercise has been described as a hormonal modulator. In addition, the Transforming Growth Factor β (TGF- β) can regulate stromal components and presents overexpressed in prostate cancer. Thus, the objective of this study is to verify the effects of aerobic and anaerobic exercise on stromal components and TGF- β in the ventral prostate of rats.

Material and Methods: Fifteen male rats with 12 weeks of age were divided in the experimental groups (n=05 / group): sedentary (SD), aerobic (AE) and anaerobic exercise (AN). The animals of the AN group were submitted to jumps in a aquatic environment (04 series of 10 jumps), with resistance in the ventral region of the trunk and progressive load (50 to 70% of body weight). The animals of AE group were submitted to swimming in tank with depth of 38cm, for 10 to 60 minutes, with resistance in the tail (progressive load: 01 to 05% of body weight). The experimental protocol lasted eight weeks and the animals were euthanized, the ventral prostate dissected, fixed and included in paraffin, followed by microtomy. stereological analysis was performed to the percentage of stromal components. The components analyzed were: general collagen (Van Gieson), reticular fibers or type III collagen (Reticulin), elastic fibers (Verhoeff) and smooth muscle (H&E). Immunoreaction for TGF- β was detected by immunohistochemistry. Data were submitted to the Kolmogorov-Smirnov normality test and One-way Analysis of Variance (Anova) with post-hoc Tukey-Kramer Multiple. The results were presented as mean \pm standard deviation.

Results: The anaerobic exercise promoted reduction of the general collagen in comparison to the aerobic group and the sedentary animals (SD: 14.68 \pm 9.26%; AE: 14.85 \pm 9.13%; AN: 9.33 \pm 6.27%; p=0.001). However, when collagen III was analyzed, there was a decrease in fibers in the animals that performed physical exercise, regardless of the modality, in comparison with the sedentary (SD: 8.66 \pm 4.29%; AE: 5.58 \pm 2.33%; AN: 5.33 \pm 2.02%; p=0.001). The elastic fibers presented the same tissue response of reticular fibers after exercise (SD: 8.66 \pm 4.29%; AE: 5.58 \pm 2.33%; AN: 5.33 \pm 2.02%; p<0.0001). The smooth muscle presented reduction in the animals that performed aerobic exercise in comparison to the anaerobic and sedentary (SD: 5.73 \pm 1.99%; AE: 3.43 \pm 1.06%; AN: 3.58 \pm 1.20%; p=0.0052). The same results was observed for the TGF- β in the prostatic tissue (SD: 2.89 \pm 2.72%; AE: 0.37 \pm 0.82%; AN: 2.70 \pm 2.85%; p=0.0003).

Discussion: Collagen is the largest structure of the extracellular matrix in the prostate, in which types I and III are the most prevalent. The absence of reduction of the general collagen in the animals of the AE group may be due to the maintenance or elevation of type I collagen, which is related to a prostate texture with characteristic stiffer and less compressible. In addition, it has been reported that there is an inverse relationship between other collagen and reticular fibers in sites with microinvasive adenocarcinoma. Under these conditions the collagen tends to present diminished in these regions, whereas the reticular fibers are increased. Therefore, this inverse mechanism resulting from the exercise may indicate new treatment perspectives. The elastic tissue is modulated by the variation of the hormonal levels, thus, the physical exercise as a modulator interferes directly in this fibers. Still, the TGF- β influence on smooth muscle and is overexpressed in prostate carcinoma. Thus, the result found should be considered in relation to the aerobic exercise as a therapeutic tool.

Conclusion: The different modalities of physical exercise modulate the stromal components and TGF- β in the ventral prostate of rats.

THE IMPORTANCE OF THE EARLY DIAGNOSIS OF CONCUSSION IN ATHLETES OF AMERICAN FOOTBALL IN BRAZIL

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Introduction and Purpose: Concussion occurs after sustaining a blow to the head (with or without loss of consciousness). It encompasses many symptoms that impact physical, emotional, and mental well-being. Physical symptoms may include headache, dizziness, imbalance, nausea/vomiting, fatigue, difficulty sleeping, double or blurred vision, and sensitivity to light and sound. Emotional symptoms may include irritability, restlessness, anxiety, depression, mood swings, aggression, or decreased tolerance of stress. Therefore, the objective of this study is to compare the trauma in American Football athletes with patients hospitalized with some kind of trauma in the head, in order to identify the importance of the diagnosis of concussion at the early stages of the disease.

Material and Methods: This research was based on the Neurability Brain Concussion Evaluation, therefore the hospital's patients and the American Football players where interviewed by the researchers. Following this activity, the date collected was analyzed using EpiInfo.

Results: After analyzing the data, we could clarify that the most relevant symptoms of the past 24 hours were "head pressure" and "fatigue", in which almost all athletes scored the maximum magnitude at level "severe". Other symptoms that were also relevant are "neck pain," "blurred vision," "feeling slow," "drowsy," "giddy," and "sadness." However, the symptoms "something is wrong" and "confusion" did not get any pointing. Regarding the "Cognitive Aspects", 75% of the orientation, 95% of immediate memory and 35% of concentration were preserved. In the "Balance Evaluation", the athletes maintained 40% of the same, while the "walk on toe heel" had an average of 13 seconds, being within the standard of normality. The "Coordination Assessment" resulted in excellent scores, and the athletes were able to complete the test without any interferences. Finally, the "Final Cognitive Aspect" obtained 90% of late memory preservation. Nevertheless, after analysis of the data of patients with light TBI hospitalized in the Municipal Emergency Room of Cuiabá (HMPSC), a 45% reduction in the global capacity of the cognition tests were observed, associated with a 37% reduction in tests that assessed immediate memory and 70% reduction in delay memory analysis, the latter being the one with the greatest change. In addition, aspects of the protocol that assessed general concentration capacity showed a 50% deficit of this ability. In addition to this, 25% of headache and 50% of photophobia were reported in the last 24 hours, being the most important complaints in those patients. Due the 75% of the patients are in a hospital bed, the coordination evaluation was not done following the exact chosen protocol. Therefore, the results are trustworthy.

Discussion: In this way, it was possible to perceive an important relationship between football players, 24 hours after a game, and patients hospitalized after a head trauma. Both had a decrease in all of the evaluated points but all hospitalized patients presented lower results. However, the lowering of this scores followed similar patterns, when we observe that symptoms such as fatigue and confusion were widely reported and the cognitive aspects, recent and immediate memory was immensely more affected, in both cases, when compared to long-term memory. In this way we obtained results that confirm the pattern in which both traumas cause similar effects in the brain.

Conclusion: Based on these correlations, it is possible to conclude that the degree of concussion needs to be evaluated in amateur football players, on the field. Considering that patients with confirmed head trauma need to stay in the hospital to further evaluations as a form of precaution and a safety measure, this players that presented close results may have the same risks, therefore, should be treated with an analogous way.

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DETERMINING VARIABLES FOR THE PERFORMANCE IN THE PLANK EXERCISE

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Introduction and Purpose: Today society seems increasingly interested in taking care of health, a proof of this are several people in search of the perfect body, in search of ready-made workouts, miracle diets and advanced exercises. A muscular group that is the target of these people who seek aesthetics is undoubtedly the abdomen, several exercises can be used in training programs to enhance the work of the core, one of the exercises that promises such aesthetic is the plank exercise. The same is an isometric abdominal exercise that is performed in the ventral decubitus, using the support of the arms with parallel elbows and aligned with the shoulder and with legs totally together, so that the individual stays in the position for a long period of time. The plank exercise is a very popular abdominal exercise in these days, being an exercise that calls attention for simplicity and at the same time for the challenging sensation. One of the factors that contributes to the maintenance of good posture is the action of the stabilizing musculature of the trunk, known as "core". These muscles tend to reduce compression in the intervertebral discs and help improve respiratory mechanics, when they fail to function, the spine is vulnerable and susceptible, however, there is still limited evidence in the literature about the factors that influence optimal performance during exercise and its limiting factors. Objective: to analyze the level of correlation between the time of plank with several factors

Material and Methods: It was analyzed 38 students from a gym in Santos, 18 men and 20 women, with average age of 38 (± 13) years, height on average of 1.67 ($\pm 0,7$), mean weight of 66.5 ($\pm 8,9$). The exclusion factor was whether the individual had any pathology or suffered from constant pain in places that could compromise the test, they performed the plank exercise to their limit, in the position of ventral decubitus using the support arms and legs. The individual could not move on the hip or rest his head on his hands, trying to stand still and stop only if he was feeling a lot of muscle pain. After answering a question about which body part was the limiting factor of the test, a tape measure was used to measure distances from: shoulder to shoulder; elbow with shoulder; elbow with foot. The relationship between plank time and the determinant variables was evaluated by the Pearson correlation coefficient.

Results: The plank test had an average of 3.01 (± 1.0), after the test of the plank, they answered the limiting factor and it was shown that the limiting factor that resulted in the end of the test was the arms (36,9%), lower back(18,4%), shoulder(18,4%), others (18,4%) and abdomen(10,5%) and there was no correlation signification of the plank time with weight, height, distance shoulder-shoulder, elbow-shoulder, foot-elbow

Discussion: There are several studies using electromyography, showing that the abdomen is very required during the exercise of plank. However, in the present study, it was possible to show that not always the main cause of muscular fatigue and end of the execution of the exercise was caused by abdominal muscles but by the arms. Perhaps the reason for this finding may be a lack of exercise or too little muscle strength in that region. In the future, studies with the objective of correlating the localized muscular strength with the limiting factors can clarify such doubts.

Conclusion: This study showed that the plank does not only require the muscle abdomen, it is much more complex than this, the most limiting factor was the arms with 36,9% and the abdomen only showed 10,5%, the variables that could influence the performance of the plank don't showed significant difference

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DIFFERENT DEHYDRATION LEVELS AND THE IMPACT ON BLOOD AMMONIA, COGNITIVE-MOTOR PERFORMANCE AND MUSCLE DAMAGE AFTER A HALF MARATHON RACE IN THE HEAT

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Introduction and Purpose: Prolonged exercise under high environmental temperature can promote dehydration and/or elevation in body core temperature (hyperthermia), which may hinder exercise performance. Specifically, it is recognized that hyperthermia is associated with impairment in cognitive-motor performance. Additionally, it is suggested that dehydration causes the deterioration of motor skill performance and disturbances in cognitive function (termed cognitive-motor performance), such as motor coordination, reaction time and memory. Furthermore, in hot environmental conditions, hyperthermia or dehydration can promote metabolic alterations, including high-energy demand and protein catabolism, which impair exercise performance and appear to exacerbate exercise-induced ammonemia. It has been postulated that increased ammonemia during exercise may cause central fatigue by altering cerebral function, which manifests as cognitive-motor disturbances, similar to the symptoms of dehydration and hyperthermia. It is also known that prolonged exercise under thermoneutral conditions can promote muscle damage and allows for biomarkers, such as creatine kinase (CK), lactate dehydrogenase (LDH), aspartate aminotransferase (AST) and alanine aminotransferase (ALT), to be released into the bloodstream. The aim of this study was to investigate different dehydration levels and their impact on blood ammonia, cognitive-motor performance and markers of muscle damage after a half marathon race in the heat.

Material and Methods: Sixteen runners performed a half marathon race and were divided in two groups: body mass change ($\Delta\%$ BM) less than 1% (G1%) and $\Delta\%$ BM greater than 3% (G3%). Before (pre) and after (post) the race, environmental conditions, hydration status, blood samples, cognitive-motor performance and body temperature (ERT) were obtained.

Results: Environmental conditions reached a high-heat stress ($\sim 31^\circ\text{C}$). The $\Delta\%$ BM was greater in the G3% group (-3.85 ± 0.79) than that in the G1% group (-0.40 ± 1.51). The ERT only increased in the G3% group. After the race, both of the groups exhibited an increase in blood ammonia concentration (G1% pre: $46.59 \pm 26.31 \mu\text{mol/L}$ vs G1% post: $117.92 \pm 21.87 \mu\text{mol/L}$; G3% pre: $41.38 \pm 15.61 \mu\text{mol/L}$ vs G3% post: $107.66 \pm 15.01 \mu\text{mol/L}$), but there was not a significant difference between groups. In both groups, there was an early increase in all markers of muscle damage (creatine kinase - CK, lactate dehydrogenase - LDH, aspartate aminotransferase - AST and alanine aminotransferase - ALT), but only LDH was greater in the G3% group than that in the G1% group. Cognitive-motor performance did not differ between groups.

Discussion: In our study, the G3% group reached a body temperature of $\sim 38^\circ\text{C}$, but no changes were observed in performance of the cognitive-motor tasks. It is acknowledged that an elevated body temperature below 40°C can impair exercise performance, but there is considerable attrition from exercise when rectal temperatures reach $39-40^\circ\text{C}$. Similar to hyperthermia, exercise-induced hyperammonemia can also affect cognitive-motor performance, especially during exercise in the heat. Hyperammonemia leads to neurotoxic levels of brain ammonia and is a major factor involved in the pathogenesis of hepatic encephalopathy, which involves cognitive-motor disturbances. Our results showed that ammonemia was higher in both groups ($\sim 112 \mu\text{mol/L}$) after the race, but no change in cognitive-motor performance was observed. Although the elevation of enzyme biomarkers of muscle damage is generally observed when measured hours or days after exercise, the results of the present study showed that all enzymes were higher in both groups immediately following exercise.

Conclusion: We conclude that dehydration up to $\sim 4\%$ of $\Delta\%$ BM does not affect blood ammonia concentration, cognitive-motor performance or markers of muscle damage in acclimated runners.

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THE IMPACT OF RESISTED TRAINING IN TYPE 1 DIABETES

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Introduction and Purpose: There is evidences that Moderate and high-intensity aerobic exercise activity may results in hypoglycemia in type 1 diabetes mellitus (T1DM), a disease that mainly affects young people. Fitness became a life style trend among the young. Recent studies indicate that short duration high intensity anaerobic exercises may decrease blood glucose (BG) progressively, without resulting hypoglycemia even in post-exercise. The objective was to identify if the resisted exercise may cause hypoglycemia in T1DM people and its safe.

Material and Methods: It was a systematic review of literature based in metanalyses and randomized clinical trials, about the prevention of hypoglycemia in resisted exercise training in T1DM, between 2011 and 2018. Basis in SCIELO, PUBMED, LILACS and COCHRANE databases.

Results: It was evidenced in a randomized controlled trial that evaluated sixteen children who was submitted to a combined aerobic and strength training, that combined exercise training seemed to lower daily insulin requirement and improve physical fitness, also promoting better well -being. In another meta-analysis which studied 323 adults (six randomized trials) of four clinical trials reported that glycated hemoglobin decreased with exercise training compared with controls and improved cardiorespiratory and reduced insulin dose compared with controls.

Discussion: A study that evaluated twelve physically active individuals with T1DM who performed aerobic exercise before 45 min of resistance training or the opposite. The first model improved glycemic stability and reduce the severity and duration of post-exercise hypoglycemia. The same author, in another study, found out acute decline of BG was higher in aerobic exercise when compared to resisted training, however, the post-exercise glycemia had prolonged reduction. A study with 12 T1DM people showed that resisted exercise did not induce acute hypoglycemia or damage muscle, BG progressively rose after one and two sets but, after a third set it attenuated hyperglycemia and returned BG to that of a non-exercise trial.

Conclusion: Resisted exercise have been shown to be a safe alternative for T1DM people related to hypoglycemia and blood glucose control.

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EVALUATION OF ADOLESCENT ATHLETES AND THE IDENTIFICATION OF MENSTRUAL DISORDERS RELATED TO TRAINING

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Introduction and Purpose: The changes related to female athletes are already well known, among them are eating disorders, disorders related to the reduction of bone mineral density and the consequences related to low energy intake with physical and mental changes that can be detrimental to health and performance of the athlete. Menstrual disorders are usually associated with these pictures. Among the young athletes who are already in their teens already subjected to heavy training loads, the identification of these disorders becomes even more difficult because it is a period in which the body is still suffering from changes in maturation. Objective To know the gynecological history of female athletes born between 1992 and 2005, who perform regular training daily for more than 2 hours a day, competing at state and national level

Material and Methods: Questionnaire containing questions on gynecological health, self-applied during the evaluations of the beginning of the season. For the analysis of the amenorrhea item, the questionnaires were divided into 4 subgroups: group 1 (absence of amenorrhea), group 2 (isolated amenorrhea), group 3 (intense training period related amenorrhea) and group 4 (amenorrhea and loss of weight related to intense training period). The study included 26 athletes of volleyball, 19 of swimming, 11 of judo, 8 athletes of gymnastics (artistic and rhythmic), 5 of rowing.

Results: The average age of the athletes was 14.8 ± 1.9 years, the mean BMI according to sports was: gymnastics 18.8 ± 2.1 , judo 23.4 ± 2.5 , swimming 20.2 ± 2 , paddle 21.7 ± 2.5 , vole 20.7 ± 2.3 . Of the 69 athletes evaluated, 71% reported having had menarche, with a mean age of 12.2 ± 1.1 years. the sport in which there were more athletes who had not had the menarche were the gymnastics. When asked about gynecological follow-up, only 9% reported follow-up. Regarding the presence of menstrual disturbances, 4 (16.6%) were in group 2, 1 (4.16%) in group 3 and 1 (4.16%) in group 4, totaling 25% of positive responses to menstrual disorders. As for swimming athletes, 1 (5.88%) were in group 2, 4 (23.52%) in group 3 and 2 (11.76%) in group 4, totaling 41.17% of positive responses to the disorders studied. Of the judo athletes, 1 (12.5%) were in group 2 and 1 (12.5%) in group 3, which corresponds to 25% of positive responses to the changes. In relation to the athletes of the artistic gymnastics, 1 (33.3%) was in group 2 and 2 (66.6%) in group 3, corresponding to 100% of positive answers. In rhythmic gymnastics, 1 (33.3%) was in group 4.

Discussion: The spectrum of menstrual problems includes primary and secondary amenorrhea and oligomenorrhea. In evaluating the athlete with menstrual irregularities, the many possible causes of the symptoms must be considered prior to assuming a connection with exercise. A multitude of factors contribute to and confound these problems. To fully appreciate the continuum of menstrual dysfunction in the female athlete, an understanding of normal menstrual physiology is necessary.

Conclusion: It was observed that there was a high prevalence of menstrual disorders in the studied population, especially among athletes of artistic gymnastics. In swimming, there was a more significant difference among the athletes who considered the changes resulting from these periods. There was association with weight loss in athletes of volleyball, swimming and mainly of rhythmic gymnastics. In judo there was only correlation with the training in half of the cases. The difference of results between the modalities suggests that the sport practiced influenced the presentation of the syndrome and the associated factors.

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KLINFELTER SYNDROME AND HIGH PERFORMANCE – A CASE REPORT

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Introduction and Purpose: Klinefelter syndrome (KS) was discovered to have an extra X chromosome (genotype XXY) instead of the usual male sex complement (genotype XY). The classic form of KS, which is present in the 80–90% of the cases, is defined by a 47,XXY karyotype resulting from the aneuploidy of the sex chromosomes. Clinical features depend on both the supernumerary X chromosome and the effects of hypogonadism. As traditionally described, patients with KS have tall stature, small testes, gynecomastia in late puberty, gynoid aspect of hips (broad hips), sparse body hair, signs of androgen deficiency and low serum testosterone coupled with elevated gonadotropins, and finally azoospermia, oligospermia with hyalinization and fibrosis of the seminiferous tubules. Serum T concentrations tend to fall to the mid-low range in the young adult with KS. The aim of study is to report a case of a swimmer with Klinefelter Syndrome and his performance before and after treatment.

Material and Methods: Athlete of swimming was 19 years old when he was referred to our center, and he was complaining of difficulty to improve strength even training in high intensity. On physical examination, his weight was 73.3 kg, his height was 184cm, and also body mass index (BMI) was normal at 21.65. Some exams were requested and diagnosis was concluded as Klinefelter's Syndrome by karyotype (47,XXY). And also, a knee and shoulder isokinetic dynamometer were done to evaluate strength before treatment. Being a professional athlete, he needed a Therapeutic Use Exemption (TUE) from FINA (Federation Internationale de Natacion) to pursue treatment. After authorization was granted, treatment was started with testosterone undecanoate, every 90 days, 1000mg, intramuscular.

Results: After 1 year of treatment, athlete's body weight increased 3kgs and body fat reduced 2,48%. Isokinetic knee dynamometer showed an increase of 13% of strength on peak torque flexion of left side and, an increase of 11.5 on peak torque flexion of right side. Isokinetic shoulder dynamometer showed an increase of 24% of strength on peak torque external rotation of left side and, an increase of 26.6 on right side. In addition, he participated in the National Championship 2018, and marked 47.95s for 100m freestyle, 1.52s lower than 1 year before. It represented a time improvement of 3%.

Discussion: Statistical analysis of athlete's time improvement, 3%, between 20 to 21 years, compared to time improvement of 20 best athletes in the world, between 20 to 21 years, in the same event, showed that the athlete of study did not represent an outlier result, meaning that the use of the medication as a treatment for Klinefelter Syndrome, just allowed the athlete fair competition with other athletes. This is the purpose of TUE (Therapeutic Use Exemptions).

Conclusion: Effects of hypogonadism caused by Klinefelter Syndrome brings to the athlete performance impairment. A correct diagnosis associated with the treatment brought to athlete, of the presented case, a fair condition to compete in high performance.

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THE CORRELATION BETWEEN DEPRESSION AND OBESITY

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Introduction and Purpose: Obesity and depression are very prevalent and recognized worldwide as a public health concern. However, little is known about the complementary relationship between both diseases, and one can lead to the injury of the other. This study aims to expose the two-way complementary correlation between obesity and depression and to highlight the importance of treating such comorbidities.

Material and Methods: Systematic review of the literature with the use of 8 meta-analysis articles from 2008 to 2018 as basis in the SCIELO, PUBMED, LILACS and COCHRANE databases.

Results: According to studies that totaled 578,021 individuals who compared the causal relationship between obesity and depression, it was possible to observe a more significant relationship of depressed adolescents being more likely to become obese. In other studies, the causal relationship between obesity and depression was more important. It was also possible to observe that obese or overweight women were more likely to develop depression, together with young adults and adolescents. It was also observed that obese patients with more than two associated comorbidities presented an even greater risk of developing depressive symptoms.

Discussion: According to studies that totaled 578,021 individuals who compared the causal relationship between obesity and depression, it was possible to observe a more significant relationship of depressed adolescents being more likely to become obese. In other studies, the causal relationship between obesity and depression was more important. It was also possible to observe that obese or overweight women were more likely to develop depression, together with young adults and adolescents. It was also observed that obese patients with more than two associated comorbidities presented an even greater risk of developing depressive symptoms.

Conclusion: Therefore, it can be concluded that there is a strong association between obesity and depression, just as the opposite is true. Awareness of groups with associated comorbidities, young adults, adolescents, especially the female audience is important. Primary and secondary prevention of both diseases must be improved.

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PREDICTORS OF CARDIORESPIRATORY FITNESS GAIN IN HEALTHY YOUNG ADULTS: CONTRIBUTION OF LEFT VENTRICULAR HYPERTROPHY

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Introduction and Purpose: The cardiorespiratory fitness (CF) is a strong and independent predictor of cardiovascular morbidity and mortality in the general population. Although CF reflects the overall capacity of the cardiovascular and respiratory systems to supply oxygen to the body during prolonged exercise and exercise resistance induce significant structural and functional changes in the heart, the influence of cardiac remodeling, including changes in left ventricular mass (LVM), on the CF gain in sedentary and healthy individuals remains poorly investigated. We assessed the influence of left ventricular mass and function on the gain of cardiorespiratory fitness evaluated by VO_2max increase ($\Delta\text{VO}_2\text{max}$) in a group of healthy young males and females submitted to 16 weeks of aerobic training.

Material and Methods: Data were obtained in 89 healthy subjects (73 men and 16 women; age = 23 ± 3 years) before and after the aerobic training program. VO_2max was measured by ergospirometry and defined as the VO_2 reached in the last minute of the test. In addition, the anaerobic threshold and the respiratory compensation point were also determined. These parameters obtained in the first test were obtained according to previous studies and were used to establish the initial intensity of physical training for each participant. The cardiac structure and function was measured by echocardiography. The LVM was calculated by the Devereux formula, following American Society of Echocardiography (ASE) recommendations. The indexed LVM (LVMI g/m^2) was determined by calculating body surface using the DuBois & DuBois formula. The training program was performed for 16 weeks and consisted of three weekly sessions of 60 to 90 min duration. Each session was composed of a warm-up period, running, muscular resistance-based activities and stretching. To statistics analysis we use Kolmogorov-Smirnov test evaluated the normality of the data. The paired t-test was used to compare two means within the same gender. Means between genders were compared with the unpaired t-test. Comparisons between the sex of the LV dimensions were performed after normalizing the variables to body surface area. Predictors of $\Delta\text{VO}_2\text{max}$ were obtained by univariate and multivariate analysis.

Results: Men showed higher $\Delta\text{VO}_2\text{max}$ than women. Baseline values of VO_2max (VO_2maxi) ($r = -0.39$) and left ventricular mass index (LVMI) ($r = 0.27$) were the main predictors of $\Delta\text{VO}_2\text{max}$. Multiple linear regression analysis showed that $\Delta\text{VO}_2\text{max}$ obtained in aerobic training can be modeled by sex, VO_2maxi and LVMI, which together explained 39% of the $\Delta\text{VO}_2\text{max}$ variation. Analysis by sex showed that VO_2maxi and LVMI determined 36% of the variation of $\Delta\text{VO}_2\text{max}$ in men. In women, the predictors were VO_2maxi and the initial left ventricular end-systolic volume (LVSVi), which determined 50% of the VO_2max gain.

Discussion: Our results suggest that a higher cardiac mass in healthy and sedentary individuals may predict a greater tendency to benefit from the physiological cardiac hypertrophy caused by aerobic exercise. Therefore, the initial differences in the structure of the heart may possibly represent different genetic characteristics. The LVM is a highly heritable trait.

Conclusion: Left ventricular structure at baseline can predict the CF improvement obtained with aerobic training in healthy young people. The greater response to endurance training is associated with left ventricular mass physiologically higher in men and with higher stroke volume in women.

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THE TRIAD OF THE ATHLETE WOMAN AND HER REPERCUSSION IN THE BODY

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Introduction and Purpose: The Athlete's Triad is a syndrome consisting of eating disorders, amenorrhea, and osteoporosis. The components of the Triad are interrelated in etiology, pathogenesis, and consequences. It occurs not only in elite athletes, but also in recreational practitioners. The Triad may result in a decline in physical performance, an increase in clinical and psychological morbidity, and an increase in mortality. The internal and external pressures to which young women and women are subjected to achieve or maintain low body weight is behind their development. This Triad is often denied, undiagnosed and underreported, so professionals in the area of Sports Medicine should be aware of the interrelated pathogenesis and the varied presentation of the components of the Triad. In this work we aim to conceptualize Triade of the female athlete, as well as to identify the associated health problems and the mechanisms that articulate it, based on a review of the literature.

Material and Methods: A bibliographic research was carried out in the databases Scielo, Google Acadêmico and Lilacs (1999-2017), selecting articles written in English and Portuguese, using the descriptors "Triad of the female athlete", "exercise" and "amenorrhea". Thirty papers were examined and 10 of them were selected. We excluded studies not related to the female gender, studies that addressed diagnosis, prediction or treatment or whose title was not related to the objectives of the review.

Results: Although the triad disorders may occur in any sport, athletes participating in sports with endurance, aesthetic, or weight-class components or sports that emphasize and reward leanness are at increased risk. Other identified risk factors for the triad include early age at sport specialization, family dysfunction, abuse, and dieting. An important calorie restriction due to inadequate dietary practices reduces the metabolic rate and causes changes in the musculoskeletal, cardiovascular, endocrine, thermoregulatory and other systems. Acute and chronic psychological problems associated include eating disorders and body image disorders, low self-esteem, anxiety, depression and suicide. The amenorrhea associated with exercise is of hypothalamic origin, with reduced production of ovarian hormones and hypoestrogenemia, associated with a reduction of bone mineral density. The prevalence of amenorrhea is estimated in 30 to 50% in professional dancers, 50% in competitive runners, 25% in non-competitive runners and 12% in swimmers and cyclists. The last component of the triad is osteoporosis which leads to greater skeletal fragility and an increased risk of fractures. Its main cause in premenopausal women in active women is hypothalamic amenorrhea. In adolescent athletes, these conditions may result in a reduction of bone bank formation during the critical years of skeletal consolidation and lead to irreversible premature bone loss, which predisposes athletes to increased risk of fractures and other bone lesions in the future.

Discussion: Studies have shown that the onset of physical activity before puberty may delay it, due to suppression of the hypothalamic-pituitary axis still immature, with delay of up to 4-5 years. In addition, body fat is a critical influence for pubertal delay in female athlete, thus demonstrating an association between late maturation and poor nutrition. Health professionals should be alert to the recognition of symptoms for early diagnosis, prevention and treatment of any of the components of the Triad.

Conclusion: In conclusion, regular physical activity is an important factor for the promotion and maintenance of women's health at all ages and situations, but young and physically active women should be informed about adequate nutrition, safe training practices, and warning signs and symptoms of Triad. The complete pathophysiology of the Triad is not fully understood, and debate continues on how clinicians and the sports community should provide care for this disorder.

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EFFECTS OF RESISTANCE TRAINING IN TRACK CYCLISTS ON INTRAOCULAR PRESSURE

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Introduction and Purpose: Elevated intraocular pressure (IOP) is the principal risk factor for the development and progression of glaucoma. The IOP is the fluid pressure exerted by the intraocular fluid of the anterior cavity - Aqueous humour (Normal IOP-14-21 mmHg). IOP is determined mainly by the balance between the production and drainage of aqueous humour. This disease has different conditions and characteristics: such as congenital, angle-closure and secondary glaucoma clearly show that increased, treatment to reduce IOP has been demonstrated to decrease glaucoma progression. Glaucoma represents the first cause of blindness in Colombia, with IOP being the only alternative to maintain normal aqueous humour levels. Inconsistency in the drainage system of aqueous humour leads to increase in IOP than normal, which in turn causes optic nerve head damage and visual field defects. Increased IOP is said to be a major risk for Glaucoma, a slow progressive neuro-degenerative disorder associated with death of retinal ganglion cells and degeneration of their connected optic nerve fibres which is second leading cause of irreversible blindness. The objective of this study was to analyze the behavior IOP in track cyclists from the city of Bogotá (Colombia), during sessions training in general preparation.

Material and Methods: Sample: thirty-eight men, this performance track cyclists from the city of Bogotá were studied. A visual assessment was developed to rule out visual pathologies that affect the study. The study was initiated after obtaining clearance from the Institutional Ethical Committee. A written informed consent was obtained from the participants following a brief explanation of the study procedure and its benefits. Procedure: IOP was measured by Icare tonometer, which realized six contacts with the corneal surface and throws the average, finding the normal values in an adult between 14 and 21 mm / Hg; IOP is assessed before and after each training for 4 weeks.

Results: Statistical analyses Prior to the planned statistical analyses, preliminary analysis was conducted (Shapiro-Wilk test) to confirm data distribution normality. Intraocular pressure was reported as mean \pm standard deviation (SD). T-tests were used for within group comparisons. Cohen's d for effect size were also calculated to determine the magnitude of the group differences. The criteria to interpret the magnitude of the ES was as follows: trivial (< 0.2), small (0.2–0.59), moderate (0.60–1.19), large (1.2–2.0), or very large (> 2.0). Statistical significance was set at $P < 0.05$. All statistical analyses were performed using IBM Statistical Analysis SPSS Statistics version 24.0 (Chicago, IL, USA).

Discussion: In aerobic exercise, IOP reduction is proportional to the increase in exercise intensity, but the volume (duration of the exercise session) is not correlated with the respective, a possible explanation for this phenomenon is the stimulation of the autonomic nervous system induced by physical activity. In general, both in athletes, physically active persons and sedentary, IOP shows a more pronounced fall in aerobic activities than in anaerobic ones.

Conclusion: The IOP generates changes in workout with a high level of effort, which indicates that the association between the training load, specifically the intensity, is possibly related to the increase in IOP. It is necessary to generate studies with larger population samples to determine the relationship between training load and IOP levels.

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RELIABILITY ANALYSIS OF THE DIFFERENT INSTRUMENTS TO MEASURE SKINFOLD THICKNESS

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Introduction and Purpose: Calipers to measure skinfolds it has been sale by the increase of the fitness e wellness industry. Currently, there are several models being marketed. The main characteristic of the equipment is the constant jaws pressure across the range. The present aim of this study is to evaluate the behavior of the tension generated by different calipers in different range.

Material and Methods: Five clinical skinfold calipers were analyzed: Body Caliper (Valtro, Italy), Innovare (Cescorf, Brazil), Neo Prime (Prime, Brazil), Lange (Beta, USA) and Slim Guide (Rosscraft, Canada); and four scientific calipers: Harpenden (Baty Int, England), Holtain (Crosswell, England), Premier (Cescorf, Brazil) and Digital (Cescorf, Brazil). All the skinfold calipers were properly calibrated before the tests. A load cells device been development to evaluate the different range by jaws: 10, 15, 20, 25, 30, 35, 40, 45 e 50 mm. To the each range it has been two measures, using the mean to determine the pressure exerted (kgf). The data are expressed by the variation delta (Δ).

Results: It was observed highest variation in tension generate by jaws in the models Neo Prime (Δ 30.53 kgf), Slim Guide (Δ 17.13 kgf) and Body Caliper (Δ 10.95 kgf) for all amplitude evaluated (10 a 50 mm). The skinfold calipers Cescorf Innovare (Δ 6.05 kgf), Cescorf Digital (Δ 4.58 kgf), Lange (Δ 4.44 kgf), Harpenden (Δ 3.08 kgf), Cescorf Premier (Δ 3.02 kgf) and Holtain (Δ 1.57 kgf) shown acceptable variables. The models Cescorf Innovare (Δ 0.11 kgf), Digital (Δ 0.33 kgf) and Premier (Δ 1.77 kgf) showed a tension curve like to the length of range in relationship to the golden standard (Harpenden). The Holtain model showed lightly poor tension (Δ 5.42 kgf), while the others calipers: Slim Guide (Δ 7.22 kgf), Neo Prime (Δ 10.94 kgf), Lange (Δ 13.12 kgf) and Body Caliper (Δ 27.08 kgf) not showed a tension curve like to the length of range in relationship to the golden standard.

Discussion: Some technical characteristics must be considered so that the tension curves to the length of range are similar (50 mm). Perhaps the main factor responsible for this discrepancy is the positioning of the springs. Admittedly, the angle of position of the springs must be precise to compensate for Hooke's Law, which determines that the tension in the springs is proportional to their deformation, which is, to the length caused by external forces. These skinfold calipers have absence of springs, vertical, circular and oblique springs.

Conclusion: The skinfold calipers Harpenden, Cescorf Premier, Innovare and Digital appear to be the models that offer the highest reliability for measuring skinfolds.

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ANALYSIS OF THE LACTIC CONTRIBUTION IN A LOCALIZED MUSCLE ENDURANCE TEST: A PILOT STUDY

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Introduction and Purpose: Physical tests that assess localized muscular endurance are widely used in both research and clinical practice, with outcomes of functional variables as total work and execution time. However, understanding the physiological contribution of such tests is of the extreme importance to the clinician, providing a new insight about the interpretation of results and the implementation of load dynamics in physical training. It is known that high intensity and short duration muscle endurance exercises essentially require the anaerobic metabolic pathways, often inferred through the blood lactate concentration [lac]. Thus, the objective of this study is to analyze the lactic contribution during an isometric endurance muscle test of the quadriceps of the dominant lower limb performed in the isokinetic dynamometer.

Material and Methods: It is a pilot study composed of a sample of seven male participants aged 20.85 ± 1.46 years and approved by the Research Ethics Committee (registration number 56973316.9.0000.5402). At the beginning of the test session, participants remained at rest for 10 minutes for basal [lac] collection and at moments three, five, seven and nine minutes after the test, 25 μ l of blood were collected for later lactacidemic analysis performed in a lactimeter. The lactate values were expressed in millimoles per liter (mmol/L). The statistical package used was SPSS Statistics. The data of time and energy related to the test were presented in descriptive values. For the [lac] the normal distribution of the data was tested by the Komolgorov-Smirnov test, which was characterized as normal. Thus, the analysis of variance (ANOVA) and Bonferroni's test (post-hoc) were used to compare all moments. Significance level was 5%.

Results: The test total time was 28 ± 5.56 seconds and the total energy value was 119.76 ± 19.22 kilocalories. For the values of [lac] a statistically significant difference was observed between the basal moment (1.42 ± 0.48 mmol / L), with the other moments [3' (3.83 ± 0.87 mmol / L), 5' (3.39 ± 1.12 mmol / L), 7' (3.43 ± 1.21 mmol / L), 9' (3.18 ± 1.31 mmol / L)] ($p = 0.016$).

Discussion: The main finding of the study is that [lac] shows a significant increase during the analyzed moments in relation to the basal moment without, however, presenting values greater than 4 mmol / L. And although these values are not elevated (> 4 mmol/L), this may occur due to the intramuscular metabolic response dependent on the total muscle mass involved in the exercise, since this test focuses only on one muscle group. Thus, the [lac] collected in the earlobe is an inference of the real value of lactate generated during exercise, which may explain the low values of its concentration. The golden standard to quantify [lac] is through muscle biopsy, however, considering the invasive procedure of this technique, inferring the amount of muscle mass of the segment tested with [lac] inferred by blood collection would provide better understanding of the real lactic contribution during exercise for the muscle group tested.

Conclusion: The isometric endurance test of the quadriceps is able to show the lactic contribution by means of a generating statistically significant increase of [lac].

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EVALUATION OF SLEEP HABITS AMONG SWIMMING ATHLETES

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Introduction and Purpose: The association between sleep quality and physical performance in athletes has become a target of study in the scientific community due to the strong relation with sleep impairment and the alteration of cognitive processes, metabolic function and immune system in the athletes. The objective of this study was to evaluate the quality and sleep habits of swimming athletes in order to be used as a screening tool for sleep disorders from the Pittsburgh questionnaire and to initiate with sleep hygiene conduits.

Material and Methods: Self-application of the Pittsburgh Sleep Quality Index (PSQI) questionnaire in 37 swimming athletes of the Grêmio Náutico União de Porto Alegre club. The PSQI assesses sleep quality over a 1-month period. The questionnaire consists of 19 self-rated questions and 5 questions that should be answered by bedmates or roommates. The 19 questions are categorized into 7 components, graded on a score that ranges from 0 to 3. The PSQI components are as follows: subjective sleep quality, sleep latency, sleep duration, habitual sleep efficiency, sleep disturbances, use of sleeping medication and daytime dysfunction. The sum of scores for these ranges from 0 to 21, the highest score indicates worst sleep quality. Data analysis was performed using descriptive statistics.

Results: We evaluated 37 swimming athletes. When asked, 81% reported having good sleep quality, 7 athletes perceived poor sleep quality at night. Sleep time per night 48.64% sleep at least 8 hours, 62% of athletes reported starting their sleep within 20 minutes of sleep. Among the athletes studied 51.3% reported taking a break to sleep after lunch. When asked about habits 72.9% take the phone to bed. When applied the Pittsburgh Sleep Quality Index 56.7% achieved scores between 5 to 10 points, being classified as poor sleep quality. Two athletes scored higher than 10, which is considered a sleep disorder.

Discussion: Reductions in endurance performance have been observed following 24 h of sleep deprivation. For sleep to be recuperative it must be of adequate duration, in order to have a physical recovery athletes may need sleep hours greater than the average individual. Sleep is the foundation of recovery and critical to the management of athletic training regimens.

Conclusion: The present study found a high prevalence of athletes presenting with sleep disorders. The identification of factors related to poor sleep quality may help in the better recovery and performance of the studied group. It is important to monitor sleep and identify possible factors that can lead to sleep impairment such as frequent travel and exposure to cell phone screens and computers after going to bed. The development of programs aimed at the adoption of sleep hygiene habits and practices of regular physical activities, especially when it comes to high performance athletes.

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LACTIC CONTRIBUTION DURING A SHOULDER MUSCLE ENDURANCE TESTED USING ELASTIC BANDS

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Introduction and Purpose: In training and/or rehabilitation programs, resistance exercise is essential and commonly performed with gym equipment. However, during recent years, the elastic band resistance training appears to be a good alternative. Among the physical abilities achieved through this type of exercise is the localized muscle endurance. Currently, studies have been aiming the construction and validation of specific diagnostic tests for this ability. However, such diagnostic tests only reflect functional results, thus physiological changes should also be quantified, giving a new light to discussions. Considering the muscle endurance skill, the anaerobic metabolism is known as an important system for adaptations and improvements, which is often measured by means of blood lactate concentration [lac]. In this sense, the objective of the study was to observe the lactic contribution, through [lac] during a shoulder muscle endurance test (MET) using elastic bands.

Material and Methods: 28 young men (23±2.4 years old) participated of 4 sessions. During Session 1 (Orientation) it was performed one maximal repetition test (1RM), initial orientations about the MET and a brief simulation of the test (20 seconds). In Session 2 and 3 (Familiarization and test) a warm-up and the MET was performed. The 1RM was the maximal elastic resistance (TheraBand® CLX) that each participant could hold for 3s during standing unilateral shoulder abduction to 90°. For muscle endurance testing participants performed repeated shoulder abductions to 90° until fatigue at two levels of elastic bands above 50% of 1RM (average of 76.1±3.5% from 1RM). The [lac] was analyzed, after 10 minutes of rest, and at moments 1, 3, 5 and 7 minutes after the MET. For this analysis it was collected 25 µl of blood for later lactacidemic analysis, performed in a lactimeter. The statistical package SPSS Statistics was used. The data related to MET were presented as descriptive values. For [lac], distribution was tested by the Kolmogorov-Smirnov test, which was considered as normal. The analysis of variance (ANOVA) and Bonferroni's test (post-hoc) were used to compare all moments with significance level of 5%.

Results: 1RM mean values was 69.39±16.83N, and thus, the torque used to perform the MET was 52.64±12.01N. Regarding the MET it was found 61.2±15.77 seconds and 20.57±4.92 repetitions to reach fatigue. For [lac] there were no statistically significant differences between the post-test moments (1'=1.87; 3'=2.21; 5'=2.30; 7'=2.42mmol/L) and baseline (1.74mmol/L), p=0.477.

Discussion: The lactate concentration increases exponentially, but it does not differ from baseline values, presenting low values (<3mmol/L) which can be explained by the small muscle group observed (deltoid). It is known that intramuscular metabolic response depends on the total muscle mass engaged in submaximal dynamic exercise. Considering a one arm exercise, the amount of lactate released in the blood is too small to cause an increase and be registered a systemic increase in a blood lactate concentration. Nonetheless, it is remarkable that increases in [lac] can be elicited at this intensity of exercise despite the low muscle mass involved. However, despite this increase, the general metabolic stress is considered slight. Thus, systemic lactate values might not adequately reflect the local lactate generation in specific muscles such as the deltoid. In this sense, the results of lactate concentration were not adequately sensitive to reflect the local muscle fatigue process.

Conclusion: The shoulder MET with elastic bands promotes an increase of the [lac], however such values are considered low and not significant.

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EFFECTS OF VOLUNTARY EXERCISE IN THE EXPLORATORY ACTIVITY, DISCRIMINATION INDEX AND MEMORY IN MOUSE MODELS FOR DOWN SYNDROME

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Introduction and Purpose: Individuals with Down syndrome (DS) have clinical signs similar the early onset Alzheimer's disease (AD). The amyloid precursor protein (APP) gene located in human chromosome 21 has been involved in the neuropathology of the AD in DS. The overexpression of APP leads to the high of levels β - amyloid ($A\beta$) peptide in brain favoring the development of the AD. Several studies have reported that voluntary exercise can promote the clearance of $A\beta$ and improve cognitive function in brain. Thus, the objective of this study is to verify the effect voluntary exercise in the exploratory activity (EA), discrimination index (DI) and memory in mouse models for Down syndrome.

Material and Methods: Twenty mice with 14-week-old were divided into four experimental groups (n=5 / group): control (C) and exercise (Ex) with genotype-positive (C1 and E1) and genotype-negative (C2 and E2) for DS. The voluntary exercise was realized for 10-week in activity wheels attached in cages. In 24-week all animals were submitted to novel object recognition test for analyze the EA, DI and memory. In first day each mice was placed in a box called of arena containing identical objects to freely explore for 5 min for analyze the EA and the time (s) was analyzed. After 1h 50min, two different objects were placed on the diagonal for test short-term memory (STM), EA and DI. Second-day, after 24 hour was tested the long-term memory (LTM), EA and DI. Data were submitted to the Kolmogorov-Smirnov normality test and One-way Analysis of Variance (Anova) with post-hoc Tukey-Kramer Multiple. The results were presented as mean \pm standard deviation.

Results: The group E2 presented decrease of the EA compared to the group C2 (C1: 13.84±2.90; V1: 10.53±7.10; C2: 10.01±3.73; V2: 26.63±12.59; p<0.011) in the first stage of test. However, the EA was not significant in the other stages of the test. Regarding to ID, STM and LTM, the results was not significant in the in the different stages of the tests.

Discussion: Voluntary exercise can promote improve of the cognitive abilities. The reduction of the time spent during the exploratory activity, indicates that the mouse remember of familiar object, recording the exploration preview. The voluntary increase neurotrophic factors, this factor, regulate the synaptic plasticity and functions, acting in hippocampal long-term potentiation, performing a play role in retention and recall of spatial memory. In the present study, we not findings an impaired of the index of discrimination and short long-term memory in mice model for DS. The voluntary exercise is a modality that can vary in intensity and duration, the lack of control of the exercise intensity may affect response physiological in body. Moreover the early-life access to exercise and practice regular is associated to positive effect on the physiology of adult mouse and decreased risk of dementia.

Conclusion: The voluntary exercise had a beneficial effect in exploratory activity for genotype negative mice, but not for those with genotype positive for DS.

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ACUTE AND RESIDUAL NEUROMUSCULAR EFFECTS OF DISPLACEMENT IN INDIRECT VIBRATORY STIMULATION**Autores:** Moreira, P V S, Nahon, R L, de Paula, L V**Instituições:** Biomedical Engineering Program/COPPE - Federal University of Rio de Janeiro - Rio de Janeiro - Brasil, Brazilian Olympic Committee - Rio de Janeiro - Rio de Janeiro - Brasil, Federal University of Minas Gerais - Belo Horizonte - Minas Gerais - Brasil**Introduction and Purpose:** Strength training with the addition of vibrations (STV) is a popular method used to improve flexibility, strength and muscular power. The aim of this study was to evaluate the effects of indirect vibratory stimulation with different magnitudes of displacement on the acute and residual neuromuscular responses.**Material and Methods:** For this study, 15 volunteers were recruited. This study used a randomized block design. The experimental sessions were composed of 5 isometric actions (elbow flexion exercise, 10s) without vibrations (CONTROL - CO) and two sessions of 5 isometric actions with addition of vibrations at 20 Hz and either 3 mm displacement (Sinusoidal Vibration A - SVA) or 5 mm (Sinusoidal Vibration B - SVB). Before and after each of the experimental sessions, an isometric action without vibrations was performed to study the residual effect. Table 1 shows the meaning of the acronyms of the analyzed variables. For to analyze the acute and residual responses a two-way ANOVA ("R" statistical software, 3.1.2) was used to compare the strength and EMG responses of the 3 conditions. Table 1. Variables. Variable _____ Meaning PF (N) _____ value of highest force during action FI (%) _____ difference between PF and force at the end of the contraction divided by PF x 100 RFDpeak (N.s-1) _____ highest production of force rate with a time mobile window of 50 ms RER ($\mu\text{V/s}$) _____ highest value of increase rate of the EMG signal RMSfbic (μV) _____ highest activation value between EMG onset and force peak RMSfbic (μV) _____ root mean square of EMG signal of peak force at the end of the action**Results:** The RER in the vibration treatments was significantly larger than in the CO treatment ($p = .03$; SVA, $p = .02$ SVB). The vibration treatments showed a significant increase in RFDpeak compared to the CO (SVA, $p = .03$; SVB, $p = .03$). The analysis of the residual responses confirmed a marginally difference in muscle strength between SVB and CO treatments (RFDpeak; $p = 0.06$). Table 2 shows the results obtained. Table 2. EMG and strength parameters ACUTE RESPONSES Variável _____ CO _____ SVA _____ SVB RER(%/s) _____ 207±79 _____ 348±217* _____ 335±148* RMSfbic(%) _____ 96±19 _____ 115±74 _____ 103±23 RMSfbic (%) _____ 105±24 _____ 119±69 _____ 114±36 PF (N) _____ 177.8±21 _____ 187±21 _____ 187±23 FI (%) _____ 15±4 _____ 14±3.8 _____ 13±4 RFDpeak(N.s-1) _____ 635±137 _____ 851±266* _____ 846±283* RESIDUAL RESPONSES RER (%/s) _____ 5.0±140 _____ 60.4±132 _____ 41.9±173 BICpeak (%) _____ 2.3±26 _____ 5.3±30 _____ 1.4±22 BICfatigue (%) _____ 10.3±20 _____ -2.5±33 _____ 5.3±28 PF (N) _____ 22.1±20 _____ 3.8±17 _____ 17.1±9 FI (%) _____ 1.8±8 _____ -0.4±8 _____ -1.1±7 RFDpeak (N.s-1) _____ 9.1± 203 _____ 180.2±248 _____ 251.5±245**Discussion:** In the present study, it was hypothesized that indirect vibratory stimulation in different displacements should directly influence neuromuscular performance, inducing some type of facilitation effect or fatigue with indirect vibratory stimulation. For the acute effect, it was verified that the addition of vibrations facilitated the capacity to develop muscle activation and strength per unit of time, that is, on the ability to rapidly activate the agonist muscle and to produce explosive strength (RER and RFDpeak), regardless of the type of displacement studied. However, no significant changes were observed for the EMG variables and muscle strength for the residual effect. It should be noted that, to the best of our knowledge, this study was the first to show that regardless of the high displacements, there was a significant acute increase in the explosive strength.**Conclusion:** The addition of vibration induced an acute facilitatory independent of the displacement adopted, but the addition of vibrations was unable to induce a residual facilitatory effect.

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INJURY SURVEILLANCE AMONG ELITE MALE YOUTH FOOTBALL (SOCCER) PLAYERS FROM DIFFERENT AGES IN A BRAZILIAN FIRST LEAGUE CLUB ACADEMY**Autores:** Teles, F B, Tamari, D, Chávez, R D, Girardi, E G, Fortuna, C C, Perez, B M**Instituições:** Curso de Medicina - FASM - Faculdades Santa Marcelina - São Paulo - Sao Paulo - Brasil, Departamento Médico - São Paulo Futebol Clube - Centro de Formação de Atletas Presidente Laudo Natel - Cotia - Sao Paulo - Brasil, Departameto de Ortopedia e Traumatologia - UNIFESP - Universidade Federal de São Paulo - São Paulo - Sao Paulo - Brasil**Introduction and Purpose:** Football is the most commonly played sport worldwide and there are around 22 million licensed players under 18 years old. Young athletes with potential to become professional players undergo high training workloads, therefore higher risk of injuries. Concomitantly, there is a necessity to promote protective measures to prevent football related injuries and to guarantee full potential development. Most researches who study injuries related to football exposure focus on male adult players. Moreover, we ought to establish the main characteristics of injuries and continuous data is necessary to identify injury profile and incidence, particularly at an elite level, with respect to trends over time. The present study aim to summarize the incidence and characteristic of injuries in an effort to comprehend epidemiologically the issue and to apply information acquired in future comparisons and researches.**Material and Methods:** This descriptive epidemiology study is based on data collected from a Brazilian first league club academy during one season. Male elite youth football players were prospectively followed regarding injuries, time of exposure for matches and training sessions, injury location, type of injury and injury severity from March 2017 to February 2018. In total, 159 young elite male participated in the study from 5 categories (U14, U15, U17, U19, U20). All injuries that occurred during the study period were registered using a standard electronic medical record and an injury form developed based on the recommendations made by FIFA Medical Assessment and Research Centre (F-MARC).**Results:** We found 261 injuries in 122 athletes (76,73% from total population). From those, 49 (40,16%), 36 (29,51%), 37 (30,33%) players sustained just one, two or three or more injuries, respectively, with an overall 1,64 injuries per athlete. Fifty six occurred during matches (21,46%) and 205 during training sessions (78,54%). There was 89221 hours of exposure for all categories, 3877 in matches and 85344 in training. The incidence of injury was 14,42/1000 hours of player-match and 2,40/1000 hours of player-training. The mean of severity of injury was 24,94 lost days. Twenty four (24,52%) per cent of injuries were minimal, 27,59% minor, 26,05% moderate and 21,84% severe. Half of injuries were traumatic (51,34%) and the other half by overuse (48,66%). Twenty one injuries (8,05%) were recurrent. Regarding injury location, 72,73% occurred in lower limbs, predominantly knees and thighs, with 60 (23%) and 63 (24,14%) from total, respectively.**Discussion:** The incidence of injury (per 1000 h) during matches was around 6 times greater than in practices. This may be explained by the more intense competitiveness and demand during matches. The incidence per player and per exposed hours was lower than that reported in senior players. It is noteworthy to mention it seems injuries occurrence increase with age. The thigh is acknowledged to be the most common injury location among male professional senior players. The present study displays the same pattern with thighs injuries corresponding to 24,14% of total, followed by knee injuries with 23%, although usually ankle and knee are the most common injury location at youth level. There was a lower recurrence rate than the reported in literature. A similar proportion between injuries severities was found. Traumatic injuries were slightly higher than overuse, which at a senior level seems to be the opposite. It may be due to the period of maximal peak height velocity rate.**Conclusion:** Both the injury incidence and the number of serious injury seems to be relatively high in elite youth players from a Brazilian first league club. Although the injury incidence seems to be lower than in adult elite players. The results of this study can be used as a basis for future studies and enhance the knowledge of injuries in Brazilian youth football helping sports medicine teams to plan preventive program.

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ULTRASONOGRAPHIC EVALUATION OF SHOULDER IN WHEIGHTLIFTING TRAINING

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Introduction and Purpose: The number of resistance training practitioners has been increasing in the last decades, both in Brazil and around the world. Estimates from the Ministry of Sports in 2015 indicated that 5.1% of Brazilians attended gymnasiums, and 3.2% practiced resistance training. The resistance training is associated with reduction of cardiovascular risk, improvement of body composition, rehabilitation of injuries, among others. However, the inappropriate practice can cause injuries or aggravate pre-existing conditions. Studies indicate that the shoulder joint is the most affected, with 36% of all injuries in the practice of Weightlifting. There is little information on the prevalence of shoulder joint injuries in resistance training, with most studies being case reports or case series. Rotator cuff lesions appear to be relatively common, but there are no good estimates of their incidence or prevalence. Thus, we decided to ultrasonographically evaluate the shoulder joint of symptomatic and asymptomatic weightlifting practitioners.

Material and Methods: We selected individuals trained in weightlifting for more than twelve months continuously, not practicing other sports, with or without chronic shoulder pain. Chronic pain was defined as pain for more than four weeks, which harms but does not preclude the training. Untrained asymptomatic individuals were also selected for a control group. We included men aged 18-40 years without previous orthopedic surgical procedures in the upper limbs and who denied the use of anabolic steroids in the last three months. All were submitted to shoulder USG bilaterally.

Results: The data indicated that in the untrained group 36% had some alteration in the shoulder USG, of which 100% with rotator cuff involvement and 60% with bursa thickening. In the group of asymptomatic trained patients, 47% presented shoulder ultrasonographic changes, such as the rotator cuff (100%) and thickening of the bursa (43%). Finally, in the group of patients with chronic pain, 76% had some alteration in the shoulder USG, with rotator cuff involvement (90%), bursa thickening (37%) and acromioclavicular injuries (10%). There was a statistical difference between groups untrained and trained without pain, even as between groups trained with pain and trained without pain.

Discussion: Weightlifting training practitioners, even asymptomatic, were more likely to have changes in imaging tests than untrained practitioners. These data are in agreement with the scarce literature on the subject, since the other authors describe a predisposition to an imbalance of strength and mobility in the training of weightlifting, leading to injuries, especially in the shoulder joint. In relation to those trained with chronic pain, the findings were well concordant, since the majority presented sonographic alterations compatible with the complaints. Following other studies, the most frequent finding in the shoulder USG was the involvement of the tendons of the rotator cuff muscles, followed by thickening of the bursa. It is important to note that 24% of the participants in the chronic pain group did not present any alterations in the imaging tests. This may be justified by the accuracy of less than 100% of the ultrasonography, as well as the unnecessary congruence of the perception of pain with the existence of an anatomical lesion, since nociception is a complex interaction between factors which may include pathoanatomical, physical, lifestyle, psychological, social, neurophysiological and genetic.

Conclusion: In this study, it was identified that ultrasound changes in shoulders are more common with the practice of weightlifting, being more common in symptomatic individuals, as expected.

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ANABOLIC STEROID USE PREVENTION PROGRAM OF UNIFESP

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Introduction and Purpose: The use of drugs for performance and improvement of physical appearance is recognized as a serious and growing public health problem, increasing the number of users, athletes and non-athletes. Anabolic steroids and similars (ASS) are the most prevalent, its use is a complex and challenging social phenomenon. Therefore, an educational program with save sources, from the main scientific and medical references is essential, as well as the appropriate place to seek help. As we know, there are worldwide known educational programs focused mainly on professional and elite athletes, such as Adolescents Training and Learning to Avoid Steroids (ATLAS) and The Athletes Targeting Healthy Exercise and Nutrition Alternatives (ATHENA). Our program, named Bomba To Fora, will raise up the drugs users issue to public health, principally for athletes outside the elite sports and users with esthetic purposes, developing tools to inform and warn about the risks of these medication. Thus, the program will offer a free reference center for the treatment of complications and rehabilitation of former users, this way it will contribute to the country's health institutions, ministries and sports entities.

Material and Methods: We have chosen methods to reach every possible users, collected data from articles and reviews and working together with Young & Rubicam agency created educational material, post of warnings about the risks, nutritional alternatives and healthy training through written press, social networks, radio, television and specially our website. Use of these materials in educational events, congresses, public agencies, gyms, sports clubs and schools. Aiming for a more effective program and contribution to public education policies we will involve municipal, state and federal government in the areas of Sports, Education, Health and Justice. Foundation of Interdisciplinary Outpatient Clinic for the care and rehabilitation of users of ASS with weekly attendance at the Endocrinology Outpatient Clinic at Sports Traumatology Center- Universidade Federal de São Paulo.

Results: The project has already been awarded as Best Scientific Article in a contest of the Sports Committee of the Chamber of Deputies, selected to represent the Brazilian Doping Control Authority with Unesco, financed by The Internacional Doping Elimination Fund.

Discussion: The prevalence rate of ASS users was estimated 3.3% of the population. Among men, 6.4%, women, 1.6%. Recreational athletes had the highest rate: 18.4%, followed by athletes: 13.4%, high school students was 2.3%. Mortality among athletes users is 6 to 20 times greater than the non users and approximately one third was due to cardiovascular causes. Even though there is not enough data for statistic relevant rates in Brazil, the ASS use is an real health public issue and our program will assist the users.

Conclusion: Doping in elite sport is widely approached nationally and internationally, and the use of ASS in competitive sports is rigidly regulated, monitored and penalized. However the use of ASS out of the elite sport scenario is not adequately addressed, therefore The Bomba To Fora program will act bringing effective programs and strategies are mandatory and urgent to minimize this serious public health problem.

ANALYSIS OF THE BEHAVIOR OF ELDERLY PRACTICERS OF PHYSICAL EXERCISE OR SPORTS (VIGITEL – SP - 2016) ASSOCIATED WITH THE VARIABLES OF HEALTH PROBLEMS

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Introduction and Purpose: Already known that both in proportion and absolute numbers, the elderly are growing rapidly and require constant changes of intervention, strategies and actions directed at health and well-being among public managers and society. In the last decades, evidences involving the practice of physical activity and physical exercises on a regular basis have been emphasized in the prevention of the health of the population, reduction of public health expenditures, improvement of the lifestyle, perception of health, the improvement of conditions reducing and controlling chronic diseases and improving biological aspects, making the practice indispensable. The present descriptive study with a cross-sectional design aimed to analyze the association between the variables of health, age group, health status, type of physical exercise or sport practiced and sex.

Material and Methods: Subjects aged ≥ 60 years who reported practicing physical activity or sport in the free time domain of the research provided by the Surveillance System of Risk Factors and Protection for Chronic Diseases by Telephone Survey (VIGITEL) were considered for this study. in the city of São Paulo in the year 2016. To verify the association between Variables: Sex, Age Groups, Smoking, Alcohol, Health Status, Arterial Hypertension, Diabetes Mellitus and Dyslipidemia, through the technique of Multiple Correspondence Analysis with the use of SPSS.20.0 software.

Results: Of the total of 592 elderly interviewed, 41.7% declared to be practicing, of which 63.4% are female. After identifying the layout of the variables and selecting the first dimension with a value of 0.212 and the second dimension with 0.194, explaining 40.6% of the data, it was possible to observe that the female sex was associated to the practices of bodybuilding, gymnastics, aquatic activities, fights, dances, not smokers, not consume alcohol, have good and very good health status, not have chronic diseases and belong to the older age group (≥ 76 years). For males, the association with walking, running, cycling and group games, alcohol consumption, smoking status and ex-smoker, poor and very poor health status, presence of chronic diseases: hypertension, diabetes, dyslipidemia, and belonging to the age group of age (≤ 75 years).

Discussion: It can be inferred that more efforts should be directed to promote the practice of physical exercise or sport in this population group, since a low prevalence of practicing elderly was identified. In addition, it was noted the association of different practices of modalities between the sexes with greater problems related to the vulnerability associated to the male population with more advanced chronological age.

Conclusion: Through joint relationships between chronic diseases, health status, physical exercise and / or sports and demographic characteristics, it is suggested that greater attention be given to the promotion of planning policies for the elderly population in relation to behavioral characteristics related to modalities sports, in order to obtain more practitioners.

EPIDEMIOLOGICAL AND CLINICAL FEATURES OF MUSCULOSKELETAL INJURIES IN BRAZILIAN ATHLETES: A CROSS SECTIONAL STUDY

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Introduction and Purpose: Demands in the sports environment can lead to the development of injuries in athletes with different degrees of functional limitations. The constant incidence of musculoskeletal injuries due high performance training has caused relevant concerns in sports medicine. Therefore, aim of study was to describe the epidemiological and clinical features of a sample of athletes, in order to identify the possible risk factors for musculoskeletal injuries presence.

Material and Methods: The Human Ethics Committee institutional approved the study (Protocol number 81225817.0.0000.5273). A cross sectional observational study was carried out, and comprised in total 175 professionals athletes: 48 from Brazilian Handball Training Center, 48 from Brazilian Judo Training Center, 35 from soccer club of Rio de Janeiro and 44 from clinic of sports medicine of the National Institute of Traumatology and Orthopedics. All athletes answered a questionnaire about demographic, sports and clinical characteristics regarding musculoskeletal injury and were divided into sport category groups: 62.9% team and 37.1% individual sport. Odds ratio (OR) with their 95% confidence intervals (CI) were calculated using a univariate analysis model.

Results: The sports modalities were judo (28.7%), soccer (28.0%), handball (26.8%), jiu-jitsu (4.6%), basketball (2.9%), volleyball (2.3%), MMA (2.3%), rugby (1.1%), Olympic Wrestling (1.1%), synchronized swimming (0.6%), water polo (0.6%), rowing (0.6%) and tennis (0.6%). The mean age of all athletes was 21.0 ± 6.4 years and 69.1% of them were males. One hundred and forty athletes presented a history of musculoskeletal injuries: 54.9% muscle injury, 34.3% joint injury, 26.9% LCA injury and 18.9% tendinopathy. There was a significant difference between team sports' athletes and individual sports' ones for height ($P=0.003$), age at the beginning of the sports practice ($P=0.04$), weekly hours of physical activity ($P=0.006$), years of practice in sport ($P=0.01$), training coach ($P=0.02$) and nutritional monitoring ($P<0.001$). The categories of 19-15 or 26-30 years versus ≤ 18 years (OR = 2.53; 95% CI = 1.05 – 6.12 and OR = 8.37; 95% CI = 1.06 – 65.90, respectively), height of 1.75-1.85m versus 1.65m or less (OR = 6.86; 95% CI = 1.98 – 23.75), 8-14 or more than 21 hours versus 0-7 hours of physical activity (OR = 3.36; 95% CI = 1.09 – 10.40 and OR = 3.50; 95% CI = 1.03 – 11.87, respectively) and more than 15 years of sports versus less than 5 years (OR = 5.91; 95% CI = 1.20 – 29.12) were positively associated with musculoskeletal injury among athletes.

Discussion: The high competitive level among the athletes causes them to train more intensely and often ends up generating musculoskeletal injuries. Despite the development of physical qualities in high performance athletes to reduce the musculoskeletal injury risk, no standard that sufficiently compensates for the demands of the training has yet been established. The knowledge of potential risk factors could be used to personalize athletes' training or treatment in combination with other approaches, with the aim of minimizing musculoskeletal injury development risk.

Conclusion: Our group has been developing studies with the purpose of identifying characteristics that may clarify new therapeutic targets or personalized training programs to treat the disease or to avoid the development of musculoskeletal injury in athletes. However, the information about magnitude of each variable is necessary to determine if the effect has an important role in practical and clinical decisions about applicability of the outcome. In this study, older age, higher height, higher time and years of practice in sport were positively associated with musculoskeletal injury in athletes.

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PRE-COMPETITIOS INJURIES AND ILLNESSES FREQUENCY IN TRAIL RUNNING PARTICIPANTS

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Introduction and Purpose: Running is one of the most popular forms of physical activity, due to its accessibility and low economic cost, however, a poor health condition and previous injuries are one of the main risk factors to develop sports injuries, including trail running. In this context, trail running is a discipline performed mainly by amateur athletes, nevertheless, little is known about pre-competition injuries and disease prevalence in this population. The objective of this research is to determine the frequency of pre-competition injuries and illness in athletes who participated in competitive trail running events and how these outcome affects their training process.

Material and Methods: A Cross-sectional descriptive study was conducted in 654 athletes (37% woman's), over 18 years old (mean=37.32±9.17; range=18-69), of 1185 participants in a trail running event. One day before the event, after signing an Informed Consent, surveys based on International Association of Athletics Federations (IAAF) and the Fédération Internationale de Natation (FINA) guidelines, regarding injuries and illnesses during 4 weeks prior to the competition were applied. Injury/physical ailment was defined as "any musculoskeletal or neurological ailment, related to sports, that generated or not alterations in training / competition". Then, the variables were analyzed through frequency distribution and measures of key trends. This research was approved by the Ethic Committee of the Medicine Department.

Results: Pre-competition injuries frequency was 31.5% (n=206) and whereas prior illnesses were present in 27.42% (n=167) of athletes. The most frequently injured anatomical areas were the knee (32.83%) and ankle (14.65%). The most frequently injury cause was "Gradual onset, during many training sessions" with 41%. Regarding the injury effect on the training process for the event, 85.5% of athletes with prior injuries had to make modifications, where the training performance and intensity were the most affected, and from them, 79.31% thought this would affect their performance during the competitive event. Finally, from the athletes with prior illness, in 82.88% of them, the respiratory system was affected.

Discussion: It is usually assumed that athletes participating in competition events are in good health, however, as demonstrated in this study, it is not always the case. This could place the athlete at greater risk of suffering new injuries or health complications during the competition. This information is important to elaborate preventive strategies and provide better medical support during competitions.

Conclusion: Almost a third of the athletes who participated in a competitive trail running event reported having an injury or illness, which affects their preparation and performance.

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THE PHYSIOLOGICAL BENEFITS OF EXERCISE IN AGING: A REVIEW OF LITERATURE

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Introduction and Purpose: According to data from the World Health Organization, the world will have two billion elderly people by the year 2050. Moreover, by 2020, 84 to 167% of the elderly will present moderate or severe disability. The evidence indicates that physical exercise is a preponderant factor in the prevention, control and treatment of chronic, psychosocial and cognitive conditions associated with aging, allowing greater functional autonomy. The objective of this study is to describe the physiological effects of physical exercise on the elderly in different physical capacities: aerobic, strength and speed.

Material and Methods: A literature review was carried out with 23 indexed scientific papers dated from 1998 to 2017 on the physiological effects of exercise in the elderly, mainly the position of the American College of Sports Medicine.

Results: Aerobic capacity exercises, when performed regularly, promote chronic effects such as: increased capacity of maximal oxygen consumption; reduction of pressure levels at rest and in submaximal exercises; improved vasodilator and oxygen uptake of trained muscle groups; produces cardioprotective effects, reducing atherogenic risk factors; reduces artery rigidity, improving endothelial and baroreflex function; increases vagal tone (falling heart rate at rest and in submaximal exercises); improvement of myocardial contractile performance. In body composition, there is loss of visceral fat. In metabolic effects, increased glycemic control, use of fat as muscle fuel during submaximal exercise and in high intensity improves the action of insulin. There is increased bone density in postmenopausal women and decreases the risk of fracture. Muscle strength exercises promote increased strength, strength and speed (power). Muscle power exercises are more associated with functional performance than those of resistive strength by increasing muscle quality through increased recruitment and discharge of motor units. Muscle resistance exercises promote reduction of the activation of motor units required to complete submaximal tasks, reduction of coactivation of antagonist muscles, increase in the availability of high energy phosphate, change in the expression of myosin heavy chain isoforms, increase of mitochondrial density and of the oxidative capacity, reduction of the volume percentage of available myofiber. In body composition there is increase of lean mass and decrease of body fat. There is also an increase in bone mass density. In the metabolic and endocrine effects there is greater use of fat as fuel, by the increase of lipid oxidation and reduction of the oxidation of carbohydrates and amino acids at rest; reduction of serum cholesterol and triglyceride; possible alterations of IGF-1; increased resting concentrations of total or free testosterone and decreased cortisol at rest, which favor muscle hypertrophy. Balance training reduces the risk of falls due to loss of balance, especially when combined with other physical abilities. Flexibility training increases joint amplitude and movement. Other reported effects of exercise are psychological well-being, increased self-esteem, decreased risk of depression and anxiety, reduced risk of dementia and cognitive decline, improvements in memory, attention and reaction time.

Discussion: Although the studies studied talk about some isolated physical capacities, mainly of the effects of aerobic exercises, all affirm that physical exercise improves the functional capacity of the elderly. It is therefore important to encourage the study of all physical abilities.

Conclusion: It is concluded that the organism of the elderly has plasticity and reacts to the training stimuli, and, therefore, normal functional reductions of age should not limit their practice. Each physical capacity causes specific adaptations to the organism. However, when combined, they appear to produce greater, more efficient physical, cognitive, psychological, and social benefits. Thus increasing longevity and improving your quality of life.

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A CRITIC REVIEW OF GRADUATION ON UNIVERSITIES IN BRAZIL AND THE RELATION WITH SPORTS MEDICINE

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Introduction and Purpose: It's been known the relevance of sports in the primary care, because of the potential effect on preventive and promotion in the quality of life directed for population. However, the universities from Brazil still have little progress on the insertion of the Sports Medicine in the graduation what produces a paradoxal in the medical education of the country. Once that the public health systems intend to empowerment the bases of primary health care, pointing for a discharge on the another levels, Objectives: Analysing the educational scenario in the Schools of Medicine in Brazil, we attend to criticize the actual project of education that do not prepare the students in deal with diseases beyond the drugs therapy offers for the patients, by that we want to induce a reflection about the development of a medical during his graduation and if it's possible to rearrange an educational system wich presents a supportive care that help people beside prescriptions and estimulate a booster in the quality of life.

Material and Methods: We research on official websites of 23 institucions wich provides medical education looking for the discipline of Sports Medicine or similars in the graduation of medicine and analyzed the curriculum in attempt to have a panoramic view from the situation of Sports Medicine in the universities.

Results: Despite some groups of study focus on the subject in a few institutions call "Ligas Acadêmicas", only one university provides the discipline as regular on the curriculum, based on the official website of the institutions, the university that offers the discipline propose an "Introduction of Sports Medicine" and "Sports Medicine".

Discussion: As long we attend the daily practice on medicine, students should be prepared to deal with "new athetles" that rise exponentially, keeping in mind the changes that part of the population follow because the increased in diabetes, obesity and cardiovascular events in worldwide; and by that new practioners emerge from a sedentary life, what is a great thing, but in the mean time, requires a prepared team to go along with them and that ensure a safe enviroment of the body, wich could be given by a physician that know the principles of the care on sports, reducing lesions, heart faillores and another risks that may appear from a sudden exercise routine. Besides, to set a therapeutic plan for patients who doesn't have any contact with sports before and suffered some stress - Heart-attack, Stroke, Dyslipidemias, Asthma- it's essential by the physician think in an approach that estimulates a change in the habits of life, including a specifically routine that contemplates the history of the patient and respect his expectations. How can a Medical attend to this context if there isn't at least a way to start this work, wich when combined with the usual treatment can produce an optimized therapy?

Conclusion: We should improve graduation with mecanisms to reavaliate and promote a life style changing conduced by food intake and exercises that aim a good state of living that could be provided by daily exercises and follow-up on the primary care by physicians.

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MORPHOLOGICAL CHARACTERISTICS OF THE LATERAL MENISCUS' POSTERIOR HORN TEAR AT THE MENISCOFEMORAL LIGAMENT'S ATTACHMENT SITE (ROOT TEAR) CONCOMITANT WITH TEAR OF THE ANTERIOR CRUCIATE LIGAMENT

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Introduction and Purpose: Tears of the posterior horn of the lateral meniscus concomitant with a tear of the anterior cruciate ligament (ACL) are frequently located at the root of the posterior horn of the meniscus at the attachment site of the meniscofemoral ligament (root tears). The purpose of this study is to present the frequency and the morphological characteristics of root tears of the lateral meniscus.

Material and Methods: The morphological characteristics of lateral meniscus' root tears were studied in 519 cases which were treated with arthroscopic ACL reconstruction, between 2006 and 2014. For classification of the tears the three types proposed by Forkel et al. were used (1; root avulsion, 2; radial tear of the posterior horn with an intact meniscofemoral ligament, 3; complete injury of the posterior horn of the lateral meniscus).

Results: Lateral and medial meniscal tears concomitant with an ACL tear were found in 32.8% (n=170) and 40.3% (n=209) of the cases respectively. Sixty-nine (13.3% of total tears) out of the 170 tears of the lateral meniscus involved the root of the posterior horn, of which 22 (32%) were found to be type 1, 35 (51%) were type 2 and 12 (17%) were type 3. The 22 type 1 root tears of the posterior horn of the lateral meniscus were treated with abrasion of the injured tissue, the type 2 tears with partial meniscectomy in 26 cases and with an all-inside repair in 9 cases, and the type 3 injuries were treated with abrasion in one case and with an all-inside repair in the other 11 cases.

Discussion: The root tears of the posterior horn of the lateral meniscus accompanying an ACL tear should be diagnosed in the pre-operative MRI. The surgeon should be prepared to visualize and classify the specific type of the tear during arthroscopy in order to apply the proper treatment.

Conclusion: The root tears of the posterior horn of the lateral meniscus at the attachment site of the meniscofemoral ligament accompany at a significant percentage the tears of the ACL. The treatment of those tears is depended on the tear-type and the integrity of the meniscofemoral ligament.

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THE ROLE OF ECCENTRIC CONTRACTION EXERCISES IN A REHABILITATION PROGRAM AFTER TRAUMATIC RUPTURE OF ACHILLES TENDON AND END-TO-END SUTURING RECONSTRUCTION TECHNIQUE IN ATHLETES

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Introduction and Purpose: The purpose of the study is to determine the role of a rehabilitation program containing eccentric contraction exercises of the calf muscle comparing to a stretching exercise program after traumatic rupture of Achilles tendon and end to end reconstruction suturing technique in amateur athletes.

Material and Methods: The study involves 23 athletes (17 men, 6 women) with an average of 35.2 years of age (30-48 years old), suffering from a traumatic rupture of Achilles tendon, all diagnosed with MRI or U/S exams. Everyone was treated with surgical reconstruction technique, using the same minimal invasive technique and end to end suturing. The athletes were divided in two groups A and B and everyone followed the same postsurgical rehabilitation program. The team A consisting of 14 athletes followed an additional program of eccentric contraction exercises of the calf muscle, whereas the team B (9 athletes) followed only a stretching exercise program. All athletes were evaluated postsurgical (12 weeks) by the VAS pain scale (0-100mm) and they had been estimated of the maximum isokinetic strength of the sole flexor muscles of both legs, using the Cybex Norm dynamometer concentric in corner velocity 90 o/sec (5 repetitions) and 225 o/sec (10 repetitions) and eccentric in corner velocity 90 o/sec

Results: According to the results, the team B postsurgical presented at the affected leg a significant reduction in the strength comparing to the unaffected leg that came up to 13,8%, 16,9% and 12,2% in the corresponding measurements. ($P < 0,01$). The team A postsurgical did not showed a statistically significant difference in the strength of the muscles of the affected leg comparing to the unaffected leg ($P > 0,01$) even though there was a deficit of 9,2%, 11,3% and 7,2% in the corresponding measurements. At the VAS pain scale the two teams did not showed a statistically significant difference (B $4,2 \pm 4,1$ / A $4,9 \pm 3,8$).

Discussion: The administration of a postsurgical rehabilitation program that contains eccentric contraction exercises of the calf muscle after traumatic rupture of Achilles tendon and end to end reconstruction suturing technique is used

Conclusion: The eccentric contraction exercises of the calf muscle after traumatic rupture of Achilles tendon and end to end reconstruction suturing technique in amateur athletes showed to be more effective comparing to a simple stretching exercise program.

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AGED WOMEN'S PERCEPTION OF PHYSICAL TRAINING IMPACT ON DAYLY LIVING ACTIVITIES

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Introduction and Purpose: It is a fact that exercise generally brings benefits to the physical performance of older people, which increases the commitment of scholars in search of more information on its use and its benefits in various fields of health. The aim of this study is to evaluate the perception of older women as to any changes caused by exercise in their daily activities.

Material and Methods: This study is the qualitative component of an intervention study with a population of elderly volunteers performed the following steps: a preliminary assessment, intervention, followed by a qualitative research content analysis on the perception of the elderly. 90 physically independent older women, not practicing physical exercise were studied. The volunteers were subjected to 24 training sessions.

Results: In qualitative research, the volunteers demonstrated in their speeches the importance of training for improvements in physical, mental, social and cognitive.

Discussion: This study corroborates to other findings from the literature, which demonstrate that physical exercise is an important factor in increasing the personal perception of the effects brought from physical exercise, such as an improvement in the psychological and cognition, as well as the physiological benefits.

Conclusion: It was concluded that the old people perceive the changes produced by physical training.

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SPORT FOR WOMEN. PREGNANCY AND POST PARTUM

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Introduction and Purpose: There is limited information on the impact of physical activity during pregnancy. Frequently asked questions are the following: What exercises can pregnant women perform, for how long and with (what) which level of intensity without risking their health and that of the fetus? When postpartum can they return to training and later, if relevant, to competition? In planned pregnancies, performing physical exams before and after pregnancy, providing sports medical advice would provide better guidance to female athletes as to the right time to return to training routines safely. The objective was to determine the evolution of some physical, cardiovascular, hematological and functional variables before and after pregnancy to try to establish a protocol of action and provide medical advice after childbirth.

Material and Methods: Longitudinal, descriptive study of repeated measures and intra subject of 8 high performance sportswomen with a planned pregnancy. Average age: 29.6 ± 1.8 old years, weight: 65.8 ± 3.6 kg, height: 168.7 ± 4.2 cm, VO_2 max: 66.2 ± 3.3 ml / kg / min about three months before pregnancy. 4 were volleyball players in the first division, 2 endurance athletes and 2 world-class triathletes. In all cases, the pregnancy was their first pregnancy. A physical (body-weight), cardiovascular (EKG, Blood pressure), hematological, 1-repetition-maximum (1RM) tests, 40-m sprint, and countermovement jump were measured between 1 and 3 months before pregnancy, as well as 1 month 3 months and a year prior to delivery. Each time, the Oslo Sports Trauma Research Centre (OSTRC) Overuse Injury Questionnaire was administered in person. Descriptive statistics (means, deviation) were determined and a t-Student test was performed for dependent variables before and after pregnancy.

Results: The participants continued to practice until the 4.29 ± 1.24 month of pregnancy. After delivery, they returned to practice at 1.83 ± 0.93 months and to competition at 5.46 ± 1.19 months. There were no complications during the pregnancy and the births were natural. All suffered posterior lateral episiotomy. The gestational age was 38.93 weeks and the average weight of the new-borns was 3707.6 ± 166.2 g. At 3 months their VO_2 max was 65.66 ± 5.33 and at 6 months was 66.68 ± 1.19 ($p < 0.05$). Countermovement jump was maximum at 6 months (34.2 ± 5.2 cm), 40m-sprint was maximum at 12 months (5.86 ± 0.55 s), 1 RM press at 6 months (59.8 ± 24.6 kg); 1 RM pull at 12 months (65.9 ± 14.6 kg) and 1 RM squat at 12 months (92.3 ± 29.8 kg) with differences mean all of them regarding the measures before pregnancy ($P < 0.01$).

Discussion: These results suggest that the physical condition of pregnant athletes does not suffer a significant deterioration after pregnancy. In all of our participants there were no complications during pregnancy or delivery, although this observation cannot be extrapolated to the entire population of pregnant sportswomen. Although the participants continued to perform physical exercise until 4 months, there were no changes in the gestational age or in the weight of the new-borns. But it is necessary to carry out more in-depth physiological studies on fetal well-being and to evaluate them in the long term. Competitive athletes should refrain from intensive efforts and repetitive weights because there is not enough evidence (about) about the result of strenuous physical exercise on the mother and the fetus. In competitive athletes, a planned pregnancy can be a personal challenge that motivates them to train at the same level or higher than before pregnancy, so psychological studies are needed to further explore this topic. In any case, pregnant athletes need the help of support staff to stay at the high level.

Conclusion: The participants improved their cardiorespiratory performance, speed and strength between 6 and 12 months after pregnancy. More studies are needed to determine the evolution of long-term physical capabilities.

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THE PREVALENCE OF DEPRESSION AND STRESS IN UNIVERSITY STUDENTS AND THE EFFECTIVENESS OF PERSONAL METHODS OF REDUCING SYMPTOMS SUCH AS PHYSICAL ACTIVITY, FRIENDS AND MEDICAL SUPPORT

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Introduction and Purpose: Stress and depression are known as 21st century diseases and are not restricted by age, sex or color. Knowing this, a large part of the world's population suffers from these disorders, including young people who, due to the competitive and demanding environment to which they are increasingly inserted, are more prone to serious psychological problems. It is known that physical activity has a good impact on the improvement of these diseases, besides the physiological benefits. The objective of the present study was to describe the occurrence of symptoms indicative of stress and depression in university students and the types of help sought in order to minimize this symptoms and and its effectiveness.

Material and Methods: Two questionnaires were administered to 40 students between 18 and 29 years old, 13 men and 27 women, the Beck Depression Inventory and the Lipp Stress Inventory. In addition, additional questions were asked about various types of help, including physical exercise, traditional Chinese medicine, and others effective bonding (relatives and friends) and their effectiveness in combating stress and / or depression in the college entrance examination.

Results: Among those who sought help, the most type of help sought were friends and physical exercises, being sought by 88.5% and 77%, respectively. Among those who used physical exercise as an aid, 95% perceived the efficacy of the method. Mild depression was the most prevalent level of severity among the 35% symptomatic depression. Meanwhile, among the 40% symptomatic stress, the resistance phase was the most prevalent and presented most physical symptoms, although in the phases of near exhaustion and exhaustion (there was no case in the alert phase) presented most psychological symptoms. Additional questions indicated that 87.5% of the population felt stressed and / or depressed in the college entrance exams, of which more than 74% sought help.

Discussion: About the types of help looked for, the study corroborated with most of the literature on the efficacy of exercise minimizing the symptoms of stress and depression. The results were consistent with the literature while indicating the highest number of women with symptoms indicative of stress and depression in relation to men. In this sense, the index of ideas of suicide was larger than expected, representing 12.5% of the total population, all of which are female.

Conclusion: It was concluded that the affective, physical exercise and psychological aids obtained more demand and more efficiency. In this sense, the search for help from friends was predominant, followed by physical exercise. The search for alternative medicine was significant and efficient in combating the symptoms of stress and depression in the year of college entrance examination, with meditation being the most sought among these, followed by masotherapy, homeopathy, yoga and acupuncture.

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WHOLE BLOOD TRANSCRIPTOMIC RESPONSE TO HIGH INTENSITY INTERVAL EXERCISE IN ASSOCIATION WITH AEROBIC ADAPTATION**Autores:** Karanikolou, A, Wang, G, Papadimitriou, I D, Yan, X, Eynon, N, Pitsiladis, Y P**Instituições:** University of Brighton - Grã-Bretanha (Reino Unido)

Introduction and Purpose: Heterogeneity in adaptation to exercise has been studied recently in connection to genetic variants and gene expression profiling in order to predict the variability in training response. The aim of this study was to investigate the whole transcriptome expression in whole blood following intensity interval exercise in the Gene Skeletal Muscle Adaptive Response to Training (Gene SMART) study and in association with maximal oxygen uptake (VO₂max) training response and aerobic adaptation.

Material and Methods: Forty-one moderately trained, healthy Caucasian participants (all males 30.1±7.9yrs, Body Mass Index 24.6±3.0kg/m²) completed a single session of High Intensity Interval Exercise (HIIIE) on a cycle ergometer (8x2-min intervals at 85% of maximal power with 1 min of recovery between intervals) followed by 4 weeks of High Intensity Interval Training (HIIT). Subjects performed a 20km Time Trial (TT) and 2 incremental cycle tests to exhaustion prior to the commencement and after the completion of 4 weeks of training, where physiological parameters values (i.e., peak power (PP), lactate threshold (LT), and VO₂max) were collected. Whole blood samples and muscle biopsies were collected before, immediately after HIIIE, 3 hrs post HIIIE and after 4 weeks of HIIT. Citrate synthase (CS) was measured in sample biopsies before and after 4 weeks of HIIT. Total RNA extracted from whole blood was used for whole transcriptome microarray analysis using GeneChip™ Human Transcriptome Array 2.0 (Thermo Fisher Scientific; >285,000 full-length transcripts). The Bioconductor package “oligo” was used to create the expression dataset for further analysis and the “limma” package was employed to perform a differential expression analysis. Differentially expressed transcripts were reported at 5% false discovery rate (FDR). A two-tailed Pearson correlation was performed to investigate the strength of the relationships between the %change in VO₂max, time trial, PP, LT and CS following 4 weeks HIIT and the gene expression response after HIIIE in the top 10 ranked transcripts by FDR.

Results: A positive correlation was observed between %change in VO₂max and CS, and between LT and PP. 3,655 and 11,324 transcripts were differentially expressed immediately and 3hrs post HIIIE, respectively; 1,417 were in common between the 2 time points. No transcripts were differentially expressed after 4 weeks of HIIT. A negative correlation was observed between the VO₂max training response after HIIT and 6 of the top 10 transcripts in 4 genes (CD69, GZMB, NCR1 and MYBL1) differentially expressed immediately post HIIIE. %Changes in CS and LT were correlated with the MYBL1 (represented by 2 transcripts) and NCR1 gene expression immediately post HIIIE, respectively, but %changes in PP were not correlated with any of top 10 transcripts. Gene expression changes at 3 hours post HIIIE (i.e., in the top 10 transcripts) were not correlated with the changes in VO₂max and CS following 4 weeks of HIIT; however, 6 genes (i.e., BMX, ALOX5AP, MMP9, KIAA0226L, MME, and PADI4) were negatively correlated with % change in PP. In addition, MMP9 and MME gene expression was also correlated with %changes in LT. No correlation was found between time trial %changes and the top 10 transcripts expressed in each time point or the physiological parameters.

Discussion: The results of the Gene SMART study confirmed the heterogeneity in adaptation to exercise and therefore, this large well-phenotyped study, provides a unique opportunity to study genetic variants and conduct gene expression profiling in an attempt to explain the variable training response.

Conclusion: Although preliminary, these data imply the association of aerobic adaptation and the triggered gene expression response to a single bout of intense exercise.

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ENCAPSULATED CARBOHYDRATE INCREASES GASTRIC EMPTYING RATE OF A HIGH CARBOHYDRATE BEVERAGE IN HUMANS**Autores:** Sutehall, S, Galloway, S, Bosch, A, Pitsiladis, Y**Instituições:** Division of Exercise Science and Sports Medicine, University of Cape Town, Cape Town - África do Sul

Introduction and Purpose: Ingestion of high carbohydrate (CHO) beverages (>10% CHO) will cause a slowing of gastric emptying and subsequently a large volume of the beverage will remain in the stomach. During exercise this may cause gastrointestinal distress which further inhibits fluid and CHO delivery. Sodium alginate is a natural biopolymer, used extensively in medicine as a delivery mechanism and in the food industry as a thickener. When CHO is mixed with sodium alginate and ingested, an alginate hydrogel will form in contact with stomach acid, encapsulating the CHO. This encapsulation will dissipate when exposed to the relatively higher pH of the duodenum, delaying the exposure of the CHO to the intestinal receptors and absorption sites. Theoretically, this would allow the ingestion of highly concentrated CHO beverages with less retardation of gastric emptying. Therefore, the aim of this study was, to investigate the effect of CHO encapsulation on the rate of gastric emptying in comparison with an isoenergetic, equimolar non-encapsulated beverage and an isoenergetic, non-encapsulated beverage with a higher osmolarity.

Material and Methods: Four active, male subjects (age; 29 ± 5 yrs, weight; 87 ± 3 kg and height; 177 ± 4 cm) were recruited to take part in this randomised, double blind study. A bolus of 500 mL of either of the three experimental drinks was instilled while seated, and gastric emptying measured using the double aspiration method every 10 min for 90 min, allowing for the measurement of the volume of test drink in the stomach, while accounting for gastric secretions and swallowed saliva. The three experimental drinks consisted of 180 g/L maltodextrin and fructose (POLY), 180 g/L glucose and fructose (MON) and 180 g/L maltodextrin, fructose and sodium alginate (ENCAP). All drinks also contained 1.5 g/L of sodium and had a CHO ratio of 1:0.8 (maltodextrin:glucose:fructose).

Results: ENCAP emptied rapidly within the first 10 min in comparison with POLY and MON (186 ± 49 vs 77 ± 48 vs 43 ± 39 mL, respectively) and continued to empty at a faster rate 50 min after instillation (ENCAP; 350 ± 23 vs POLY; 280 ± 15 vs MON; 200 ± 60 mL, respectively). At 60 min ENCAP and POLY had emptied similar volumes (380 ± 37 and 371 ± 46 mL, respectively) while MON had only emptied modest amounts (222 ± 20 mL). This trend was maintained until 90 min where all three drinks had emptied similar volumes (ENCAP; 480 ± 16 vs POLY; 470 ± 23 vs MON; 438 ± 31 mL).

Discussion: These findings, albeit preliminary, suggest that encapsulating CHO in alginate hydrogel is an effective method to enhance gastric emptying and increase CHO delivery without impeding fluid delivery.

Conclusion: Once confirmed, further investigations are necessary to quantify the potential metabolic, cardiovascular, thermoregulatory and performance benefits of this novel fluid and CHO delivery mechanism.

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DOES CRAMP ALTER THE CREATINE KINASE (CK) RESPONSE USED TO MONITOR TRAINING LOAD IN SOCCER? A CASE STUDY

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Introduction and Purpose: Cramp is a phenomenon characterized by intense painful and involuntary muscle contractions of a particular muscle or muscle group. Its occurrence has been investigated in sports as a potential generator of muscle damage. To verify the effect of the cramp occurred at the end of an official soccer match in the individual response of the creatine kinase (CK) concentrations.

Material and Methods: The soccer player presented a cramp event shortly after a full soccer match. The athlete was monitored for the rating of perceived exertion (RPE) throughout the season. The data were grouped by multiplying the trained RPE minutes of each training session to determine the training load, later used to analyze the ratio of acute / chronic load (A/C). The (A/C) was calculated from the 33 days prior to the occurrence of cramp.

Results: 35h (1840 (U/L)) and 53h (1280 (U/L)) after the match, the CK concentration was higher than individual CK response measured (703 (U/L)) during whole season for this same moment of evaluation.

Discussion: Cramp is a phenomenon characterized by intense painful and involuntary muscle contractions of a particular muscle or muscle group. This phenomenon can occur during, or after exercise, and its possible causes pointed out in the literature are still not conclusive, however, there are two main theories that support the occurrence of this phenomenon, one of them is the occurrence of cramp associated with muscle fatigue and the other is the theory is associated with a deficiency of electrolytes. There are some risk factors indicated for the occurrence of this phenomenon, such as the intensity and duration of the exercise performed inadequately for a certain physical condition, as well as the previous occurrence of cramps and family history. According to Ispiridis et al., an increased state of muscle damage after a football match may be accompanied by decreased performance and late muscle pain. Therefore, the occurrence of cramp added to the overload imposed on the football match may potentiate this effect and compromise the individual interpretation of CK blood concentrations, as well as athlete recovery. The monitoring of the training performed by the evaluation of CK concentrations in soccer has been done in an individualized way. However, factors external to the game overload may increase CK response, such as the occurrence of muscle injury. In this way, cramp could also be considered as a factor that compromises CK concentrations. Therefore, when interpreting and recording the state of muscle overload from CK concentrations, the occurrence of cramp should be noted as a factor that interferes with these data so that the analysis of individual CK response arising from soccer match alone is more reliable. Another caution would be the type of conduct in the training, in which the athlete who suffered cramp should have in the days following this event. For, a high state of muscle damage can impair performance in this athlete's training, expose him to a new cramp event, as well as increase the risk of injury. Therefore, in the present study, at 35 hours, we chose a regenerative training conduct of this athlete. Understanding CK's response caused by cramps and soccer play can assist practitioners involved in training prescription to exercise an effective training prescription.

Conclusion: The muscle cramp may to increase CK concentration of soccer players beyond individual response during whole season. Therefore, we suggest that individual monitoring of CK response in soccer should consider the occurrence of the cramp as a factor that compromises CK response to soccer match.

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ANALYSIS OF POLLUTANT CONCENTRATIONS WITHIN CYCLE PATHS IN THE CITY OF FORTALEZA - CEARÁ, BRAZIL

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Introduction and Purpose: The state of Ceará is currently home to approximately 1.83 million motor vehicles, thus occupying the ninth position in Brazil in terms of total number of automobiles, as well as placing third within the Northeastern region of the country. The large number of circulating motor vehicles contributes to an increase in atmospheric pollutant emissions, as well as reducing urban mobility. Thus, there is a growing need for alternate methods of population mobility. One solution is to encourage the use of bicycles. The city of Fortaleza - Ceará saw an increase in the number of cycle paths, from 68 kilometers at the end of 2013, to approximately 209 kilometers in 2017, distributed among various neighborhoods throughout the city. However, as the numbers of bike lanes and cyclists increase, there is no corresponding reduction of the existing total of motor vehicles. This gives rise to a number of health and occupational risks for bicycle users, who are often forced to circulate in close proximity to considerably large motor vehicle corridors, which also contain noticeably great concentrations of pollutants. With this in mind, the aims of the present study were to analyze the concentration of polycyclic aromatic hydrocarbons (PAH), metals and particulate matter (PM) present within the atmospheric gases encountered during transit in a cycle path in Fortaleza, between the hours of 08:00-09:00 A.M. and 05:00-06:00 P.M.

Material and Methods: Data was collected for the cycling lanes of the Bezerra de Menezes and Mister Hull avenues, which correspond to a total path length of approximately 5.7 kilometers. Collection was achieved by means of filters connected to a suction pump and a mass counter (Met One) attached to a bicycle. The collection system analyzed concentrations of particulate material with sizes of 1 µm, 2.5 µm, 4 µm, and 10 µm. The cyclist rode the study trajectory in both directions during both time frames, thus riding for a total of 11.4 km.

Results: Our study results demonstrated a marked presence of phenanthrene, acenaphthylene, fluorene, and acenaphthene among the PAHs found in the samples, at concentrations of 10.16, 8.64, 7.11, and 5.22 µg/m³, respectively. With regard to the presence of metals, we found concentrations of copper and iron to be 4.52 and 5.37 µg/m³, respectively. On the other hand, average concentrations for the PM analyzed were 0.5 µg/m³ of MP1, 2.7 µg/m³ of MP2.5, 6.1 µg/m³ of MP4, and 33.0 µg/m³ for MP10, during the period between 08:00 and 09:00 P.M. For the afternoon time frame, results obtained were 0.7 µg/m³ of MP1, 3.7 µg/m³ of MP2.5, 9.9 µg/m³ of MP4, and 33.0 µg/m³ for MP10 from 05:00-06:00 P.M.

Discussion: It is widely known that PAHs can be absorbed through inhalation, oral exposure and dermal contact and are considerably harmful to human health, as they may be transported through the bronchi, thus allowing for pulmonary deposit. Exposure to PM may cause several injurious effects, particularly to the respiratory system. Such pollutants may be harmful to people who transit within areas similar to the study path, and, considering the increased respiratory volume per minute that occurs during cycling, these risks can be exacerbated, leading to a greater exposure to the aforementioned pollutants.

Conclusion: Our study results may provide a basis for regulation or adjustments to environmental laws that restrict vehicular emissions, as well as serving as a warning for the population that uses bicycles as a means of transportation. It is imperative that a considerable fraction of the circulating population reduce motor vehicle use, and instead turn to alternative methods of transportation that are also environmentally-friendly, such as bicycles, thus reducing the release of atmospheric pollutants. Until this occurs, this portion of the city's cycle paths cannot be regarded as safe for human health.

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USE OF WHEY PROTEIN IN THE MANAGEMENT OF HIV WASTING SYNDROME

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Introduction and Purpose: HIV wasting syndrome is characterized by an involuntary loss of at least 10% of total body mass within a 12-month period, or more than 5% loss over 6 months along with diarrhea, weakness and/or fatigue for at least 30 days. When observed in HIV+ patients, wasting is considered a marker for worsened prognosis and increased risk of death. Therapeutic approaches include the use of anabolic steroids, growth hormone (GH), cytokine modulators, appetite inducers, exercise, diet modifications, nutritional supplements with increased calorie and/or protein content, among others. Whey protein (WP) is a supplement consisting of high biological value (HBV) protein that exhibits excellent bioavailability and absorption throughout long portions of the small intestine. However, there is very little research available regarding its use as a treatment option for HIV wasting syndrome. The aim of this study was to systematically review the available scientific literature regarding the use of WP in the management of HIV wasting syndrome.

Material and Methods: PubMed/Medline, Cochrane Central Register of Controlled Trials (CENTRAL), Scielo, ScienceDirect, Europe PubMed Central (Europe PMC), LILACS (BIREME) and BVSalud were systematically searched. Search parameters consisted of combinations of the terms HIV, wasting syndrome, muscle mass, and whey protein, in English, Portuguese and Spanish. From these filters, three articles were identified for analysis.

Results: One article was published in AIDS, one in BMJ, and the third was published in the American Journal of Clinical Nutrition. All three studies were quantitative in nature (100%), with a combined total of 407 participants (mean=135,7). Study volunteers were mainly female (60,7%), and no volunteers had other pathologies that could lead to muscle wasting or were receiving anabolic treatments. Studies were carried out in the United States (n=2) and Ethiopia (n=1). One study analyzed the effects of whey protein alone, one compared whey protein to exercise and to an association between these two, and the third study compared whey protein to soy protein. The main research variables were weight (n=3), body cell mass (n=2), fat-free mass (FFM) or lean mass (n=3), fat mass (n=2), and muscle strength (n=2). WP was associated with increased weight overall. In two studies, WP alone led to increased lean mass or FFM, but one study saw no effect on muscle mass. Muscle strength showed little or no significant increases with WP alone. However, one study revealed a discrete increase in muscle mass and improved nutritional status, along with a reduction in fat mass, when WP was used in a hyperlipidic base with reduced carbohydrate. In addition, two studies showed increases in CD3, CD4+, CD8 counts, as well as reduced inflammatory cytokines.

Discussion: Muscle mass and strength increases are important survival predictors in HIV+ patients with AIDS. Despite a significant increase of protein intake (above normal recommended intake levels) in all three studies, the amounts of WP used did not yield significant increases in muscle mass or muscle strength, even in the light of consistent overall weight gains. Furthermore, one study also revealed lack of a positive effect when WP was associated with exercise. Therefore, WP alone may possibly have no effect on muscle mass in HIV wasting syndrome patients. The effects seen when WP was given with a hyperlipidic supplement suggest that such a combination of macronutrients may yield increases in muscle mass and strength after both short and long-term use.

Conclusion: The results of this review suggest that WP alone may lead to weight gain, but may have no significant effect on muscle mass in HIV/AIDS wasting syndrome. However, it is possible that WP in a hyperlipidic substrate may lead to increased muscle mass and strength. Furthermore, the improved immunological status seen with WP may be, in itself, an important factor to reduce risk of death in HIV wasting syndrome. Thus, further studies are justified.

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MEDIAL PATELLOFEMORAL LIGAMENT RETENSIONING REPAIR FOR ACUTE PATELLAR DISLOCATIONS

Autores: Yanasse, R H, Aravechia, G, Araujo, R J, Lima, L G, Medeiros, D Z, Laraya, M H, Mizobuchi, R R

Introduction and Purpose: Acute patellar dislocation accounts for 2% to 3% of all knee injuries and typically occurs in young active patients under the age of 20 during sports participation. An acute patellar dislocation can lead to a 90-100% rupture rate of the medial patellofemoral ligament (MPFL) and is the second most common cause of traumatic knee hemarthrosis. 1,4 Osteochondral lesions may be present in up to 25% of these patients and are missed in 30-40% of plain radiographs. The natural history and non-operative treatment of an acute patellar dislocation report a high recurrence rate of up to 44% in adults and 69% in children, and that more than 50% of the patients develop asymptomatic knee. Altered biomechanics and patellofemoral joint contact pressure, recurrence and the presence of an osteochondral lesion resultant from an acute patellar dislocation have been related to patellofemoral osteoarthritis at long-term follow-up. This study aims to review the results of a retensioning repair of the MPFL in acute patellar dislocation. Our hypothesis is that surgical retensioning repair of the MPFL can provide improved stability and less patellar dislocation recurrences.

Material and Methods: A retensioning repair of MPFL was performed in 21 patients with acute first-time patellar dislocation by a senior surgeon (R.H.Y) with the same surgical technique that has been previously described (Arthroscopy Techniques). Mean age was 22 years, and mean follow-up was 5.8 years. Patients were assessed by radiographic evaluation, the Kujala Scoring System, Tegner Activity Scale, apprehension test and patellar dislocation recurrences.

Results: The mean sulcus angle measured in Merchant View was 138 degrees (SD 10.4). The mean patellar morphology assessed using the Wiberg classification was type 3 (SD 0.87). The mean patellar height using the method described by Caton-Deschamps was 1,11 (SD 0.18). The mean postoperative Kujala Score was 92 (SD 8.57) (Range 68-100). Before injury patients had a mean Tegner Activity Scale of 5 (SD 1,02) (Range 4-7), and postoperatively a mean of 5 (SD 0,90) (Range 4-7). All patients assessed by physical examination had a negative apprehension test post-operatively at follow-up. One patient had recurrence of the dislocation 4 years after surgery playing soccer, before recurrence he had returned to his previous activity level and had a Kujala score of 98. One patient had thrombosis on the operated leg after surgery, did not go through physical therapy and did not regain full knee range of motion. This patient was evaluated three years after surgery and had a Kujala score of 68 and did not return to the pre-injury Tegner level.

Discussion: Case series have demonstrated that surgical treatment can have a remodeling effect on the femoral trochlea and patella, and this may be another reason for indicating surgery as early as the first-time patellar dislocation in a skeletally immature patient. We would like to state that the present surgical technique is simple, no hardware is used and can be performed in children without having growth plate concerns. The layers described by Warren and Marshall fuse near the patellar insertion and difficulty separating these structures is a critical step with this technique. Anatomical studies have described the MPFL, classically present in layer II, to course to the posteromedial capsule, and the deep fibers of the MPFL to be continuous with the posteromedial capsule and anchored to the bone just distal to the adductor tubercle. We believe that the structure tightened in which Krackow stiches are placed is the deep portion of the MPFL.

Conclusion: The anatomical retensioning repair of the MPFL in acute patellar dislocations provided effective and functional patellar stability with reduced recurrences, encouraging short to medium-term results and return to previous activity levels.

AMENORRHEA AND LOW MINERAL BONE DENSITY IN BRAZILIAN ATHLETE: CASE REPORT ON DIAGNOSIS AND TREATMENT OF THE RELATIVE ENERGY DEFICIENCY SYNDROME IN SPORTS

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Introduction and Purpose: In 2014, the International Olympic Committee introduced the concept of relative energy deficiency in sport (RED-S). In this Syndrome, athletes with low energy availability (<30 Kcal/ Kg /mm / day) present deficit in several systems: neuroendocrine, musculoskeletal, immune, and cardiovascular. In women, the impact on the menstrual cycle may be significant leading to decreased levels of estrogen and modified bone remodeling. The RED-S syndrome is still underdiagnosed because its symptoms are manifold and appear silently. The consequences of the syndrome compromise the athletes' performance and quality of life. This report aims to describe the diagnosis and treatment of an athlete with RED-S syndrome that evolved to amenorrhea and mineral bone density below normal levels for her age

Material and Methods: J.C., 30 years old, an amateur street runner, attended in our medical service in June 2015 with the complaint of suffering from amenorrhea for a year. She had eight hours of training per week, with an average mileage of 10 km. She had no morbidities and did not present any other gynecological complaints. Physical examination revealed a body mass index of 19.39 kg/m² and 17% body fat. The Eating Attitude test (EAT-26) questionnaire was applied to diagnose inappropriate eating behavior. Results above 21 indicate concern about their diet and body image. The result of EAT-26 was 12. The energy balance was calculated at 17.14 kcal / kg of lean mass per day, leading to the diagnosis of low energy for sports. Laboratory tests excluded endocrine diseases (thyroid, prolactin, and ovarian failure). Bone densitometry resulted a Z-score of -2.3 in the lumbar spine. The diagnostic conclusion was RED-S syndrome with amenorrhea and mineral bone density below normal for the age group. The planned treatment was the increase of the caloric intake to 45 kcal /kg/ mm /day and hormonal therapy with estradiol valerate 2 mg and levonorgestrel 0.25 mg

Results: In the following clinical appointments, the energetic intake and the menstrual cycle were controlled. The patient remained in amenorrhea until August 2015, when she resumed cycling. Hormone therapy was suspended in July 2016. From this point on, regular cycles with reduced flow were maintained. Only in January 2017 the cycle did normalize (duration of 4 days and moderate flow). Bone densitometry performed in January 2017 showed z-score of -2.0 in the lumbar spine. The exercise load remained stable throughout the treatment

Discussion: The difficulty in recognizing the symptoms and connecting them explains the delay in the diagnosis of RED-S syndrome. The absence of a standard protocol for assessing energy balance aside from influencing diagnostic delay can cause worsening of the consequences on the affected systems. The treatment of choice is to increase energy intake, with or without interruption / decrease in sports activity, depending on the severity of the condition. Assessment of bone health is also necessary in some cases, such as amenorrhea, for six or more months. Pharmacological treatment with hormone therapy (HT) is indicated if there is maintenance of amenorrhea after correction of energy balance. The time interval for the introduction of HT is not established. Although the initial treatment for RED-S syndrome is the correction of available energy balance, pharmacological treatment should be considered since, due to the delay in the arrival of the athlete to a center capable of conducting correct investigation and diagnosis or the difficulty in determining the diagnosis, the health of some systems may be affected in the long term. In the case reported, if there was no parallel treatment to energy balance correction there could be worsening of mineral bone density

Conclusion: The diagnosis and treatment of women with RED-S syndrome should follow a specific protocol to prevent the onset of amenorrhea and low mineral bone density

2016-2017 HEALTH INVENTORY OF TURKISH PROFESSIONAL FOOTBALL LEAGUES

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Introduction and Purpose: The fact that the athlete is able to reach the highest level of health services, reduce the risk of injury and perform high performance has gained even more importance with the growing football economy. The first and important step in this situation is the health organizations and services of the clubs. In this study, it is aimed to determine the situation by evaluating health organizations and service facilities of the clubs in professional football leagues of Turkey and to establish infrastructure standards for the structuring of ideal health accordingly.

Material and Methods: In this study, the answers given to online surveys by 90 clubs, which agreed to participate in the study, out of 126 clubs in Turkish professional football leagues were evaluated. The survey consists of 3 parts, including health team staff and qualification, physical infrastructure (facilities, buildings, room specifications, etc.) and health equipment used in the field of Health. All questions were answered by the team doctor or club manager and the data were evaluated as descriptive.

Results: When the medical staff in the clubs were examined, in 70 of the clubs participated in the study, contracted team doctor (total number (n)=91), in 29 clubs, physiotherapist (n=51), in 18 clubs, athletic performance specialist (n=19), in 16 clubs, nutrition specialist (n=17), in 17 clubs, psychological performance consultant (n=18), in 88 clubs, masseur (n=172) were determined. When the characteristics of the areas reserved for health and the health equipments used were examined, only the health rooms of Super League clubs were separated and more than 80% of the teams had the doctor room (n=15), the treatment room (n=12), the examination room (n=7), the massage room (n=14) and the fitness room (n=15). In the lower leagues, the massage room and the fitness room are found in more than half of the clubs, while the doctor room, the treatment room and the examination room are found in a very small number of the clubs. The defibrillator and the necessary emergency medical equipment are available in all clubs except 1 in the Super League. In 11 clubs of the other leagues, the defibrillator and 62 of the other leagues were found to have the necessary emergency medical equipment.

Discussion: The athlete's success lies in the fact that he/she does the sport in the healthiest and the highest performance possible. In addition, injuries bring great economic burden to clubs, while causing players to stay away from the competition for varying periods of time according to the type of injury and therefore it directly affects the team's success. In this sense, it is very important and valuable to have a good medical staff, appropriate physical infrastructure and medical equipment for emergency and first intervention in the field, preventive medicine, performance medicine and diagnostic/therapeutic medicine applications. In this sense, UEFA took first big step in the 2012-2013 season and created "Minimum Medical Requirements" for the match day and the day before the match. By creating a similar guide, it is planned that the clubs have medical staff, application areas and equipment that are suitable for their level. In the next 5 years, it is aimed to bring all the clubs to the standards in line with their league level. A study or manual in this field could not be determined when the Football Federations of the countries and the literatures were examined.

Conclusion: With the establishment of the health standards of the club; 1. All players will be able to receive health care at certain standards 2. Players' performance will be improved and the risk of injury will be reduced in order to reduce workforce loss 3. The economic burden of health problems brought to clubs will be reduced.

ASSOCIATIONS BETWEEN PHYSICAL ACTIVITY, BODY MASS INDEX AND ACADEMIC ACHIEVEMENT AMONG COLLEGE STUDENTS: A CROSS-SECTIONAL STUDY

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Introduction and Purpose: Physical fitness is a major determinant of health throughout the lifespan including prevention of several diseases. During childhood and adolescence, high levels of cardiorespiratory fitness has been positively associated with academic performance and cognition, while obesity and sedentary lifestyle have been associated with decrease in gray matter mass and cognition. However, the association between academic achievement (AA) and physical activity (PA) level remains uncertain in the adult population since high evidence graded with large sample size studies are lacking. The aim of this study is to evaluate if there is correlation between current and previous PA level with AA in medical students.

Material and Methods: The study followed a cross-sectional design conducted during the first semester of 2018, when all medical students from a single university were invited to participate. The students enrolled answered a self-administered questionnaire divided into three sections. The first and second sections included questions about the academic year, grade point average (GPA), frequency of final exams and classes failed within the graduation, height, weight, current PA level, during childhood and adolescence. The third component of the questionnaire was the International Physical Activity Questionnaire (IPAQ). Body mass index (BMI) was calculated and IPAQ category was disposed as sedentary (low) or physically active group (medium and high). The descriptive analysis of the data was performed by calculating the mean and standard deviation for continuous variables and the frequency analysis for categorical variables. The associations between categorical and continuous variables were assessed by analysis of variance followed by comparison of means by the t-test, of categorical variables by the chi-square test and of continuous variables by linear correlation analyzing the β (angular coefficient) and R^2 (coefficient of determination). The level of statistical significance was set to 5%. The programs SPSS[®] 17.0 and Epi Info 7[®] were used for analysis.

Results: A sample of 360 medical students from the 6 years periods participated in this study. Among them, 56.1% were female and 43.9% male. The mean BMI was statistically different in female (22,8kg/m²) and male students (24,9kg/m²) whereas a total of 35% of the total sample were classified as sedentary. We did not find any significant statistic difference between sex, age, academic year, BMI, GPA, number of final exams and failures when comparing the sedentary and the physically active group (currently or previously). In spite of that, we found a correlation between BMI vs. sex, higher in males ($p < 0,001$), age ($R^2 = 0,035$; $\beta = + 0,18$; $p < 0,01$), academic year ($R^2 = 0,013$; $\beta = + 0,1$; $p < 0,05$), GPA ($R^2 = 0,019$; $\beta = 0,14$; $p < 0,05$), number of final exams ($R^2 = 0,013$; $\beta = + 0,11$; $p < 0,05$), and failures ($R^2 = 0,034$; $\beta = + 0,18$; $p < 0,01$). Moreover, students with BMI $< 30\text{kg}/\text{m}^2$ had higher GPA than those with $30\text{kg}/\text{m}^2$ or more ($p < 0,05$). The subgroup analysis found no difference between variables.

Discussion: There was no significant statistic difference between AA and the physically active or sedentary groups. The main findings were regarding the influence of BMI on GPA, frequency of final exams and of classes failed. According to prior studies, students with healthier BMI tend to have higher grades, which can be related to increased cognitive function and also promoting long-term wellbeing. Although other works present findings with both physical activity and BMI related with higher grades, the difference between sedentary and non-sedentary students' BMI was not relevant. The findings are on favor of healthier BMI, independent of the practice of physical activities or gender, playing an important role on the path to increased GPA.

Conclusion: The findings favor to healthier BMI, independent of the practice of physical activities or gender, playing an important role on the path to increased AA.

A PHARMACOLOGICAL CRITIQUE ON WADA'S PROHIBITED LIST 2018

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Introduction and Purpose: WADA aims to prevent doping and hence to create a fair and equal status for all competitors. Also it targets to protect athlete's health from unexpected or side effects of the compounds which have a potential to misuse. If an athlete require to take particular medication under the prohibited list, a Therapeutic Use Exemption (TUE) may give the athlete the authorization to take the needed medicine. Despite that sincere targets of WADA, there are numerous of illogical statements and restrictions on the medications and methods in 2018 prohibited list. In the present poster, those illogical statements and restrictions will be discussed and presented.

Material and Methods: The prohibited list of 2018 consists of 3 major titles: Prohibited substances are classified as "S" code, while prohibited methods as "M" and substances prohibited in particular sports as "P". Despite the International Standards of prohibited list reviews annually by WADA, some minor changes is done. The prohibited list of WADA-2018 was carefully examined and inconsistent terms and practices are listed below.

Results: Under the subtitle of S3, all beta-2 adrenergic agonists were prohibited, except; inhaled salbutamol, formoterol and salmeterol, daily dose and urine levels dependently. Furthermore, if an athlete proves to get included in a pharmacokinetic study, those banned drugs will not be regarded as doping. It is not only illogic part of it, but also prohibiting to use of other beta-2 agonists such as albuterol, bitolterol and terbutalin. On the other hand, allowed beta-2 mimetics use is limited to administration by inhalation. It is not possible to determine the routes of administration of those molecules, by urine or blood sample analysis. Despite the urine levels for salbutamol and formoterol were limited, there is no determined levels for salmeterol. The S5 subtitle is about the use of diuretics and masking agents. Most of them were prohibited, except drosiprenone and pamabrom. Drosiprenone is a progestine while pamabrom has diuretic effects. While other diuretic compounds were banned, but not pamabrom is not logic. Under the subtitle of M2-Chemical and physical manipulation, "intravenous infusions and/or injections of more than a total of 100 mL per 12 hour, were prohibited" expression is exist. Actually, it is impossible to detect the certain volume of injections in a certain time period by using nowadays technology. S6 subtitle describes prohibited stimulants with some exceptions, dose and urine levels limitedly including pseudoephedrine, ephedrine and methylephedrine. Under the P2 beta blockers subtitle, those drugs were banned in some sports such as billiards, darts, archery and shooting but not in fencing and gymnastics.

Discussion: WADA rules to create a fair and equal status for all competitors, as well as to protect athlete's health from unexpected or side effects of the compounds which have a potential to use. Over all, it is very respectful, but some criticisms must take into account such as; 1. Without determining the pharmacokinetic profile of each individual, it would be unfair to let limitedly use of some compounds by detecting urine and/or blood levels of them. 2. If a compound is banned, there must not be an exception. So, such the terms of "controlled pharmacokinetic study" cannot be acceptable. So, inclusion elite athletes into the pharmacokinetic studies seems questionable. 3. In case of life threatening clinical indications and necessities, any kind of drug will be administered under the rules of "Therapeutic Use Exemptions". So, prohibited drug groups must be strictly followed and exceptional compounds of the groups must be removed immediately. 4. Avoiding the terms such as "Other substance with a similar chemical structure or biological effects" is crucial.

Conclusion: The doping issue should be individualized to each athlete, regarding their pharmacokinetic, pharmacogenetic profile, etc. Until that, all or none for all drugs without exceptions must be ruled.

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SYSTEMATIZATION OF NURSING ASSISTANCE TO THE ATHLETE

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Introduction and Purpose: The athlete is not a machine, but a Person; and, as a Person, he pursues goals of excellence and effectiveness, whose success depends on his physical dimension, but also on multiple other variables, which must be considered, in order also, in this context, to project Man into his Whole, in your dream to be more. Nursing has, in a sports environment, many specificities and a complexity that is only understandable with adequate technical and scientific preparation. Despite this, sports nursing is a poorly explored area in Brazil. The study seeks to show that, through the Systematization of Nursing Assistance (SNA), the nursing professional is able to identify and characterize the needs of the athlete, acting in the prevention, treatment and recovery of the same.

Material and Methods: For the validation of the protocol, SNA was used in patients of both sexes, more aged 13 years and who practiced competitively sport regularly for at least one month. The athletes selected for the research were attended at the sports nursing clinic of a private university in the state of São Paulo, evaluated according to the protocol of attendance to the athlete and their bio-psycho-social conditions, an electrocardiogram was also made and, after, the guidelines and appropriate referrals were given. Based on the consultations performed, some basic guidelines were established and could be modified according to the needs of each athlete.

Results: When questioned about personal history, Rhinitis-sinusitis (17%), bronchitis-asthma (12.5%) and 17% surgeries for repair of upper and lower limb injuries were reported, without the technicians' knowledge. Incidence of current symptoms presented were joint pain (25%), shortness of breath (12.5%) and dizziness (7.8%). As for psychological support, they presented the following complaints: Irritability (26.5%), mood changes (21.8%), demotivation (20.3%), sweating and dry mouth (14%) and compulsions (9%). One of the patients had all symptoms except dry mouth. They started their training at 13.68 (\pm 8.81) years old, with a current training load of 3h (\pm 1) in 5 days (\pm 1) in the week, of moderate to vigorous intensity. When they were approached about doping, 56% said they did not know the list, they were also questioned about they report that they are athletes in medical consultations, with a positive return in 71% of patients. Regarding the use of sunscreen, 79% of negative responses were obtained. In the indices of sports injuries we obtained: lower limbs (23), upper limbs (21), trunk and spine (5), general (8). Having as pain score in the lesion 2pts (\pm 2) and pain in the practice 3pts (\pm 3). In view of the aforementioned, the most incidental conducts where to focus are in to sunscreen (56%), water intake increase (53%), vaccine portfolio (46%), condoms (43%) and Doping (42%).

Discussion: It was noticed in the consultations that in their daily practice athletes do not worry about small details that have great impact on their sports practice, such as the fact that in the consultations do not speak that is an athlete, since an uncontrolled medication can cause him to be caught doping. Having a professional that is aware of this the chances of a sporting interurrence decrease.

Conclusion: It is hoped that the instrument will expand the ability to more accurately diagnose athletes and make timely and long-term interventions that are directed to the specific care of each athlete, who are different from the rest of the population. It is also expected that nursing professionals can develop a critical sense of care aimed at the biopsychosocial view that perpetuates throughout all areas of an athlete's life, not just the injury. And that the need for a professional of nursing acting together with the athletes in the prevention of injuries and accidents to be able to provide a better yield is perceived.

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A NEW SYSTEM FOR GRADING MENISCAL TEARS AT MRI AND ARTROSCOPY

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Introduction and Purpose: Although there are several different classification systems for the description of meniscal injuries of the knee, each has certain limitations and deficiencies that can lead to confusion mainly in the correlation image and arthroscopy. We are proposing a new system that describes meniscal changes in simple terms. It is based on three separate and distinct variables: the location according to its standard vascular injury, associated with traditional described types of meniscal lesions and in its position number of clock hours.

Material and Methods: Four orthopedic specialists in knee surgery and two independent radiologists analyzed ten Resonance images and their respective 45-second arthroscopy videos demonstrating meniscal lesions, videos and images demonstrating a variety of medial and lateral meniscal lesions. As inclusion criteria, patients aged 18 to 35 years with meniscal lesion who had a surgical indication for meniscal injury were selected, and patients with previous knee surgery were excluded from the study. The ten arthroscopic videos were made by a single surgeon. This number of videos was evaluated to ensure an adequate statistical analysis of the different types of meniscal ruptures. The meniscal lesions were defined by the correlation of the preoperative MRI with the complete arthroscopic evaluation of the surgeon. The videos were edited to show the arthroscopic view of the meniscal rupture and its measurements performed with a millimeter probe. Each observer received an instruction sheet with the proposed classification, without any additional coaching, and a score sheet with classification schemes. The images and videos were evaluated for the morphological pattern of lesion, vascular supply and positioning in relation to the number of hours of the watch. The interobserver reliability for categorical variables was assessed using the unweighted k statistic for multiple evaluators.

Results: The Zone can be divided into 4 compartments and not more than 3, being defined by the vascular supply as the presence (red) or absence (white) of capillary blood supply and the meniscal deinsertion of the capsular margin. White / white A. (absence of vascularization) B. red / white (near the margin, with vascular supply not ideal in the center of the lesion) Red / red C. (much vascularization and great healing potential) D. insertion of the meniscus of its capsular margin We propose in this study a new meniscal vision in analogy with the clock hands for an axial cut of Right Knee Resonance. For this we take 3 reference points, so we will have the Patellar Tendon at 12 o'clock, the Posterior Cross Ligature at 6 o'clock and the fibula at 8 o'clock; with this we will have the body of the medial meniscus at 3 o'clock and the body of the lateral meniscus at 9 o'clock; thus maintaining an easy, practical and reproducible positioning from the point of view of Magnetic Resonance analysis and the surgical description of knee arthroscopy. As for the types of injury we can use the classic way using the initials in English.

Discussion: Consistency in documentation is essential for valid assessment of treatment for meniscal lesions. Disagreement among surgeons in the classification of meniscal lesions may invalidate clinical trials aimed at evaluating the results of treatment of the same. We are currently faced with a constant lack of parallelism between the resonance reports and the lesions found during the arthroscopic procedures, mainly regarding the positioning and extension of the lesion

Conclusion: Although it is a new proposal, the system allows the surgeon to have a more accurate preoperative planning because it is a fairly objective and reproducible classification. We have used this classification as part of our meniscal classification system and proved to be very useful and reproducible both by the radiologist, in preparing its reports, as for the surgeon to plan your surgery and to describe them, facilitates the systematization and statistical analysis.

THE ASSOCIATION BETWEEN THE MECHANISM OF INJURY AND THE VISUAL MRI PATHOLOGY OF ACL INJURIES

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Introduction and Purpose: The increase in the number of anterior cruciate ligament (ACL) injuries in recent years in both athletes as well as in the general population is concerning. These injuries may lead to significant absence from activity with subsequent associated financial and social burden. No definitive association has been described between mechanism of injury and pathology, to implement preventative measures in order to limit these injuries. The method of using magnetic resonance imaging (MRI) to grade ACL injury has become very popular. The aim of this study was to determine whether there is an association between the mechanism of injury and pathology seen on a MRI scan in ACL injuries.

Material and Methods: A cross-sectional analytical study of 87 male patients with ACL injury, who had an MRI scan of the knee within the last two years. Participants were contacted for consent in this study. The mechanism of injury and pathology seen on the MRI scan was noted and categorised into different injury and associated pathology groups. Statistical analyses included a summary of data and association between the mechanism of injury and pathology. A modified version of the chi-square test for independence was used to analyse the multiple pathology responses to each mechanism.

Results: MRI scans of ACL injuries indicated the mechanism of a solid foot plant with rotation of the knee has a greater tendency to be associated with medial meniscal injuries (77%), and also a 54% possibility to be associated with lateral meniscal injuries. A solid foot plant with a valgus stress on the knee showed a higher incidence of associated medial collateral ligaments (MCL) injuries (41%) and femoral bone bruising (62 %). These two mechanisms of injury are the most common in ACL injuries and contribute to the clinical significance found in this study. The p-value was however not statistically significant ($p=0.44$, chi-square value=20.27, $df=45$) for any association between pathology and mechanism of injury.

Discussion: Some injury mechanisms causing ACL injury were more common than others and also had more associated pathology. The most common mechanism of injury noted is a solid foot plant with either rotation of the knee or valgus stress on the knee.

Conclusion: Although no statistical significant association between mechanism of injury and pathology as observed on a MRI scan could be proven in this study, some clinical relevant observations are reported. This research enable a better understanding of the specific mechanism of ACL injuries and also add to improve the current knowledge on pathology patterns related to the mechanism of ACL injury. These specific patterns of ACL injury remains essential to the Radiologists and Sports Physicians to document especially in sports and activities that require multi plane movement of the knee, and thus have a higher risk of injury. Strengthening tissue structures involved in those movement patterns that cause these mechanisms can possibly limit ACL injuries in athletes and the general public.

THE HUMAN METABOLISM OF THE ANABOLIC STEROID METHASTERONA: APPLICATION IN DOPING CONTROL ANALYSIS

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Introduction and Purpose: Methasterone (17 β -hydroxy-2 α ,17 α -dimethyl-5 α -androstan-3-one) is a designer anabolic steroid prohibited to athletes and monitored by antidoping laboratories since 2006. This drug has already been reported to cause serious liver damage. Steroids are normally excreted in urine in the original form for only a short period of time. Therefore, the discovery of metabolites that can enlarge the detection time window is very important for doping analysis. Typically, steroid metabolism includes phase I (oxidation, reduction and hydrolysis) and phase II (conjugation) steps increasing the hydrophilism. The goals of this study are finding methasterone phase I metabolites, establishing the excretion kinetic of them and investigate the availability of phase II metabolism in urine matrix. Gas chromatography (GC) and liquid chromatography (LC) coupled to mass spectrometry were used.

Material and Methods: The "nutritional supplement" was purchased from a web sports supplement store. According to the label each capsule contains 10 mg of methasterone. An excretion study was performed with four healthy male volunteers. The volunteers collect blank urine from one day until few minutes before taking the methasterone capsule. They collected post-administration urine samples separately for 30 days. The aliquots of urine samples were prepared by enzymatic hydrolysis followed extracted with methyl terc-butyl ether and analysis by GC and LC.

Results: The approach used to find methasterone metabolites was based on the search characteristic fragments for the steroidal skeleton. For metabolites with intact D ring the target fragment was m/z 143. To C16-hydroxylated metabolites the fragments were m/z 218 and 231. To C18-hydroxylated metabolites was performed through fragments m/z 103 and C12-hydroxylated metabolites was done by m/z 170 and 185. By extension, 12,16-hydroxylated and 16-keto metabolites were investigated through the fragments m/z 258, 273 and m/z 244 respectively.

Discussion: Through this approach nine metabolites, seven already detected and two unpublished were found. The two new metabolites candidates designed as M1 and M9. M1 is a product from epimerization at C5 and M9 was obtained from the hydroxylation at C2 and C16. Their respective names are 17 β -hydroxy-2 α ,17 β -dimethyl-5 β -androstan-3-one and 2 α ,16 α ,17 β -trihydroxy-2 α ,17 α -dimethyl-5 α -androstan-3-one. After analyzing the urine samples without previous hydrolysis by β -glucuronides, was possible to conclude that methasterone and its nine metabolites were not excreted on free form but only as glucuronide conjugates. By UPLC/MS/MS, It was also investigated if these metabolites could be excreted as sulfate, cysteine and N-acetylcysteine conjugates. Nevertheless, only glucoconjugated metabolites were found.

Conclusion: In conclusion in doping control field will be useful insert methasterone metabolites like M4 (2 α ,17 α -dimethyl-5 α -androstan-2 β ,3 α ,17 β -triol), M8 (2 α ,17 α -dimethyl-5 α -androstan-2 β ,3 α ,16 ξ ,17 β -tetrol) and / or M9 in routine analysis. The main reason for this suggestion are their detection windows, as large as the M2 metabolite (2 α ,17 α -dimethyl-5 α -androstan-3 α ,17 β -diol), nowadays the target analite to methasterone detection.

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GLOBAL VISION EVALUATION SYSTEM: A DIGITAL VIEWER FOR FULL SCREENING OF ATHLETE'S VISUAL SKILLS

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Introduction and Purpose: The evaluation of athlete's visual skills is actually a psychophysical examination. It should be tested in a quantitative and qualitative way and in the most different conditions, not only by the morphoscopic visual acuity measurement (to determine the smallest letters that a person can read with the use of a standardized chart), which represents just one of several factors. The athlete's activity is a dynamic and changing action because when the speed increases the athletes use an increasingly narrow visual field. When the speed increases the image focus moves forward, details of close objects become more difficult to see and the depth perception decreases. It is a logical fact that the athlete's eyesight should be also tested with a binocular visual field and a stereoscopy examination. The other parameters evaluation is essential, even if those other parameters are relatively less significant. During the athlete's night activity at least two more main parameters must be seriously considered: the contrast sensitivity function (the ability to correctly detect two objects with different grades of brightness), and the glare recovery time (the time needed to recover a good vision after a dazzling light exposure). Another factor that can't be ignored is chromatic sense evaluation that is extremely important, especially in particular conditions. Purpose: To create a digital viewer capable of making a visual skills global assessment through well-defined and repeatable results and obtained from a simple procedure.

Material and Methods: We proceeded to create a digital technology instrument (Global Vision Evaluation System) capable of offering a quantitative evaluation of all the different factors that contribute in varying degrees to create the athlete's global vision: -Morphoscopic visual acuity -Binocular visual field -Stereoscopy -Contrast sensitivity -Glare recovery time The only way to give a correct judgment about athlete's visual skills "in toto" is to create a Global Visual Index (GVI) that represents the single athlete's global visual skills. We obtained that index through an adequate and specific combination of every single visual parameter. We gave to each of those parameters a numerical value expression of its relative importance, compared to that of all the other ones. Its definition was obtained by homogenizing the results of a multifactorial eye exam with those of tests carried out with a highly immersive driving simulator on a track specially created. This particular procedure has been possible through the application of fuzzy logic. A bespoke algorithm implemented on a viewer's software was used to calculate a Visual Index that numerically expresses all the athlete's visual skills. The feasibility assessment of the proposed approach has been performed on 250 athletes.

Results: The first viewer in the world realized through digital technology able to define a precise quantitative assessment of the various factors that contribute, individually and globally, to the athlete's vision. The proposed procedure provides an adequate answer to all the doubts concerning motorsport drivers license requirements, comparing their individual DVI to a predefined one.

Discussion: The assessment of the visual skills of an athlete must be appropriate both to the type of sport and to the level at which it is practiced. The Global Vision Evaluation System via a custom algorithm based on fuzzy logic allows modulating the examination criteria according to the specific needs of the different sports disciplines.

Conclusion: We were able to provide precise criteria for all various visual skills evaluation through standardized, reproducible and precise systems obtained with a single instrument use and in a short time examination (between 10 and 12 minutes).

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TRAUMATIC INJURIES IN A 94.7 KILOMETER CYCLE RACE: A 3-YEAR CROSS-SECTIONAL STUDY IN 67 417 CYCLISTS

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Introduction and Purpose: Cycling is gaining popularity as a recreational activity and as a competitive venture in South Africa and Internationally. In cycling, as with most sporting activities, there is an associated risk of injury. Traumatic injuries (including serious life-threatening injuries) have been recorded during road cycling events. However, the incidence of traumatic injuries in a community-based road cycle challenge has not been well described. The objective of this study was to document the incidence and the nature of traumatic injuries during three consecutive years of the 94.7 Cycle Challenge races held in Johannesburg annually. In addition, to determine different anatomical sites of injuries in order to advise on preventative measures during future races.

Material and Methods: This is a prospective study involving all cyclists who entered and participated in the 94.7 Cycle Challenge (94.7km cycle race) during 2014, 2015 and 2016. Traumatic injuries (defined as any trauma or injury sustained by a cyclist on race day, and requiring medical attention) were recorded in each of the 3 years of the study period. Data was collected at the en-route medical points and at the medical tent at the finishing point as well as from hospital transfers. These results were then analysed and categorised by area of injury and final diagnoses.

Results: During the 3-year period, a total of 67 417 cyclists participated in the race. The overall incidence (per 1000 participants; 95% CI (Confidence interval)) of traumatic injuries 2014-2016 was 7.4 per 1000 participants. The incidence of all traumatic injuries was 6.34 per 1000 participants (95% CI: 5.7 – 7.1) for males, and 11.05 per 1000 participants (95% CI: 9.4 – 12.9) for females. Females compared to males had a higher risk of sustaining traumatic injuries than males. Participants 15 years and younger had a higher risk of sustaining traumatic injuries (16.3 per 1000 participants; 95% CI: 9.14 – 26.92). Most traumatic injuries affected the musculoskeletal area of the body (3.5 per 1000 participants; 95% CI: 3.07 – 3.98). Serious traumatic injuries included fractures with an incidence of 0.3 per 1000 participants (95% CI: 0.18-0.46).

Discussion: The main findings of this study are that overall the traumatic injury ratio reported was relatively high at 1:136 (1:180 in 2014; 1:156 in 2015, and 1:98). The musculoskeletal system was the most affected. The younger age groups (less than 15 years of age) had a higher incidence of injuries and females are more prone to injury. The distance cycled, the type of route (e.g. whether uphill, downhill, etc.) and the specific weather conditions on the day did not seem to have an effect on the incidence of injuries. Surprisingly serious adverse events (hospitalisation and any deaths due to injury) did not pose to be a big problem.

Conclusion: In order to reduce the risk of injuries in community-based cycling events for novice and recreational cyclists, more studies need to be conducted to determine the risk factors for sustaining traumatic cycling injuries. Strategies to reduce the risks of musculoskeletal injuries in cyclists and prevention programs focused on females and cyclists 15 years and younger should be implemented.

EPIDEMIOLOGICAL PROFILE AND PREVALENCE OF URINARY INCONTINENCE IN FEMALE ATHLETES

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Introduction and Purpose: Routine physical activity, such as sports practice, promotes a number of health benefits. On the other hand, it is also associated with health risks, especially in individuals with high sports performance level. The number of female athletes is increasing in different sport modalities and competitions. However, strenuous sporting practice has led to numerous problems for the female athlete's health, such as urinary incontinence. Involuntary urine loss is associated with medical and psychological morbidity that greatly influences the quality of life and has a negative impact on athletic performance. Systematic surveillance of athlete's health is essential and epidemiological data contribute to better planning and provision of athlete healthcare. This study was aim to trace the epidemiological characteristics and to verify the presence of urinary incontinence in the athletes who are attended at the gynecological clinic of the sport.

Material and Methods: A cross-sectional observational study, including female athletes attending in a gynecological sport service of São Paulo, evaluated from February 2015 to May 2018. The volunteer's epidemiological characteristics were evaluated using a structured questionnaire, which include: age, weight, high, body mass index (BMI), ethnicity, education level, obstetric history and sports modality. To evaluate the presence and severity of urinary incontinence (UI) was used the International Consultation of Incontinence Questionnaire-Short Form (ICIQ-SF). Statistical analyses were done by using the BioEstat, version 5.3 and significance level was set at $p < 0.05$.

Results: A total of 133 female athletes were included in this study. The volunteer's age ranged from 12 to 70 years and the mean age was 28,16 (DP: 12,89) years, BMI mean was 22,95 (DP: 3,82). From 133 women, 24 (18,04%) had experience pregnancy and parity, 15 (11,28%) vaginal delivery and 13 (9,77%) cesarean sections. In total, 22 sports modalities were analyzed and divided in individual sports, collective sports and other, practiced by 104 (73,76%), 31 (21,98%) and 6 (4,25%) of these athletes, respectively. The most prevalent sport modality was running, practiced by 36 (25,53%). UI was verified in 35 (26,32%) women, 14 (40%) were classified as slight UI (score range 1-5), 12 (34,29%) moderate (6-12), 9 (25,71%) severe and none was classified as very severe (19-21). UI type was also verified: 10 (28,57%) athletic UI, 17 (48,57%) stress UI, 3 (8,57%) urgency UI and 5 (14,29%) mixed UI.

Discussion: Most women in our study was young, with normal BMI and nulliparous, which is a common profile among athletes. The prevalence of UI was high in the case of women with this profile. It is well established in the literature that factors such as increasing age and BMI, number of pregnancies and parity are associated with higher risks of developing UI in women. Both modes of delivery are considered as fact risks, however vaginal delivery is greater associated with prevalence of urinary incontinence than those delivered by cesarean section. Recently review included 7507 women aged 12 to 69, of these 5527 were professional or amateur athletes. According to this study, 33,69% prevalence of UI was found in athletes. Some studies show that sports practice is a risk factor for UI in female athletes and it prevalence depends of the sport modality, which is going to increase as the impact in physical practice increases.

Conclusion: This initial study provides important data on the epidemiological characteristics and urogynecological dysfunctions of female athletes, making possible the accomplishment of future studies in this area of research.

CASE REPORT: SERIOUS EATING DISORDER IN ULTRAMARATHON. CHALLENGES IN DIAGNOSIS AND TREATMENT

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Introduction and Purpose: Athletes who practice modalities which weight or appearance is important in their performance, are at greater risk of developing into eating disorders, including anorexia and bulimia. Anorexia nervosa consists of food refusal associated with BMI < 17.5 . The patient cannot perceive his low weight and adopts food restraint behavior aiming at its loss and/or maintenance weight. Energy restriction leads to many organic dysfunctions, one of which is alteration of the functioning hormonal axis in men and women. A clinical expression of this neuroendocrine disorder involves menstrual changes in women and decreased libido in men, as delayed sexual development in prepubescent men. Treatment in both situations involves a multidisciplinary approach, seeking nutritional recovery, treatment of clinical comorbidities and psychological approach. Report a case of an athlete with severe eating disorder in difficult diagnosis and treatment.

Material and Methods: 36-year-old ultramarathonist sought medical service with a complaint of menstrual irregularity for three months. She was training seven times a week with an average training load of 140 kilometers per week. The nutritional evaluation showed a relative energy deficit for sport (25.34 Kcal / kg / day) and a body mass index of 19.5 kg / m². A diet plan, follow-up with psychologist and reduction of the training load were proposed before the diagnosis of relative energy deficiency

Results: Patient returned after three months with low adherence to the food plan, referring "fearing loss of performance". She maintained menstrual irregularity. After six months of follow-up, the patient developed a right tibia stress fracture, added to hot flashes and maintenance of menstrual irregularity. Despite the events, the athlete was reluctant to reduce the training load. With 14 months of follow-up, although with resolution of the stress fracture, there was continuity of the hot flashes, associated with amenorrhea and weight loss (four kilos in five months). A new assessment of psychology raised the hypothesis of anorexia. Sickie remains resistant to nutritional guidance and maintains specific training load four times a week (40 to 110 km weekly). Due to the unfavorable evolution, it was requested monthly follow up with psychiatrist and change of training pattern with reduction of training volume only.

Discussion: The importance of the case report is that some athletes in RED-S may not present at a first moment the classic symptoms of eating disorders already recognized by the Diagnostic and Statistical Manual of Mental Disorders (DSM-V). The patient in question did not present the fear of gaining weight and BMI ever fall below the recommended level, but it also performs food restriction despite the impact on their own health. This patient profile becomes increasingly common with the diffusion of sport and the requirement, in many modalities, of an aesthetic and / or weight standard for competition or even the confusion between low percentage of body fat and performance. Thus, although there is no classical energy restriction as in anorexia nervosa, when comparing the demand of these athletes with the energy intake, the restrictive pattern is clear. Sports doctor are often the front line for screening of these patients, so it should always be alert to the signs of these disorders and direct them to the most appropriate follow-up. Similarly, mental health professionals must be prepared to deal with this new patient profile.

Conclusion: The diagnosis and follow-up of eating disorders may be difficult in athletes with RED-S syndrome. The case shows the importance of the knowledge of the professionals in the area of the sport on these comorbidities.

INJURIES AND ILLNESS PREVALENCE PRIOR TO COMPETITION IN GOALBALL PLAYERS

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Introduction and Purpose: Goalball is a sport specifically created for the blind. In spite of all benefits that participating in sport-related activities brings to the visually impaired, there is also the inherent, associated risk of being injured. Competing presenting injuries and/or illnesses not only decreases performance in contests, but also increases the risk of suffering new injuries. There is no information available regarding prior-to-competition injuries or illnesses in this type of athletes. The objective of this research is to determine the prevalence of past injuries and illnesses in athletes that took part in a competitive sport event and characterize them regarding their effect over training for a championship.

Material and Methods: A Cross-sectional and descriptive study was conducted in 39 athletes (12 women) (41.02 ± 14.96 years old [15.4-71.5]) of Southern Chilean teams participating in the Goalball National Championship. A questionnaire of seven questions, based on those used by the International Association of Athletics Federations (IAAF) and the Fédération Internationale de Natation (FINA) during their world championships in 2013, about injuries and illnesses during 4 weeks prior to the competition, was used. Were analyzed through frequency distribution and measures of key trends. For the Informed Consent (IC), the athlete was asked to choose a trusted person for the reading of the document. Participants either signed or stamped their fingerprint on the IC formulary. This research was approved by the Ethic Committee of the Medicine Department.

Results: The prevalence of injuries prior to a sport-competitive event was determined as of 64.1% (n=25). Regarding the effect of the injury over training or contest as preparation for the championship fifteen (60.0%) athletes had to make modifications, with the volume of training being the most affected. Regarding anatomical location of injuries, 48.0% of them occurred in upper limbs. Distribution of injury causes was homogeneous. There was an equal frequency (n=6) in the alternatives "Due to a clearly identifiable event", "Suddenly, while during normal training or contest" and "Gradual starting, during many training sessions". Another incident, not related to goalball also presented a similar frequency (n=5). On the other hand, time length of injury in most of them was over 4 weeks (n=15; 60.0%); 32.0% (n=8) between 1 and 4 weeks; and only 8.0% (n=2) less than one week. From them, 60% thought this would affect their performance during the championship. Finally, 25.64% (n=10) presented a previous disease, from them, 6 affected the respiratory system, 1 the gastrointestinal system, 1 the tegumentary system and 2 the ophthalmic system.

Discussion: To our knowledge, this is the first study determining past injuries and illnesses in visually disabled athletes. This information is important to elaborate preventive strategies and provide better medical support during competitions.

Conclusion: Concluding, most goalball players entered in this championship presenting some injury or illness that generated changes in their preparation. This, according to the athletes themselves, may affect their performance.

PREVALENCE OF CARDIOGRAPHICAL FINDINGS IN PRE-PARTICIPATION EVALUATIONS OF A PROFESSIONAL FOOTBALL CLUB

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Introduction and Purpose: Football is the most popular sport in the world. Being an intermittent activity characterized by most dynamic periods (isotonic) and few static (isometric) periods, as well as aerobic and anaerobic metabolism, field soccer, promotes physiological adaptations in the athlete's body throughout its practice. The association between unsuspected cardiovascular diseases and sudden cardiac death in athletes is not coincidental. The odds increase with performance in competitive sports and the rates reach up to 90% of death occurrences during training or competitions. In Brazil, after the death of a soccer player in the match of the Brazilian Championship of 2004, there was a great production of studies related to the subject. In 2005, the Brazilian Society of Exercise and Sport Medicine (SBMEE) defined the concept of sudden death as "death unexpectedly, instantaneously or not, or death within 6 to 24 hours after practice" and suggests pre-participation evaluation. This proposal is consistent with international protocols such as the European and the American. The objective of this study was to analyze the results of pre-participation examinations of professional soccer athletes, with the intent of confronting the most prevalent findings with a literature and the development of new strategies for the prevention of sudden death.

Material and Methods: This is a retrospective study with the objective of doing a quantitative research based on the survey and the treatment of epidemiological data of prevalence and confrontation with a current literature. We obtained approval from the Ethics and Research Committee (CEP) under opinion n° 2.097.005. We used a sample of 110 male soccer players. Stages of the study: 1) data collection of the pre-participation tests (cardiac history, electrocardiogram, exercise test and echocardiogram), by means of a form, in a period of three years (2015 to 2017); 2) tabulation of data using Word and Excel Office 2010 software; 3) confrontation with literature.

Results: The mean age of the athletes was 23.2 years (standard deviation = 4.72), with the youngest athlete being 17 years old and the oldest being 37 years old. Of the athletes studied, 55.5% had sinus bradycardia and 14.5% had ventricular repolarization, 33.3% had minimal tricuspid reflux, and 45.7% had physiological pulmonary reflux. In the ergometric test, 53.6% of the athletes reached the maximum stage and 46.4% discontinued the test due to physical fatigue. Regarding the arrhythmias, in 21.8%, we observed rare isolated ventricular extrasystoles and in 8.2% rare isolated supraventricular extrasystoles.

Discussion: In athletes less than 35 years of age, the most common causes are congenital heart disease, with hypertrophic cardiomyopathy and anomalous origin of the coronary artery being the most prevalent. Over 35 years, coronary artery disease (CAD) is the most common cause. The Athlete's Heart syndrome encompasses clinical, electrocardiographic and echocardiographic alterations, such as sinus bradycardia and myocardial hypertrophy. These changes are secondary to the regular and prolonged practice of physical exercise and reveal the adaptation of the cardiovascular system. The change in ventricular repolarization and the pattern of early repolarization are physiological changes related to the practice of isotonic exercises (such as soccer). The refluxes are due to small blood regurgitations that occur through the heart valves, being often present not only in athletes, but also in non-athlete adult population. The presence of arrhythmias is associated with an increase in the sympathetic autonomic modulation imposed by the postgraduate exercise, thus, non-pathological changes when it comes to athletes.

Conclusion: The findings corroborate data from the cardiology literature of exercise and sport, since they represent, mainly, physiological adaptations of the athlete's heart. It is up to the sports doctor to monitor the athletes for the prevention of sudden death.

IMPORTÂNCIA DO EXERCÍCIO FÍSICO EM PORTADORES DE DIABETES MELLITUS TIPO 2 E HIPERTENSÃO ARTERIAL

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Introduction and Purpose: Exercise associated with a balanced diet has been considered as one of the three main approaches in the treatment of Type 2 Diabetes Mellitus (DM) and Hypertension (SAH). This study aims to evaluate how physical activity influences the treatment of these comorbidities.

Material and Methods: The work developed followed the precepts of the exploratory study, through a bibliographical review.

Results: The practice of physical activity by type II diabetic individuals was effective in reducing glycemic levels in 92.89% (n = 196) of the analyzed cases (n = 211), when practiced 3 to 4 times a week during 30-60min, showing to be an effective way of controlling the disease. Continuous aerobic exercise was able to reduce systolic blood pressure (SBP) by 11.3 mmHg and diastolic blood pressure (DBP) by 8.9 mmHg (N = 92) when performed for more than 10 minutes and more than 10% of VO₂max, this is due to its post-exercise hypotensive effect. Resistance exercise was able to reduce SBP and DBP by 15.8 mmHg and 8.65 mmHg, respectively, in 99 hypertensive patients, either acutely (post-exercise effect) or chronically, when performed at a minimum of 2-3x / week for a time greater than 9 weeks, and this effect may extend for up to 4 weeks after discontinuation of activity. The HIIT (High Intensity Interval Training), when performed in the same molds of resistance exercise, showed potential in reducing SBP levels by 12 mmHg and DBP by 8 mmHg in the ambulatory blood pressure monitoring in the 88 hypertensive patients analyzed.

Discussion: A direct proportionality relation was observed between how intense was the activity and the extension of the reductive effect induced by the exercise; as well as, the greater the reduction the greater the blood pressure values before the practice of the exercises. This reductive effect may be associated with increased prostaglandin E production, increased urinary sodium excretion, increased vagal activity, and reduced plasma levels of catecholamines, that is a reduction of sympathetic activity (neurohumoral adaptations in general), vascular adaptations and thus, improved endothelial function. In addition, indirect mechanisms such as reduction of body fat and improvement of the metabolic profile. During exercise, the transport of glucose in the muscle cell increases as a result of increased blood flow, as well as the sensitivity of the cell to the action of insulin, causing greater transport of glucose to the muscle. These responses are absent in patients with type 2 DM and are resumed with physical exercise, thus reducing glycaemia. Being of extreme importance the aerobic physical exercise associated to a diet restricted to carbohydrate, sugar, salt and fat.

Conclusion: Although the studies show benefits of aerobic physical activity in SAH and type 2 DM, whether due to the reduction of risk factors such as obesity and insulin resistance or the reduction of blood pressure levels and improving metabolic functions, it is of the utmost importance that more research be done, in order to reduce the complications and mortality of these pathologies in our society.

THE RELATIONSHIP OF PHYSICAL EXERCISE IN THE REDUCTION OF PROSTATE SYMPTOMS

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Introduction and Purpose: The symptoms of the lower urinary tract are due to dysfunctions in the storage and emptying or elimination of urine. These symptoms appear more often in men from the 4th to the 6th decade of life, and may be influenced by the patient's lifestyle, such as physical activity, diet, smoking and alcoholism. The presence of these symptoms interferes in the quality of life of these patients, acting in several social spheres, being able to denote causes of disability in this group. Among several causes, the main ones are benign prostatic hyperplasia and prostate cancer. Despite numerous epidemiological studies have directed their objectives to understand different aspects related to BPH and prostate cancer, it is still difficult to position the role of physical exercise in these pathologies, as already defined in other neoplasms. Therefore, this study seeks to analyze the influence of physical exercise on the incidence and prevalence of urinary symptoms in patients over 40 years using IPSS (International Score of Prostatic Symptoms). To evaluate the prevalence of prostatic symptoms in conjunction with the practice of physical exercise in patients of the Núcleo de Atenção Médica Integrada.

Material and Methods: Materials and methods An observational, descriptive, quantitative, like outpatient survey was conducted through a questionnaire in patient of the outpatient service at the Núcleo de Atenção Médica Integrada (NAMI), Edson Queiroz Ward, Fortaleza, Ceará, Brazil, from January 2018 to May of 2018. Was considered active patients those who engaged in physical activity for at least 150 min/week for at least 3 months and were excluded patients under 40 years of age, in addition to the patients in clinical treatment of prostate disease or history of prostatic surgery.

Results: Crossing the data collected in the questionnaire and formulating tables, there was an N of 70 men with an average age of 54.5 years, whose physical activity practice has a relation with the values found in the IPSS. Among the individuals who reported mild symptoms, only 16.7% of them were in the sedentary group, while 63.30% were in the group that practiced physical activity. For the severe symptoms: 13.3% of their subjects were among the sedentary ones and only 3.3% in the practitioners of physical activity. The relationship between physical activity and IPSS was verified by Pearson's X² test, with X² = 13.870; p = 0.001. The value of V of Craemer was 48.1%, demonstrating the relationship between the variables.

Discussion: Considering that physical activity is globally recognized as an improvement factor for several other health problems, the present study has shown that this may also extend to prostatic symptoms. It is known that prostate diseases, especially benign prostatic hyperplasia, are common conditions and that the intensity of urological symptoms has a high relation with the quality of life of these patients, and it was observed that there is a big tendency in the group of sedentary to have more severe symptoms and in the group that practices regular physical activity an improvement of these. Despite the study fails to isolate regular exercise from other factors, such as genetic and dietary, it is clear that physical activity can be a good protective factor for prostate diseases, and should be used as a method to prevent the onset or the advancement of their symptoms.

Conclusion: From what has been exposed it is permissive to observe one more benefit of the practice of physical exercise contributing to male health regarding the reduction of prostatic symptoms. It is worth noting the inclusion of other orientations for lifestyle changes for this age group.

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RESPIRATION VARIABILITY OF ATHLETES AFTER COMPETITION LOAD

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Introduction and Purpose: The search for methods to study the functional state of the body of athletes, which could be used for operational and current monitoring, continues.

Material and Methods: We examined 9 highly qualified players in the morning of the day of the game (M1) and two consecutive days after the game (M2 and M3). The study was conducted using ultrasound spirometry as part of the device "Spiroarteriocardiorhythmograph", which allows to register the flow and volume of inhaled and exhaled air with subsequent spectral analysis. The duration of registration was 2 minutes. We defined total spectral power of the respiratory function (TPBR, (L/min)²) and the spectral power in the very low frequency (VLFBR, (L/min)²), low frequency (LFBR, (L/min)²) and high frequency (HFBR, (L/min)²) ranges. Nonparametric methods of statistical analysis with the definition of the Wilcoxon test were used.

Results: The study of traditional cardiovascular parameters (HR – heart rate, min⁻¹; SBP, DBP – systolic and diastolic blood pressure, mmHg) and respiratory rate (RR – respiration rate, min⁻¹; Vt – volume tidal, L) systems showed results indicating a gradual recovery of the organism after a competitive load: HRM3 62.7 (55.6; 64.7) against HRM2 70.8 (65.9; 78.7), p<0.01 and HRM1 61.0 (54.0; 71.5), p>0.05. HRM2 was significantly greater, then HRM1, p<0.05. DBPM3 79.5 (79.4; 82.6) against DBPM2 84.4 (79.5; 89.4), p<0.05 and DBPM1 79.4 (69.5; 81.9), p>0.05. DBPM2 was significantly greater, then DBPM1, p<0.05. RR M3 17.5 (11.8; 19.9) against RRM2 18.7 (14.0; 21.3), p>0.05 and RRM1 15.7 (15.2; 18.5), p>0.05. In this case RRM2 was significantly greater, then RRM1, p<0.05. Vt for the morning after the load decreased insignificantly from Vt M1 0.651 (0.566; 0.707) to VtM2 0.603 (0.567; 0.692), p>0.05, and on the second morning after the load, VtM3 0.644 (0.609; 0.703), p<0.05 significantly differed from VtM2.

Discussion: TPBR can be characterized as the total power of regulation of respiration. The indicator TPBRM2 420.3 (163.8; 600.3) did not significantly differ from TPBRM1 400.0 (338.6; 479.6), p>0.05, however TPBRM3 231.0 (213.2; 278.9), was significantly lower than TPBRM2, p<0.05, и TPBRM1, (l/min)², p<0.01, which indicated the economization of the function of regulation of external respiration. It should be noted that the dispersion of TPBRM2, for players on the day after the game was the greatest, which can be connected with a different speed of recovery processes. The dynamics of the VLFBR, indicators, which might be related to the ergotropic mechanisms of breathing regulation, proved to be quite informative, and showed a significant increase in the variability of the effects on the next morning after the game, VLFBRM2, 2.3 (0.8; 5.3) versus VLFBRM1 2.0 (1.4; 2.6), p<0.05, and the morning after the game, a significant decrease in this indicator VLFBRM3 0.8 (0.6; 1.2) in comparison with VLFBRM2, p<0.05, and VLFBRM1, p<0.01 that may be due to a decrease in the psycho-emotional constituent. Similar dynamics was observed in the LFBR: LFBRM1 13.7 (9.0; 22.1) versus LFBRM2 11.6 (2.6; 31.4) and LFBRM3 6.8 (2.9; 9.6), p<0.01, and p<0.05, respectively, which probably characterizes the decrease in sympathetic influences on the function of external respiration. It is noteworthy that HFBRM2 269.0 (125.4; 376.4), was insignificantly different from HFBRM1 302.8 (216.1; 400.0), p>0.05, but significantly different from HFBRM3 210.3 (204.5; 225.0), p<0.05, which may indicate a decrease in parasympathetic influences on external respiration on the second day after exercise.

Conclusion: Taking into consideration the rapidity and non-invasiveness of this method of research, we should note that obtained criteria can be used in assessing the recovery of the organism after a competitive load.

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CAFFEINE DECREASES NEUROMUSCULAR FATIGUE ON LUMBAR EXERCISE/STRESS TEST – A PILOT STUDY

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Introduction and Purpose: Caffeine is an ergogenic aid which increases fatigue tolerance. We evaluated the role of caffeine in muscle stress in the lumbar extensor muscles.

Material and Methods: Four healthy university students (age 21.2 ± 1.6 years, mass 72.7 ± 5kg), male, sedentary, were treated with caffeine (6 mg/kg, V.O.) or vehicle (0.3% saline) on alternate days in a double-blind crossover study. Subjects were stressed on the Biering-Sørensen test after 60 minutes of treatment, caffeine or vehicle. We evaluated: surface electromyography (EMG) activity of the musculus obliquus externus/transversus abdominis and spinal erectors, blood lactate, heart rate, blood pressure, and subjective response to pain (1-10) and Borg's effort scales.

Results: Caffeine increased exercise performance in the Biering-Sørensen test, which reflected higher blood lactate values. EMG suggests that muscle contraction peaks have been attenuated by caffeine. The response to pain was attenuated after treatment with caffeine but not the effort sensation. Caffeine further increased the hemodynamic response by raising the cardiac double product.

Discussion: Caffeine appears to modulate lumbar neuromuscular activity by increasing performance on the Sorensen test while decreasing muscle contraction peaks. This suggests better neuromuscular control, possibly due to the neurological mechanisms of caffeine, such as the antagonism of A2AR receptors in the central nervous system. Caffeine still had analgesic effects in the first moments of the test. The ergogenic effect of caffeine was confirmed by the increase in physiological responses to exercise, such as lactate and double product values.

Conclusion: The ergogenic effects of caffeine appear to be related to its neuromodulatory and analgesic mechanisms during exercise.

TO THE QUESTION OF CARDIORESPIRATORY VARIABILITY ESTIMATION IN TESTS WITH CONTROLLED RESPIRATION

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Introduction and Purpose: Estimation of the cardiorespiratory variability is connected with the problem of the frequency and depth of respiration during the study, which significantly affect them. Therefore, in order to unify the results of the study, an approach should be developed that, in addition to estimating the data obtained from spontaneous respiration (SR), also the data obtained with controlled respiration (CR).

Material and Methods: In a state of rest using "Spiroarteriocardiorhythmograph", 1930 athletes aged 22 ± 1.3 years were examined. The study protocol suggested 3 subsequent recording of cardiorespiratory system data with SR and CR at a frequency of 6 (CR6) and 15 (CR15) times per minute. The duration of each recording was 2 minutes. In synchronous recording heart rate (HRV, ms²), systolic (SBPV, mmHg²) and diastolic (DBPV, mmHg²) blood pressure and respiration (RV, (L/min)²) variability were measured. Nonparametric methods of statistical analysis were used

Results: In the CR6 test in comparison with SR, the contribution of the absolute values of the low-frequency component of the RV (LFRV) from 16.8 (10.2; 60.8) to 841.0 (400.0; 1332.3), $p < 0.0001$, which is transferred to the low-frequency component of the HRV (LFHRV), which increases from 1030.4 (557.0; 2088.5) to 15450.5 (10836.8; 19182.3), $p < 0.001$, systolic (LFSBPV) and diastolic (LFDBPV) pressure, which increases from 6.8 (3.2, 10.9) to 36.0 (24.0, 59.3), $p < 0.001$, and from 3.2 (2.0; 5.8) to 13.7 (7.8; 22.1), $p < 0.01$, respectively. In this case, the absolute values of the high-frequency component of the RV (HFRV) decreased from 376.4 (243.4, 533.6), $p < 0.01$, which practically does not affect the high-frequency components of the HRV (HFHRV) - 1632.2 (979.7; 3124.8), and with CR6 of 1962.5 (1049.8, 3457.4), $p > 0.5$, of SBP (HFSBPV) and DBP (HFDBPV), with SR 5.3 (2.9; 10.9) and 1.2 (0.8; 2.2), respectively, and for CR6 4.4 (2.3, 8.4) and 2.0 (1.0, 4.0), $p > 0.1$ and $p > 0.05$, respectively. In the CR15 test, in comparison with SR, an increase in the contribution of absolute HFRV values from 376.4 (243.4, 533.6) to 1482.3 (645.2, 3271.8), $p < 0.001$ is expected, which is transferred by an increase to HFSBPV from 5.3 (2.9; 10.9) to 13.7 (7.8, 32.5), $p < 0.01$, and HFDBPV from 1.2 (0.8; 2.0) to 2.6 (1.2; 5.8), $p < 0.01$, but does not affect HFHRV - with SR 1632.2 (979.7; 3124.8), and for CR15 1664.6 (784.0; 3036.0), $p > 0.5$. In this case, a slight increase in the absolute values of LFRV from 16.8 (10.2, 60.8) to 29.2 (14.4; 56.3), $p < 0.05$, practically does not affect the absolute values of LFSBPV and LFDBPV - with SR 6.8 (3.2; 10.9) and 3.2 (2.0, 5.8), respectively, and for CR15 6.3 (2.9; 9.6) and 2.6 (1.4; 4.0), $p > 0.1$ and $p > 0.05$, respectively, and also leads to a decrease in the absolute values of LFHRV from 1030.4 (557.0, 2088.5) to 552.3 (289.0, 823.7), $p < 0.001$. In addition, a significant increase in the VLF-component of the RV (VLFVRV) at CR6 and CR15 in comparison with SR from 2.9 (1.7; 4.4) to 14.4 (8.4; 23.0) and 7.8 (3.2, 13.7), $p < 0.005$ and $p < 0.01$, respectively, did not lead to significant changes in the parameters of VLFHRV, VLFSBPV and VLFDDBPV.

Discussion: Taking into account the impossibility of constructing the equations of transient processes that arise when the RR is changed, it is proposed to rank HRV, SBPV, DBPV and RV for SR, CR6 и CR15 in a single scale, which will allow each indicator to be estimated within the limits of percentile deviations - <5%, 5-25%, 25-75%, 75-95%, and > 95% with scores of -2; -1; 0; +1; +2, respectively.

Conclusion: A joint analysis of the results of the study will allow to establish the initial level of regulation of the cardiorespiratory system (with SR) and individual changes in ranks, the indices obtained for CR6 and CR15, which will characterize the reactivity of the sympathetic and parasympathetic contours of cardiac rhythm, blood pressure and respiration.

EVALUATION OF THE IMPACT OF SUCCESSIVE ERGOSPIROMETRY TESTS IN TRIATHLETES

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Introduction and Purpose: In triathlon athlete's swim, cycling and run on the same day, in a subsequent way. Many athletes request to perform successive ergoepirometric tests, as is the way of the race. It is common for some evaluators to perform ergospirometry tests on the cycle ergometer and treadmill successively to simulate the race. The aim of this study is to verify the impact of such a protocol, in a practical way.

Material and Methods: 14 competitive triathletes with physiological, anthropometric and statistically homogeneous performance characteristics were selected and submitted to a protocol specifically established to evaluate what was intended. The test started with the measurement of blood lactate. Subsequently the volunteers were submitted to an ergospirometry on the cycle ergometer. At the end of the test, the blood lactate level was measured again. The athlete had 2 minutes to supplement (carbohydrate gel), to hydrate and already initiated the second test in the treadmill. The ergospirometry test on the treadmill, as well in the cycloergometer, was designed with 2-minute stages. At the end of the treadmill test the blood level and blood lactate was collected again. After 72 hours of the tests, the volunteer returned to the laboratory to perform a new ergospirometry on the treadmill, with blood lactate measurements at the beginning and end of the test.

Results: In consecutive tests the following results were found: Borg index: 6 on the cycloergometer and 9 on the treadmill. Beats per minute: 108 on cycle ergometer and 138 on treadmill Lactate: 1.6 mM on the cycloergometer and 6.9 mM treadmill Final speed on the treadmill: 17.8 km / h In the isolated test (treadmill) the following results were found: Borg index: 6 Beats per minute: 107 on the treadmill Lactate: 1.8 mM, on the mat Final speed on the treadmill: 20.7 km / h

Discussion: The results clearly show a reduction in performance in the second test (treadmill) when performed after the cycle ergometer in comparison to the treadmill test performed alone. When the variable rate perception of effort (RPE) is analyzed, the first test (cycle ergometer) started with the Borg index of 6, on average, after warm up, while in the consecutive test, the Borg index started with the scale in 9. This fact already indicates an initial fatigue that is much greater than the one desired. Blood lactate, meanwhile, had a mean of 1.6 at the beginning of the test, reaching 6.9 at the beginning of the treadmill test. Initiating an ergospirometry test in these conditions may compromise the outcome. The same analysis can be made in relation to the beats per minute (BPM). The first test started with a BPM of 108 after heating, while the second test (treadmill, made consecutively to the cycle ergometer) started with BPM of 138. The analysis of the detrimental impact on performance becomes clearer when one observes the results of the treadmill tests done after the cycle ergometer in relation to the treadmill test done 72 hours later. The final outcome shows a Vo_2Max speed of 17.8 km / h, on average, in consecutive tests, versus a speed of 20.7 km / h in the treadmill test done alone. This means a reduction of approximately 17% in the estimated speed when the tests are performed successively. The analysis of lactate presents even more striking results, because in the successive tests, the initial lactate level of the treadmill test was 6.9, on average, indicating a very high initial acidosis level to start a maximum test. In the individual test, when the treadmill test was done, the initial lactate level was, on average, 1.8. This value seems to be more suitable for starting a maximum stress test.

Conclusion: The results clearly show the limitation of successive trials for triathletes. Acting in this way we will be underestimating the athletes' ventilatory thresholds for running training. Successive tests can even be done to determine how much the athlete loses performance between stages, for strategy adjustments, but never for training prescription.

SPONTANEOUS BAROREFLEX SENSITIVITY AND EXERCISE

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Introduction and Purpose: An important role in maintaining systemic hemodynamics of athletes has mechanisms to provide feedback in the regulation of blood pressure, which have a number of influences mediated by the peripheral and central nervous system. A well known indicator is the spontaneous baroreflex sensitivity (BRS), which is the magnitude of the reflex response per unit deviation of SBP values from the baroreflex working point. The urgency of determining the latter in athletes is predetermined by the high variability of changes in systemic hemodynamics, both during exercise and after them.

Material and Methods: To determine BRS (ms/mmHg), spiroarteriocardiorhythmography was used, which in the simultaneous registration mode determines the HR, SBP and DBP parameters for each heartbeat. According to HRV and SBPV, the α -coefficient was determined for the low frequency (LF) and high frequency (HF) components of systemic hemodynamic regulation with spontaneous respiration (SR) and controlled respiration 6 (CR6) time per minute. To study the changes in BRS before (M1), in the first 5 minutes after (M2) and the next morning (M3) after training, 28 highly skilled male athletes were examined at the age of 20.8 ± 3.2 years in the pre-competition period of the one-year training cycle. Nonparametric methods of statistical analysis with the definition of the Wilcoxon test were used.

Results: The changes in the traditional parameters of the cardiorespiratory system were recorded – HR (min⁻¹), SBP (mmHg), DBP (mmHg), CO (L/min), respiratory rate (RR, min⁻¹), MVR (L/min). Their following dynamics was noted: HRM2 94.3 ± 13.8 min⁻¹, HRM3 65.6 ± 10.5 min⁻¹; SBPM1 127.1 ± 13.6 mmHg, SBPM2 130.4 ± 13.2 mmHg, SBPM3 127.1 ± 13.6 mmHg; DBPM1 75.4 ± 8.8 mmHg, DBPM2 76.1 ± 9.8 mmHg, DBPM3 75.2 ± 8.0 mmHg; COM1 4.9 ± 1.0 L/min, COM2 6.0 ± 0.8 L/min, COM3 4.9 ± 1.0 L/min; RRM1 14.9 ± 4.6 min⁻¹, RRM2 18.8 ± 6.8 min⁻¹, RRM3 14.9 ± 5.7 min⁻¹; MVRM1 9.5 ± 4.0 L/min, MVRM2 12.7 ± 5.9 L/min, MVRM3 8.3 ± 4.2 L/min. Changes in all indicators except SBP and DBP, which returned to baseline in the first 5 minutes after exercise, indicate the effect of physical stress on the cardiorespiratory system. The dynamics of BRS LF and BRS HF under the influence of the training load was of the same type and informative. BRS LF M1 with SR 17.2 (10.7; 20.4) after the load, BRS LF M2 significantly decreased to 6.3 (4.2; 11.4), $p < 0.01$, and by the next morning BRS LF M3 did not significantly differ from BRS LF M1 15.3 (11.8; 17.8), $p > 0.05$. BRS LF M1 with CR6 changed even more significantly from 20.4 (17.1; 28.8) to BRS LF M2 9.3 (4.8; 12.8), $p < 0.001$, and BRS LF M3 21.0 (13.4; 24.9) did not differ from BRS LF M1. BRS HF M1 at SR 21.6 (12.2; 27.9) after loading BRS LF M2 significantly decreased to 6.5 (4.3; 11.5), $p < 0.001$, and by the morning of the following day BRS HF M2 11.5 (6.9; 19.3), $p < 0.01$, and BRS HF M3 19.3 (10.6; 28.9) did not differ from BRS HF M1.

Discussion: The obtained results show that the decrease in the parameters of BRS LF and BRS HF under the influence of the training load suggests switching the baroreflex mechanisms of regulation of hemodynamics to others – neurohumoral and muscular. On the other hand, the important thing is to restore them by the next day. The latter circumstance suggests that, otherwise, these indicators may be the criteria for overfatigue, overtraining and overreaching.

Conclusion: It is shown that the physical load leads to a decrease in BRS, more pronounced for BRS HF with SR and BRS LF with CR6, which can be used in current control of athletes.

ALTERNATED SUPPORT DURING “DUCK DIVE”: A POSSIBLE ALTERNATIVE TO REDUCE THE SURFER’S LOW BACK PAIN?

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Introduction and Purpose: Surfing is a sport that has grown in popularity in recent decades, especially in Brazil. The practice of this sport is divided into 5 major moments 1,2,3: paddling, waiting, paddling to catch the wave, “surfing the wave” and mixed activities, with the first moment corresponding to 44 to 54% of the total time 1,2,3 and the last one involves activities such as “Duck Dive” - DD, recover from a wave fall among others, it is about 16% of total time². This sport is an intermittent physical activity that includes episodes of high intensity exercises interspersed with periods of low intensity activity and requires the practitioner to prepare properly. Regarding the injuries that this activity causes, many are caused by the period that the surfer remains paddling. In this position, he assumes an actively extended position of the spine, with constant rotation of the trunk, often together, creating a complex biomechanic. The complaint of back pain is frequent in numerous sports. In surfing, the incidence of painful complaints of the lumbar spine is high, reaching from 56 to 60% of surfers^{4,6}. The DD is a very repeated maneuver during a surf session¹ and consists of a coordinated asymmetric movement of knee and / or foot support on the board, Figure 1, in order to push it to depth to pass more easily through the wave. It requires synchrony of the upper limbs, trunk and lower limbs, we can divide it into phases according to the sequence in Figure 2. Most of the surfers perform this maneuver with exclusive unilateral support on the board, that is, for those who support the board with the right lower limb will always support with that same limb, and for those who support with the left limb, they will always use the same limb as support. Never in an alternate way. The objective of this prospective study is to evaluate the interference of the support (single exclusive x alternating) during DD in the complaints of low back pain.

Material and Methods: Fifty male surfers with a mean age of 31.4 years (20 to 50 years) were assessed in a 6-month period. With at least 5 years of surfing practice. We included those athletes with a routine of at least 6 hours of surfing weekly and who had at least 2 episodes of low back pain in the last 12 months prior to this study that made it impossible to surf for at least 1 day. Separated into 2 randomized groups: Group 1 with 25 individuals who adopted the alternate method of DD and Group 2 (control) with 25 individuals who maintained the single DD support. We evaluated the incidence of low back pain, presence of pain that made surfing impossible, and the need for pain killer analgesic.

Results: After 6 months, the groups were reevaluated. Group 1: 2 cases of low back pain that took him out from surfing for at least 1 day, Group 2: 4 cases. Group 1: 5 cases of pain requiring the use of pain killer medication, while Group 2 recorded 8 cases. All 25 cases of Group 1 reported improvement in well-being after the surfing session.

Discussion: In the series studied by Furness et al.⁵ with 1348 professional and recreational surfers, the predominant lesions were: muscular (31.3%), skin (17.2%) and nerves (6.9%). Regarding the mechanism of trauma, 10.9% were related to the act of paddling and 4.6% to the act of “drilling the wave”. The author classified as MAJOR injuries those in which the surfer needed to leave the surf and / or work for at least 1 day. Low lumbar spine injuries in this series affected 9% of all injuries and 32% of the low lumbar complaints were muscular, 31% articular, 18% neurological, 10% skin lesions, 5% marine lesions and 4% bone lesions.

Conclusion: The results suggest that the alternating support during DD reduces the need for analgesic medication for back pain as well as decreasing the incidence of withdrawal of the activity for at least one day. We know that in the practice of surfing has lots of variables that can interfere in the results of our intervention. And more clinical trials are needed with statistical evaluation

SHOULDER FUNCTIONAL PROFILE OF THE BRAZILIAN ELITE MALE GYMNAST

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Introduction and Purpose: Gymnastics continues to be one of the most popular and injury-prone sports in the United States. The National Collegiate Athletic Association cites artistic gymnastics as second only to spring football in its rate of injury during practices, and fourth overall when combining competition and practice injury rates. Because of the physical demands of the sport of gymnastics, a wide variety of injuries occur. At men artistic gymnasts, shoulder is an important joint of severe injuries (Overlin et al., 2011). It is known that injuries occur with imbalance of range of motion, force, muscle control or temperature. Therefore, this work has with aim to describe the shoulder functional profile of the gymnast, that is important to prevent lesions.

Material and Methods: Nine male gymnast (1.65±0.05 m, 66.4±3.88 kg), included Brazilian National Team, participated in this study. The joint complex of the shoulder functional profile was defined in terms of range of motion (ROM), moment of force (MF), muscle control (MC) and thermography (IR). For this the following test were selected: active ROM, isokinetic, scapular dyskinesis and thermography, respectively. For the active ROM test, the gymnasts were instructed to perform the greatest range of motion (5 repetitions) during actions: flexor-extensor, abductor-adductor e medial-lateral rotation. The isokinetic test was performed in concentric contractions at velocities of 60 deg/s (5 repetitions) for internal rotation (IR) and external (ER). The scapular dysfunction was based in the motion pattern of the inferior angle around during adduction movement (5 repetitions) (Kibler et al., 2002). The thermography measure was performed in the frontal plane (anterior and posterior), anatomical position and in environment controlled (Hildebrandt et al., 2012). All the results were expressed in terms of mean (\bar{x}), standard deviation (SD), coefficient of variation (CV), deficit and ratio.

Results: The largest differences in ROM between athletes were observed in shoulder rotation. On the other hand, the main bilateral deficit (5%) was observed in the abduction-adduction movement. The internal rotation torque peaks (87% of body weight) were higher and more regular than external torques (64% of body weight). Deficit between both shoulders during internal rotation was 7.85% and during external rotation was, also, 11%. The scapular dyskinesis was present only in one case. Higher temperatures were observed in posterior shoulder (0.2 C higher than anterior shoulder).

Discussion: The main bilateral deficit (5%) of ROM was observed in the abduction-adduction movement, but this difference is accepted as normal parameter. A deficit between right and left peak of force during internal and external shoulder rotation was 7.85% and 11%, and it can be justified because of laterality. Higher temperatures are present in athlete's posterior shoulder region, justified by the demand of athletic gesture at gymnastics training associated. Literature says that a difference lower than 0.3 C should be considered normal. About muscle control, only one athlete presented an imbalance, represented by scapular dyskinesia. These results represented a low risk of injuries. In order to prevent shoulder pain, gymnasts perform, daily, a scapular stabilization work, resistance training of external rotation, myofascial release and joint mobilization.

Conclusion: Some important parameters for prevent injuries were evaluated in Brazilian Gymnastic Male Team and the conclusion was that all of them (ROM, peak of force, muscle control and thermography) showed a low risk of important shoulder injury. In addition, it is believed that prevention work daily is responsible for this low risk.

A QUESTIONNAIRE FOR MEASURING PHYSICAL ACTIVITY AMONG PREGNANT WOMEN: A TRANSCULTURAL ADAPTATION TO SPANISH IN COLOMBIA

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Introduction and Purpose: Transcultural adaptation is a process whereby a scale or questionnaire is translated and adapted to another language different from the original. It considers maintaining semantic, idiomatic, experimental and conceptual equivalences. This process takes into account the context, culture, and lifestyle of the target population. It minimizes the information bias related to the administration of questionnaires in countries with different languages and cultures. Objective: to cross-culturally adapt the Pregnant Physical Activity Questionnaire (PPAQ) in Colombian pregnant women.

Material and Methods: PPAQ's authors' permission to use the questionnaire was requested and obtained. Initially, the PPAQ was translated from English to Spanish by a Spanish mother tongue official translator. Then, the PPAQ was translated back into English by an English mother tongue translator. The translated and original versions were submitted to a panel of 10 experts including three physiotherapists, two physicians, two bacteriologists, one social communicator, one nurse and one licensed in the Spanish language. The experts came from different regions of Colombia, such as Bogota, Medellin, and Bucaramanga. They individually evaluated semantic, idiomatic, experimental and conceptual equivalences using yes/no questions such as Do you consider that the PPAQ has semantic equivalence? Scores were calculated summing yes responses and dividing it by the number of experts. Items with scores below 0.70 were modified until all the members of the panel agreed. Subsequently, 20 pregnant women were interviewed individually to establish the understanding, clarity, precision the questionnaire as described in the literature. Prior to the interviews, an informed consent signature was requested from the pregnant women.

Results: Four out of 36 items of the PPAQ needed modifications. The item related to low-intensity household activities obtained low scores in semantic (0.70), experimental (0.60), and idiomatic (0.60) equivalences; the item related to mobility using means of transport such as bus or car got low scores in experimental (0.70) and conceptual (0.70) equivalences. These two items only required replacing some terms with others used daily in the context of Colombian women without modifying the activity to which the original instrument referred. Finally, two items regarding low/medium-intensity gardening activities obtained low scores in all the equivalences. Equivalent activities replaced the gardening activities according to the Compendium of Physical Activity, in which each activity has a representation in METs. A consensus was reached to get the final PPAQ Spanish version.

Discussion: Differences in PA levels have been found according to ethnic and race characteristics. The questionnaire has proven to be a tool that can be successfully adapted to different cultures and contexts as described by the literature in its Spanish versions for population of Spain, Portuguese, Chinese, Japanese and others. In the case of the Polish version, the number of questions due to cultural differences was reduced, specifically the question related to "mowing lawn while on a riding mower"; in our case this same question had to be eliminated considering that this type of tools are not used frequently in Colombian homes.

Conclusion: We obtained the PPAQ Spanish version to be applied in the Colombian context. The Spanish version for Colombia of the PPAQ meet the appropriate semantic, idiomatic, experimental and conceptual equivalences. Further research is needed to evaluate other psychometric properties of the PPAQ Spanish version to be used in Colombian pregnant women. Thus, researchers and clinicians can obtain reliable and comparable results during the physical activity evaluation of this population.

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ASSOCIATION BETWEEN PHYSICAL ACTIVITY AND ANXIETY IN ACADEMICS OF MEDICINE

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Introduction and Purpose: Medical students, when they enter the university environment, are influenced by several factors: new social relations, stress, psychosocial instability and lack of time due to their activities. Studies have shown that the presence of stressors, such as the time required for studies, pressure to learn, high performance requirement, volume of information, lack of time for social activities and contact with sick people can lead to the onset of symptoms of stress, anxiety. In order to fit into established school schedules, young people are more likely to have an inadequate lifestyle, such as a sedentary lifestyle, which directly influences quality of life, increasing the chances of developing chronic-degenerative diseases and psychiatric disorders such as anxiety, depression and some negative mood states. The work aims to analyze the relationship between the level of physical activity and anxiety in medical students

Material and Methods: It is a quantitative, descriptive study, with a cross-sectional design, carried out at Valença-RJ Medicine college. The sample consisted of 100 academics, 59 women and 41 men, aged between 17 and 26 years and who were regularly enrolled in the Faculty of Medicine of Valença. To assess the anxiety level of medical students, the Beck Anxiety Inventory (BAI), an internationally validated questionnaire and widely used in anxiety studies, was applied. The physical activity level was evaluated through the International Physical Activity Questionnaire (IPAQ), validated in 2001 in Brazil by Matsudo, and widely used by several researchers for such assessment. The classification was adapted by creating 2 groups. In group 1 are the active and very active classifications, while in group 2 it was included the classifications of insufficiently active and sedentary. Descriptive statistics were used to characterize the sample. Spearman's correlation test was used to find the relationship between the variables, considering $p \leq 0.05$ for significance. In the data analysis the statistical package SPSS version 23.0 was used.

Results: In the evaluation of anxiety level, 71 academics (71%) have minimal anxiety, 21 academics (21%) have mild anxiety, 5 academics (5%) with moderate anxiety and 3 academic (3%) with severe anxiety were found. In the evaluation of the level of physical activity, we found 24 academics (24.0%) classified as sedentary or irregularly active. In the active and very active classification were found 76 academics (76.0%). In the statistical analysis, there was no correlation between the level of anxiety and the level of physical activity, with $p = 0.473$.

Discussion: Contrary to the results found, the study by Netto et al. showed us that the practice of physical activity, in fact, provides an improvement in the psychological aspect of the students of the health area. In addition, Serinoli et al. showed that the benefits of physical activity in medical students are not only in the psychological domain, but in the quality of life as a whole.

Conclusion: No correlation was found between anxiety levels and levels of physical activity, however, individuals who practice physical activity tend to be less anxious.

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ADIPOCYTES AS A SECRETORY CELL

Autores: Souza, R F R D

Introduction and Purpose: The concept of the adipocytes are secretory cells appeared in recent years with the discovery of leptin in 1994. Adipocytes synthesize and release a variety of peptides and non-peptides and express other factors besides their ability to mobilize and deposit triglycerides, retinoids and cholesterol. These properties allow an interaction of adipose tissue with other organs, as well as other fat cells. The characterization and recognition of various substances produced in adipose tissue expanded knowledge related to obesity and related disorders. The objective of this work is to elucidate the endocrine function of the adipocyte.

Material and Methods: The search in the databases was performed using the terminologies registered in the Descriptors in Health Sciences created by the Virtual Health Library developed from the Medical Subject Headings of the US National Library of Medicine, which allows the use of common terminology. The inclusion criteria for the studies found were the metabolic function of adipose tissue; as well as the relation of these metabolic products with other organs and systems. Studies focusing on specific drugs were excluded. As descriptors were used: Adipocyte; Lipogenesis; Lipolysis; Adipokines; Adipogenesis; Obesity.

Results: The adipose tissue is a dynamic organ that secretes several factors, among them adipokines. Adipokines are bioactive peptides secreted by adipocytes being important in energy regulation, inflammatory and immune response. Among the most studied adipokines are leptin, adiponectin and resistin. From the data found in the literature some findings can be made. The circulating levels of these adipokines are directly associated with the degree of obesity presented by the individual. High or low circulating concentrations of the adipokines studied may lead to benefits or impairments in immune competence, making obese individuals more susceptible to infections and inflammation than eutrophic individuals. The content of adipose tissue (including adipocytes, connective tissue matrix, nervous tissue, immune cells and vascular stroma) responds to multiple body signals mediated by factors such as leptin, adiponectin, complement components, plasminogen inhibitor, resistin, and proteins of the renin system with important endocrine functions. Associated with these functions are the metabolism of sex steroids and glucocorticoids that also occur in adipose tissue. In addition to synthesizing and releasing a variety of peptides and non-peptides, adipocytes express other factors capable of depositing and mobilizing triglycerides, retinoids and cholesterol. These properties allow an interaction of adipose tissue with other organs as well as with other adipose cells. The important observation that adipocytes secrete leptin as the ob gene product in 1994 established adipose tissue as an endocrine organ that communicates with the central nervous system.

Discussion: According to WHO, between 1980 and 2013, the proportion of obese adults in the world rose from 28.8% to 36.9% among men and from 29.8% to 38% among women. Obesity is considered a global public health problem and its increased incidence has brought risks and consequences that are increasingly worrying. This disease is characterized by the accumulation of adipose tissue in the body. Currently, many studies are directed to obesity and the comorbidities associated with this pathology, in order to clarify the mechanisms involved.

Conclusion: From this we can conclude that the discovery of Leptin in 1994 led to the knowledge of the endocrine function of adipose tissue and its relationship with other organelles. The characterization and recognition of various substances produced in adipose tissue expanded the knowledge related to obesity and its disorders, being recognized several factors, including genetic.

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INFLUENCE OF PHYSICAL ACTIVITY LEVEL IN TOTAL CHOLESTEROL OF MEDICINE ACADEMICS

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Introduction and Purpose: Several forms of training are currently used in gyms, clubs and centers of reference in physical activity, most of which have as their main objective body aesthetics. However, the regular practice of physical exercise brings other non-visible benefits, such as changes in total cholesterol values, with positive impact on the prevention of certain diseases and improvement in quality and life expectancy. The objective was verify the influence of physical activity levels on total cholesterol.

Material and Methods: It is a quantitative, descriptive study, with a cross-sectional design, carried out at the Faculty of Medicine of Valença/RJ. The sample consisted of 100 academics, 59 women and 41 men, aged between 17 and 26 years and who were regularly enrolled in the Faculty of Medicine of Valença. To evaluate the total cholesterol, 5 ml of blood was collected by venipuncture for the biochemical measurement of the lipid profile. The blood collection was performed by the laboratory of the Luiz Gioseffi Januzzi School Hospital, by the vacuum system, BD Vacutainer®. For this, the patients were asked to undergo a fasting meal of ten to twelve hours. The physical activity level was evaluated through the International Physical Activity Questionnaire (IPAQ), validated in 2001 in Brazil by Matsudo, and widely used by several researchers for such assessment. The classification was adapted by creating 2 groups that included the active and very active classifications in group 1, while in group 2 the classifications of insufficiently active and sedentary were included. Descriptive statistics were used to characterize the sample. The point-biserial correlation test was used to find the relationship between the variables, considering $p \leq 0.05$ for significance. In the data analysis the statistical package SPSS version 23.0 was used.

Results: The mean values of total cholesterol found in the academics were 172 ± 30 with a minimum of 117 and a maximum of 250. In the classification of the total values, according to the AHA, 16 academicians (16.0%) were identified with total cholesterol level and 81 academics (84.0%) with acceptable / desirable total cholesterol values. In the evaluation of the level of physical activity, 24 academicians (24.0%) classified as sedentary or irregularly active were found, with a median total cholesterol value of 176 ± 26 . In the active and very active classification 76 students were found (76.0 %) with median total cholesterol values of 166 ± 32 . In the statistical analysis, there was no correlation between the values of total cholesterol and the level of physical activity, with $p = 0.961$.

Discussion: The current study found no significant relationship between total cholesterol values and physical activity levels. This result goes against previous studies, which demonstrate that the practice of physical exercise, with recommended frequency and intensity, generates beneficial effects on the lipid profile of the individuals, however, it is worth mentioning that the previous studies were longitudinal, and the individuals were evaluated before and after a few weeks of training, which did not occur in the present study, which analyzed the practice of exercise only by applying the IPAQ, which may justify the non-relation. Recent studies point to an improvement in total cholesterol values in individuals who exercise at least 150 minutes per week, a fact investigated in a sample over 40 years of age, different from the current study, which investigated university students and found no correlation of the level of activity with total cholesterol values.

Conclusion: No correlation was found between the values of total cholesterol and the level of physical activity, however, individuals who practice physical activity have more desirable values of total cholesterol.

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ELECTROCARDIOGRAPHIC ABNORMALITIES IN ATHLETES OF A PROFESSIONAL SOCCER TEAM

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Introduction and Purpose: Sudden death (SD) in athletes is a catastrophic event with great social repercussions and, because of that, the preparticipation physical evaluation (PPE) has been the subject of discussions for its goal, among others, is to identify athletes with an elevated risk of SD. In Brazil, the PPE includes an electrocardiogram (ECG) which can demonstrate electrical abnormalities in diseases that could result in SD and yet are occasionally asymptomatic. ECG shows, as the most common causes of SD in athletes, hypertrophic cardiomyopathy, arrhythmogenic right ventricular cardiomyopathy, dilated cardiomyopathy and left ventricular noncompaction. Therefore, our proposal was to perform and analyse ECG tests in Brazilian profession athletes. Analyze the main electrocardiographic abnormalities in Ferroviário Atlético Clube athletes.

Material and Methods: It was performed a cross-sectional study through the analysis of ECG tests performed in 44 Ferroviário Atlético Clube professional athletes at "Núcleo de Atenção Médica Integrada" (NAMI), health service supported by the University of Fortaleza (UNIFOR).

Results: In the normal ECG, we find sinus rhythm in normal patterns and sinus bradycardia in a juvenile physiological pattern. Within the athlete's ECG category, we find sinus rhythm with right bundle branch block with altered ventricular repolarization. In the abnormal ECG, we find sinus rhythm with left ventricular overload (Sokolov-Lyon criteria), sinus bradycardia with left ventricular overload and sinus rhythm with suggestive left ventricular hemodynamic overload compensated by left ventricular hypertrophy.

Discussion: In this study, it was observed a left ventricular overload pattern, which leads us to investigate looking for ventricular hypertrophy, which makes us think of hypertrophic cardiomyopathy (HCM), which is a pathological abnormality that can occur in athletes. The hypertrophic cardiomyopathy is a genetic disease of the cardiac muscle, and it is characterized by a ventricular hypertrophy with no known cause, such as systemic arterial hypertension or valvar disease. The poor ventricular compliance (diastolic dysfunction) is common, and so is the microvascular dysfunction, which leads to ischemia during exercises. The HCM symptoms include exercise intolerance and chest pain, although some cases may be asymptomatic. The cardiac muscle fibrosis is common and may be related to ventricular arrhythmias and sudden death. The HCM may be diagnosed by the ECG combined with echocardiography or magnetic resonance imaging. A common dilemma in the evaluation of an athlete diagnosed with ventricular hypertrophy is to know whether this hypertrophy is indeed pathological, as – in an athlete's heart – hypertrophy might be the result of adaptations due to exercise, although heavily trained athletes occasionally show abnormal patterns in the ECG, suggesting cardiomyopathy. In cases with ECG abnormalities with no confirmation of structural disease, after complete investigation, the athlete might be cleared to compete. Such athletes must be though carefully examined every year.

Conclusion: Regarding the discussion and the analysis of the ECG tests performed in the professional soccer club Ferroviário Atlético Clube athletes, we can conclude that the majority of athletes do not exhibit hypertrophic cardiomyopathy pattern, therefore they are cleared to engage in their sport activities. Only 3 athletes must undergo future cardiologic follow-up with echocardiography or magnetic resonance imaging in order to exclude the diagnoses of HCM.

SUBJECTIVE SCALE FOR ASSESSING MUSCLE FATIGUE AND INJURY RISK IN PROFESSIONAL SOCCER PLAYERS

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Introduction and Purpose: Soccer is the sport played most consistently around the world. The current levels of muscle lesions in professional soccer is high, when compared to earlier years and other sports. The consequences for amateur sports are not serious but problematic for professional athletes. The management of muscular injury and return to play involves technical and sports issues, could affect team performance. Literature lacks evidence showing accurate subjective assessment for the follow-up of muscular injuries in sport. To investigate a novel subject pain based scale, the Subjective Scale for Muscle Function (SSMF), to assess muscle fatigue and risk of injury after a soccer match.

Material and Methods: Over 3 soccer seasons, 121 players were followed. Participants were assessed 36 to 48 hours after a match via analysis of creatine kinase (CK) concentration, score in the SSMF scale. The SSMF is a scale ranging from 0 to 3 in which 0 corresponds to no pain, 1 to general pain, 2 to pain in the full length of a specific muscle, and 3 to pain in a specific area of the muscle. Participants were further assessed after a follow-up of 7 days after the match. All athletes who reported localised muscle pain were assessed by the team physician who made a decision on whether an MRI or US image assessment was necessary. The athletes were only allowed to return to practice (training or game) if image assessment did not show rupture of muscle fibers and there was improvement in symptoms (usually after around 3 days). We analysed the correlation between the CK concentration and the SSMF via Pearson Correlation Coefficient and a repeated measure ANOVA. We also analysed odds ratio of muscle injury as identified by the SSMF with a logistic regression.

Results: SSMF was correlated to CK concentration ($r=0.40$, $p<0.001$). The SSMF presented differences among the levels, except the comparison between levels 2 and 3. It can be noted that the mean CK concentration increases as the SSMF score increases. Overall, the included athletes suffered 23 muscle injuries during the study period. From the logistic analysis, it is noted that the probability of injury increases significantly for those with a score of 3 in the SSMF.

Discussion: The different levels of SSMF showed good capacity to detect the different levels of CK concentration. The level of perception by the participants of general body pain and local muscle pain was related to CK concentration, therefore SSMF could be used to follow-up athletes after matches. The logistic regression showed that participants with the maximal score in the SSMF (score of 3) were 9 times (95% CI 3 to 27) more likely to have an injury up to 5 days after a match when compared to participants with the lowest score in the SSMF (score of 0). The current study showed that the SSMF can be used by doctors and physiotherapists to decide whether an athlete should be further assessed (minimum score 2 - pain in the full length of a specific muscle) or not. We recommend a thorough assessment of athletes describing pain in the full length of a specific muscle (score 2 in the SSMF) especially when it is related to fatigue and soreness, or pain in a specific area of the muscle (score 3 in the SSMF), which is usually related to a non-structural injury or muscle tear.

Conclusion: The SSMF was effective in differentiating levels of CK concentration. It was also effective in determining risk of suffering an injury, particularly when the participant reported pain in a specific area of the muscle (score of 3 in the SSMF).

IMPACT OF BODY FAT PERCENTAGE ON EXERCISE CAPACITY AND BLOOD PRESSURE IN FEMALE ATHLETES

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Introduction and Purpose: Correlation between body composition, especially the body fat content and cardiovascular system is very well known and processed issue, but a specific focus on female athletes in this concept not that much. That is why we considered this as field for examining in female athletes. The aim of this study was to assess the impact of body fat percentage on exercise capacity and blood pressure in female athletes.

Material and Methods: In total 114 female elite international level athletes were divided into two cohorts according to body fat percentage (BF%): BF%<20% (low-fat athletes, LG, n=87), BF% and BF%≥ 20 (high-fat athletes, HG n=27). These athletes were practicing professionally some of next sports: basketball, tennis, kayaking, volleyball, cycling, swimming, kayaking, taekwondo; in the period from 3 to 26 years and more than 8 hours per week. Any of them had no cardiovascular diseases neither in medical history, nor in physical examination and ECG on preparticipation check-ups. Our research was conducted in the laboratory for functional diagnostics at the Serbian Institute of Sport and Sports Medicine in Belgrade. All female elite international level athletes were screened by the recommendations of the European Society of Cardiology (ECS) with a complete medical history, physical examination, anthropometry measurement done with In Body 370 scale, echocardiography (ECG) and cardiopulmonary exercise test to exhaustion (maximal progressive ergospirometry test) done on the T200 Cosmed treadmill, which was performed to determine maximal oxygen consumption (VO₂max), resting and maximal heart rate (HR) and blood pressure (BP).

Results: Compared with low fat group, high fat group female athletes had lower body mass index and body muscle percentage ($p<0.05$ all). Also maximal systolic and diastolic blood pressure, as well as maximal heart rate were higher in low fat in compare to high fat group athletes ($p=0.007$, $p=0.000$, $p=0.036$, respectively), without differences in resting blood pressures and heart rate. Body mass and high as well as, VO₂max were similar between the groups ($p > 0.05$).

Discussion: Before writing this paperwork, we reviewed a lot of different paper works from the sports medicine field, especially those related to professional female athletes and we realized that there are not many of them that connect fat percentage with exercise capacity and blood pressure, specifically in professional female athletes. Our pool of over 100 sportswomen practicing in different sports is just a beginning of our interest in this subject and processing this subject, because we consider this topic as one of those with a lot of empty space around waiting to be full filled.

Conclusion: Our data demonstrates that low level in comparison with high of body fat percentage in female athletes shows significantly higher maximal systolic and diastolic blood pressure and maximal heart rate, without change in VO₂max of these athletes.

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INSOMNIA IN HIGH PERFORMANCE ATHLETES

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Introduction and Purpose: Insomnia is a symptom that occurs in innumerable psychic pathologies. Insomnia signals to therapists, practitioners and physicians that there is an emotional and chemical imbalance occurring in the patient's brain. The presence of insomnia is a factor that reduces athletes performance. Through the scientific review will be discussed the causes of the pathologies involved that lead to insomnia. The treatment of insomnia in high-performance athletes is a very important issue. The therapies employed require a very specific and particular look, differing from the treatments offered to other populations, such as the risk of doping and the decrease in performance along the athletes training day.

Material and Methods: The method chosen was the literature review in the Scientific Electronic Library Online (SciELO) and Public Medline (PubMed). The search strategy was the intersection of the terms: insomnia and athletes. The inclusion criteria of the journals were: articles available in full, without temporal cut of time. As exclusion criterion, we exclude non-medical journals and when they did not report on insomnia in high performance athletes. We found 31 articles, selecting 20 papers and 1 textbook that referred to the current theme.

Results: Insomnia is a sign of illness and mental suffering. The diseases mentioned in scientific articles as causes of insomnia in high performance athletes are: nocturnal snoring, nocturnal apnea, anxiety, depression, bipolar disorder, stress, obesity, restless legs syndrome, attention deficit hyperactivity disorder and use of psychoactive substances. There are behavioral changes or pathological behaviors that also contribute according to the scientific articles for the installation of insomnia such as: sleep late, use of tablets or cell phones before bedtime and recall events of the day. Reviewing the scientific articles, there is a consensus that 21% to 28% of populations of high performance athletes present poor sleep quality for several reasons. These studies applied the scales as: Pittsburgh Sleep Quality Index (PSQI) and the Epworth Sleepiness Scale (ESS) in the groups of athletes analyzed.

Discussion: After analyzing the data, we can verify that the prevalence of insomnia in athletes is high in the populations evaluated. Insomnia in athletes has multifactorial causes. Among the causes are common aspects to non-athletes such as: anxiety, depression, use of psychoactive substances, etc... and also very specific to the category of high-performance athletes such as: stress and exposure in the media.

Conclusion: Insomnia is a very frequent symptom in the population of high-performance athletes. We conclude that insomnia is of great relevance in the field of mental health in sports medicine. Deepening research on the causes and treatments for insomnia will help in the future to minimize this suffering in high-performance athletes.

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SPORT AS A FACTOR FOR THE INTEGRATION AND PROMOTION OF PHYSICAL AND MENTAL HEALTH OF THE MEDICAL STUDENT

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Introduction and Purpose: It is estimated that 15% to 25% of college students present some type of psychiatric disorder during their academic training. Among these disorders, depressive and anxiety disorders are the most frequent. Depression is one of the most prevalent mental disorders of our time and the greatest occurrence is recognized among medical students and physicians, than in the general population. Severe forms of suicide are also reported. According to a study by researchers from the American medical and administrative institutions, the proportion of diagnoses of depression or depressive symptoms among medical students worldwide, including in the period of residence, is 27.2% and that of suicidal ideation, or thoughts about the possibility of suicide, 11.1%. The practice of sports has proved to be an instrument of integration among people, a great help in the medical treatment of depression. We propose to evaluate and offer sports practices for medical classes as a factor of social integration and health promotion. To try to reach the participation of the largest number of students by tracing the psychological profile of the participants and assessing the benefit to the state of mental health of the students, defining the relation between the practice of sport and its impact on health.

Material and Methods: An observational study was conducted with cohort design in undergraduate students of the Medicine course of the Federal University of Rio de Janeiro Macaé campus from the first to the sixth year. Were assessed using psychological tests validated in Brazil (Beck Anxiety Scale and the Beck Depression Scale) the state of depression and anxiety of medical students and a questionnaire evaluation and interest whose variables were age, gender, if you consider yourself healthy, if you have any clinical or surgical disease, practice regular physical activity, leisure, hobby, alcohol use, use of psychoactive drugs for psychiatric and / or drug treatment for anxiety and depression, if you use any medication and proposed sports modalities (Beach Volleyball, Beach Soccer, Peteca, War Cape and Slackline) and revalued after the end of the competition of these modalities.

Results: High rates of depression and anxiety among medical students were confirmed, according to the national and international literature, which interfered in the choice, participation and adherence to the different sports modalities.

Discussion: According to the American Medical Association, about 11% of their students have suicidal tendencies and 27% had depression or depressive symptoms tables. Of this group, only 16% seek psychological or psychiatric treatment. The data of the Brazilian students reflects in the study carried out in 2010 among students of the State University of Maranhão who pointed out depressive symptoms among 47.5% of the medical students of the institution. Another study, conducted in 2015 among medical students from the city of Santos (SP), reached the 30% index. The numbers are significant and raise the discussion about the importance of prevention and treatment of the disease in several scenarios. And for this, there are great allies as the activities and physical exercises. Batista and Ornellas (2013) concluded in their cross-sectional study that more physically active people are more protected against depressive disorders compared to less active ones. There seems to be a direct and inverse relationship between the level of physical activity and increased levels of depressive behavior.

Conclusion: Sports practices should be stimulated and instituted during medical graduation and the positive results are verified in the medium and long term.

COMPARISON OF CONVENTIONAL AND VIRTUAL REALITY PHYSICAL TRAINING IN BODY COMPOSITION AND FUNCTIONAL CAPACITY IN PATIENTS WITH HEART DISEASES

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Introduction and Purpose: Cardiovascular diseases are one of the main causes of mortality in the world, virtual reality presents itself as an alternative therapeutic resource to be inserted in physical training process of cardiac patients inserted in cardiovascular rehabilitation programs, stimulating the practice of physical activity by interaction between man and machine. Physical training with virtual reality has favorable effects on body composition and functional capacity, such as flexibility, muscular strength and cardiorespiratory fitness, thus contributing to reduce the number of mortalities. However, these effects on heart disease patients are still scarce. Objective: To compare the effects of two types of physical training: conventional cardiac rehabilitation and virtual reality in body composition and functional capacity in patients with heart disease.

Material and Methods: 27 patients aged over 45 years of both genders were randomly divided into a conventional rehabilitation group (CRG) and a virtual reality rehabilitation group (VRG). They underwent a program for eight weeks, two weekly sessions of 60 minutes, throughout the session the Borg's subjective stress scale and heart rate were checked to ensure that it did not exceed the individually calculated training heart rate according to the Karvonen formula. VRG training was implemented from the Xbox 360^o video game with Kinect™, using the YourShape™ and Dance Central 3™ games. For CRG, treadmills were used to perform aerobic exercise and free weights in resistance exercise. For analysis of body composition, Bioimpedance was performed and for functional capacity evaluation, a 6-minute walk test was performed. Both evaluations were performed at baseline and final conditions. For the main outcomes student T test or Mann Whitney test were used.

Results: Patients presented a mean age of 63.46 ± 8.12 years with predominance of males and systemic hypertension as their main comorbidity. In the comparison of groups, there was a significant increase in the Δ percentage of fat for the VRG (p value = 0.0213) and Δ fat weight (p value= 0.0325) also for the VRG. There were no differences detected between the groups for Δ lean weight (p value= 0.2683). The effect size between the groups of the body fat percentage variable was considered large (d= 0.96), in relation to the fat weight the effect size was also large (d= 0.89). And small for the lean weight variable (d= 0.06). There was a significant improvement in functional capacity for GRC (p value= 0.0231) and GRV (p value= 0.0345) at baseline and final respectively, however, without differences in gain variation in the comparison of functional capacity deltas between the two groups (Δ 54.00 meters for the CRG and Δ 32.25 meters for the VRG).

Discussion: Both conventional and virtual reality rehabilitation brought improved benefits functional capacity in patients with hearts disease. The use of technology in rehabilitation can positively contributed to motivation and interaction of patients, so it can be used as an alternative. However, there was significant difference in relation to the fat weight in GRV after the protocol training was observed a gain of fat weight, which was not expected. However, we can highlight that nutritional monitoring was not performed and the training was carried out for a period of 8 weeks. We believe a change in body composition would require a longer period of training.

Conclusion: The two modalities of rehabilitation did not promote effects on body composition groups after intervention. In addition, similar improvement in functional capacity was observed in both groups.

CARDIOVASCULAR EFFECTS OF ACTIVE SHORT-TERM HOLIDAYS

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Introduction and Purpose: To what extent the duration of a vacation and the activities therein have an impact on health and wellbeing remains unclear because we lack scientific measurements of physiological parameters before, during, and after a vacation. The East Tyrolean Health Tourism Study is an open comparative study to investigate the cardiovascular effects of a one-week vacation with different activities on healthy vacationers.

Material and Methods: Fifty-two healthy vacationers spending one week in East Tyrol participated in two types of vacation activities (golf vs. Nordic walking or e-biking [nw&eb]). In the former group 30 subjects played golf for 33.5 hours per week, and in the nw&eb group 22 engaged in Nordic walking or e-biking for 14.2 hours per week. Cardiovascular parameters such as performance capacity, blood pressure, heart rate profiles and cardiac diastolic function were measured by a cardiopulmonary exercise test, holter ECG and echocardiography performed one day before and after the stay.

Results: In both groups we noted a reduction of blood pressure and heart rate, which was marked and significant only in the golf group. We observed no significant changes in performance capacity, but did note an improvement of cardiac diastolic function in both groups. In the golf group and the nw&eb group, the median absolute maximum power output (Wmax) was 150 W and 175 W, respectively, while the median values of relative maximum power output were 1.8 and 2.0 Wmax/kg, respectively. After a one-week vacation there was no change in maximal performance in the golf group, and a very small but significant decrease of 1.7% in the nw&eb group (p<0.01). Although the maximal power output did not change essentially, there were reductions in heart rate, systolic and diastolic blood pressure at the submaximal work load of 100 W, which were significant only in the golf group. The vacation reduced blood pressure and heart rate in both groups. The reduction in systolic (-11.0 mmHg) and diastolic blood pressure (-5.0 mmHg) was pronounced and significant in the golf group (p<0.01), while the reductions in systolic and diastolic blood pressure were -3.0 and -3.0 mmHg, respectively, in the nw&eb group. Mean heart rates recorded by Holter ECG decreased by 3 beats/min in the golf group and 5 beats/min in the nwb&eb group, with unchanged characteristics in circadian heart rate profiles. At the submaximal work load of 100 W, the reduction in heart rate was 11 beats/min in the golf group (p<0.01) and 4 beats/min in the nw&eb group. The number of ventricular and supraventricular premature contractions were also similar in the two groups and stable between the two points of time. Echocardiography revealed no changes in left ventricular systolic function as expected, but a significant improvement in diastolic function in the nw&eb group, with a clear decrease in the E/e' ratio and the left ventricular Tei index. The corresponding reductions in the golf group were less distinct and non-significant. There were no significant changes in the cardiac blood markers Nt-proBNP and hsTnT.

Discussion: The cardiovascular benefits observed consisted in a marked reduction in systolic and diastolic blood pressure, in the lowering of heart rates and an improvement of cardiac diastolic function. The reduction of blood pressure was much more pronounced in the golf group because of extensive isometric handgrip training in golf. Its mean reduction was 11.0/5.0 mmHg. Due to these results playing golf seems to be the even more effective antihypertensive treatment than walking or biking.

Conclusion: The data of the East Tyrolean Health Tourism Study prove that just a one-week vacation with various activity programs is able to induce several improvements in cardiovascular parameters and confidently may be recommended as an excellent recovery program for cardiovascular regeneration.

RESISTANCE TRAINING ASSOCIATED TO CHROMIUM PICOLINATE SUPPLEMENTATION DOES NOT REVERT BOTH THE BODY ADIPOSITY AND CONTRACTILE DYSFUNCTION IN OBESE RATS

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Introduction and Purpose: Obesity is a complex multifactorial disease characterized by excessive accumulation of adipose tissue, described as an independent risk factor for cardiovascular diseases. The elevation of adipose tissue promotes consequences to heart characterized by changes in ventricular remodeling, systolic and diastolic dysfunction. Supplementation with chromium picolinate (PiCr) has been used to promote decreased body fat and increased muscle mass. While physical training is used as a non-pharmacological tool in reducing body weight and minimizing risks related to obesity. Resistance training (RT) is reported for benefits in improving body composition and cardiac function. However, the association between RT and PiCr supplementation on adiposity and contractile function in the condition of obesity needs to be investigated. Thus, this study was designed to evaluate the body composition and contractile performance of obese rats submitted to RT and supplemented with PiCr.

Material and Methods: Wistar rats were induced and exposed to the condition of obesity and redistributed in the following groups: control (C); control supplemented with PiCr (CSp); control submitted to RT (RT); control supplemented with PiCr submitted to RT (CSpRT); obese (Ob); obese supplemented with PiCr (ObSp); obese submitted to RT (ObRT) and obese supplemented with PiCr submitted to RT (ObSpRT). C groups received standard diet and the Ob groups high-fat diet for 15 weeks. The RT protocol consisted of climbing a vertical ladder performed for 8 weeks, for 3 times a week. RT consisted of 4 to 5 series with progressive intensities of 50%, 75%, 90% and 100% of the maximum load; if the animal completed the 4th series it was submitted to 5th series with 100% of the maximum load plus 30g. Nutritional, blood pressure, glycemic, lipid and hormonal profiles, determination of water content on lung and liver was performed. In addition, the total weight of the heart and its relation to tibia length were analyzed. Contractile function was performed in isolated cardiomyocytes. Data were expressed as mean \pm standard deviation or median \pm interquartile range. The comparisons between groups C and Ob were performed by student's t test. Two-way analysis of variance (ANOVA) followed by Bonferroni and Holm-Sidak post hoc tests were used to compare the other groups. The level of significance was 5%.

Results: It was observed that the final body weight and body fat in the Ob group were statistically different in relation to C, showing that high-fat diet promoted obesity. In contrast, supplementation with PiCr and RT did not promote change in these variables. Obesity also promoted a cardiomyocyte punctual impairment, evidenced by the reduction in the percentage of shortening, but with lower T50% Relax, suggesting a protective effect of obesity on myocardial relaxation. Considering the treatments isolated with PiCr or RT in the obesity, preserved contractile function in cardiomyocytes was visualized; in contrast, RT associated to PiCr supplementation promotes myocardial relaxation damage.

Discussion: As previously seen the PiCr and TR in an isolated way, the interaction of the treatments in the condition of obesity was not able to change the body and nutritional parameters. In addition, the same behavior was observed for the lipid profile evidencing, that this interaction was not able to alter plasma concentrations of total cholesterol and LDL. A study evaluating the isolated effect of PiCr on the condition of obesity, shows that the supplementation was not able to revert the cardiac dysfunction, visualized by lower percentage and velocity of shortening. In the evaluation of cardiac function, treatment with PiCr improved cardiac performance in the condition of hypertension and myocardial infarctio

Conclusion: Resistance training associated to chromium picolinate supplementation does not revert both the body adiposity and contractile dysfunction in obese rats.

RISK BEHAVIORS IN ADOLESCENT MALE ELITE SOCCER ATHLETES

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Introduction and Purpose: It is well known that physical exercise can act as a protective tool against substance abuse and other risky behaviors. Nevertheless, there is evidence showing that elite athletes are more prone to excessive alcohol consumption, drug abuse, and high-risk sexual behavior. The aim of this study is to reveal the main risk behaviors Chilean elite soccer athletes get exposed to, and what is the age for the onset of the main health risk behaviors reported in the literature.

Material and Methods: An anonymous, digital format survey (Typeform software) was conducted, which contained multiple choice questions taken and adapted from the Alcohol, Smoking, and Substance Involvement Screening Test (ASSIST). The inclusion criteria were: the athletes had to be 1st division soccer club trainees, be between 13 and 19 years of age, and answer the 26 questions of the test. The survey was carried out between September 30th, 2016 and October 18th, 2016 in separate sessions by age group, in which participants were supervised and all of their questions answered. 134 surveys were conducted and all of them were satisfactorily answered.

Results: All of the surveys met the inclusion criteria, so none were excluded from the study. Regarding sexual activity, the findings were as follows: 57% of the participants had had sexual relationships at least once in their lives. Among them, 92% reported having had sex without contraceptive methods and at the age of 18, 95.4% of the sample had had sex at least once without contraceptive methods. Also, in the same age group, 45% had had two or more sexual partners in the last 6 months. Between ages 15 and 16, the biggest difference can be seen in relation to sexual activity: 35% of 15 years old vs 84% of 16-year-old athletes had had sex at least once in their lives ($p = 0.002$). Regarding school/street fights, 63% of the complete sample had been involved in a fight at least once. An acute increase in this number can be seen between the ages of 17 and the 18 – 19 years old group: 57.6% for the first and 95.4% for the latter ($p = 0.026$). With reference to alcohol consumption, 33% reported drinking alcohol at least once or twice a year, but no more than twice a month. Other interesting outcomes were: 18% had tried tobacco cigarettes, but none smoked on a daily or weekly basis. 49% had been passengers of car drivers under alcohol influence. 13% had consumed illegal drugs at least once in their lives.

Discussion: Some of our findings are equal to those reported within the local non-elite athlete community. On average, Chilean male adolescents have their first sexual relationship at 16 years old, the same average we found in our study. Also, it is debatable whether age of sexual activity initiation is a health risk factor per se, but since the big majority of athletes reported having had them at least once without contraceptive methods, that puts them at risk of getting STDs and having to deal with pregnancy before they are ready, in the middle of their training to be professional soccer players. It should be noted that involvement in fights rises sharply between certain years of age. Just as with sexual activity without protection, interventions to address this issue should be considered before the onset of these behaviors. Some other findings of interest are those regarding tobacco and alcohol. This soccer club trainees seem to be well below the national and international averages. Since our study was conducted in only one soccer club, there might be some bias in the results.

Conclusion: Surveyed athletes in our study seem to be more prone to sexual misbehavior and to get involved in fights. These findings comparatively make drug use, cigarette smoking and alcohol consumption a minor issue. Further studies comparing different soccer clubs and with a bigger sample size are needed, so we can extract more accurate conclusions and deploy countermeasures that can decrease this type of behavior within the adolescent soccer trainees.

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EFFECT OF STATIC STRETCHING ON STRENGTH OF ISCHIOTIBIAL, QUADRICEPS AND CHEST MUSCLES**Autores:** Tenorio, P R, Freire, A P C F, Hassan, A, Muchiutti, D C, Muchiut, A P d L, Pereira, M Y F, Cacefo, A C, Chico, A P, Santos, J A, Sasaki, F L, Pacagnelli, F L, Santos, M C A**Instituições:** Universidade do Oeste Paulista - Presidente Prudente - Sao Paulo - Brasil

Introduction and Purpose: Static stretching is an exercise modality widely used in sport, presenting a proven efficiency in the scientific literature in increasing flexibility and range of motion. This modality is commonly used as part of a warm-up routine before the practice of resistance exercise, however the use of static stretching for this purpose appears ambiguously in the scientific literature. Some studies even show a deleterious effect over the strength production. Aims: The present study aimed to investigate the effect of the static stretching performed before the resistance exercise in the maximal number of voluntary repetitions (MVR).

Material and Methods: All experiments were approved by the responsible human ethics committee. 3 independent studies were performed, all volunteers were women, aged between 18 and 25 years old, practicing recreational physical activity, and have been clarified previously about the methods used in the studies. All experiments consisted of one control group (GC) and one experimental group (GE). The two groups performed 1 series of the selected exercise as a warm-up followed by 1 series at 90% of the 1RM until failure, was given a 5 min interval, during the interval the GE group performed 3 sets of 30 seconds of static stretching for the target muscular group, the GC did not perform the stretching. After the interval a new exercise series was performed at 90% of the 1RM until failure. The number of repetitions performed was the evaluated parameter. In experiment 1 (QUAD)(GC=12, GE=12; BMI: 23,41±2,02 vs 22,83±2,91 kg/m²; respectively) the target muscle group was the quadriceps femoris and the exercise was the extensor chair; experiment 2 (PEC)(GC=10, GE=10; BMI: 21,31±3,78 vs 21,73±2,36 kg/m²; respectively) the target muscle was the pectoralis major and the exercise was the bench press; experiment 3 (HAMS)(GC=12, GE=12; BMI: 21,08±3,63 vs 23,44±3,13 kg/m²; respectively) the target muscle group was the hamstrings and the exercise was the leg curls.

Results: The QUAD experiment did not show a reduction in the number of repetitions after the stretching (1RM: 51,66±11,88 vs 56,08±10,92 kg; First MVR serie: 6,16±2,69 vs 6,25±2,19; Second MVR serie: 7,08±3,05 vs 6,33±2,49; p>0,05; GC vs GE), already for PEC (1RM: 28,22±6,82 vs 29,56±6,62; First MVR serie: 7,4±1,9 vs 7,1±3,07; Second MVR serie: 8,7±2,31 vs 6,1±2,38; p<0,05, GC vs GE) and HAMS(1RM: 32,67±6,6 vs 35,42 kg; First MVR serie: 5,17±2,04 vs 5,25±2,14; second MVR serie: 5,83±1,4 vs 4,17±2,04; p=0,0292; GC vs GE) there was a significant reduction of MVR.

Discussion: The findings corroborate the literature, at least for young female subjects with normal BMI, showing reduction in the total voluntary repetitions followed the static stretching in at least 2 of our experiments. Although no study at our knowledge shows improvement in power or volume after stretch and our results demonstrate a statistic reduction in the number of repetitions, is important to point that some few subjects show improvement in the EXP3 after the stretching, perhaps due to the familiarity if some of the elements in the protocol. The absence of finding in EXP1 may be explained by the size of the muscle group in question, which due to this factor may require a greater volume of stretching before demonstrating negative effects.

Conclusion: Further studies are needed to determine the mechanisms by which stretching interferes with strength production and to establish a general recommendation, but the authors suggest that sports professionals at least review the practice of using static stretching before training sections that focus on power production or prioritize training volume.

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PROFILE OF FITNESS PRACTITIONER ANABOLIC USER IN ITAJUBÁ - MG**Autores:** FERRER, C R L, Ferreira, K K, Cipullo, R**Instituições:** Faculdade de Medicina de Itajubá - Itajubá - Minas Gerais - Brasil

Introduction and Purpose: One facet that has characterized the contemporary consumer society is the greater emphasis placed on body appearance. The extreme use of anabolic-androgenic steroids, aim a faster weight loss and muscle gain through sudden muscle hypertrophy or indirectly providing "intense physical activity sessions". The objective of this study is to analyze the profile of steroid users among bodybuilders in the academies of the city of Itajubá.

Material and Methods: The total study sample consisted of 503 individuals. The questionnaire consisted of 9 questions that sought to clarify the variables sociodemographic and behavioral data required for completion of the study.

Results: The results showed that 15.7% of respondents have made use of anabolic steroids. The age of users was between 18 and 25 years, and most have college degrees. Approximately 65% had no side effects and 40.1% of respondents claimed to have improved performance in bodybuilding. Most users had use guidelines given by doctors (28.7%).

Discussion: Most of the data found in this study is consistent with the literature up to this moment. However, attention is drawn to the ease of purchasing the substances and age of users and ex-users, who are mostly young people. The shocked result is orientation, with the majority given by physicians (28.7%), which differs from the literature, ranging from 4 to 11%. Therefore, this information is relevant to alert us to the prescription of these substances by medical professionals, since there are not enough studies to have an accuracy of the ideal dose and the effects of them on the body.

Conclusion: According to the data obtained and analyzed, we can conclude that more study is needed to determine the cost benefit of using these substances and if there is a safe dose for administration.

NATIONAL OUTPATIENT CLINICS OF SPORTS NURSING

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Introduction and Purpose: Faced with the need for adaptation of all professions nursing should not be left behind, and a branch that is increasingly in evidence is that of sports. Many courses implement and encourage the vocation to this branch through attendance in sports outpatient clinics. With the intention of fomenting this field of study to nursing undergraduates, the University Anhembi Morumbi created the Ambulatory of Sports Nursing. This research was conceived with the purpose of confirming the pioneerism of the Universidade Anhembi Morumbi; being the only university in Brazil, with a sports nursing clinic.

Material and Methods: A report was drawn from the E-MEC website containing all institutions of nursing graduation level. The report initially contained 1148 results, with duplicate or triplicate results being used as the exclusion criterion, the report was finalized with the result of 781 institutions (it was not possible to identify the reason for duplicity or triplicity through the E-MEC website). It was searched through the Internet the respective sites of these 781 institutions listed by the E-MEC, the following information was inserted in a spreadsheet of the Excel program: Federal Unit of the institution, if you have a curricular grid inserted in the site, if you have any information about sports nursing such as the Universidade Anhembi Morumbi, and finally, the link of the institution's website, containing the nursing course, was inserted in this worksheet. All institutions have been surveyed, including institutions that have more than one site (due to several campuses in different cities or states). It would only be considered the institution that has a sports nursing clinic in the same way as the Universidade Anhembi Morumbi.

Results: We analyzed 781 institutions listed on the MEC website, 563 institutions were found with the curriculum available on the site, 164 that do not have and 54 institutions could not be verified. No institution presented a sports nursing clinic similar to Universidade Anhembi Morumbi, according to the information inserted in the respective sites.

Discussion: Many professions are already well established in the field of sports, and for this they are based scientifically in their curriculum or post-graduation, so nursing should not be different, but lack the incentive of the universities themselves to provide a new field of atuation for them.

Conclusion: According to the data and results obtained, as discussed in this study, it is possible to state that Universidade Anhembi Morumbi is the only university in the national territory that has a sports nursing clinic, which provides primary care for amateur and professional athletes.

INJURY INCIDENCE AMONG CROSSFIT ATHLETES: A PROSPECTIVE STUDY

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Introduction and Purpose: CrossFit® is a strength and conditioning fitness programme created to improve fitness and health. Based on constantly varied functional compound movements and high intensity intermittent exercise training (HIT) sessions, CrossFit® focus on all athlete's physical capacities in order to build a non- specialized but a complete athlete. A variety of authors have shown CrossFit® benefits¹, from physical to clinical and psychological aspects². Others, have focused on CrossFit® associated injuries (CFAI), mainly on case reports and epidemiological studies. The reported rates have been ranging, from 19.4% to 73.5%³⁻⁷ of injured athletes and from 2,1 to 3,14 8 9 injuries per 1000 hours of exposure. Even with different methodological designs, an over two times fold prevalence rates variation seems too high and suggests that this is still an open subject to be studied. The main purpose and primary objective of this study was to prospectively determine injury incidence among HIT athletes selected at CrossFit® training facilities from the metropolitan area of São Paulo, Brazil.

Material and Methods: This is a prospective 12 week cohort study of 406 HIT athletes, selected from CrossFit® boxes, followed up by an online survey, regarding training injuries incidence and associated factors. Incidence was calculated based on the number of reported injuries per 1000 hours of CrossFit® exposure.

Results: There were 198 men (48.8%) and 208 women (51.2%), final sample (n=406). The mean age was 32.1 years (31.4 to 32.8, 95%CI); weight, 74.3kg (72.9 to 75.7, 95%CI); height, 1.7m (1.7 to 1.7, 95%CI). Overall CrossFit® experience was 1 year (0.5 to 1.8, IQR) of practice. Urinary incontinence (UI) was also a baseline question and revealed a total of 6.7% (n=27) prevalence, being 12% (n=25) females and 1% (n=2) males. Mean CrossFit® exposure was 3.9 days/a week (3.8 to 4, CI 95%). Proportional cumulative incidence was 38,9% (n=158, CI 95%) Incidence density based on type of reported injury (n=309) was 23.7 injuries/1000 exposure (21.1 to 26.3, CI 95%) and based on injury site (n=379) was 29.1 injuries/1000 exposure (26.1 to 32, CI 95%). The mean injury severity was 5 (4.7 to 5.3, CI 95%) when graded with Visual Analogical Scale (VAS), ranging from 0 (no pain) to 10 (extreme pain). Mean absence days due to injury was 2,7 days (2.3 to 3.1, CI 95%).

Discussion: Incidence was calculated based on injury's report and training exposure, measured by the exact number of reported training days and expressed as number of lesion per 1000 exposures (training or competing). No average retrospective exposure was used. The reported rates were over ten times higher than previous ones established in the current literature. We believe the injury definition, prospective study design, sample size, and injury measurement were key points to this study and responsible for these higher rates.

Conclusion: Our results show that injury incidence associated with CrossFit® training is ten times greater than previously reported, ranging from 23,7 (type of lesion) to 29,1 (anatomical injury site). Nevertheless, injuries are graded as moderated by visual analogical scale (5,0) and low by time of training absence (2,7 days).

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DOES RECOVERY, EXTERNAL AND INTERNAL LOAD DIFFER BETWEEN PLAYING POSITION AND MATCH OUTCOME IN PROFESSIONAL FOOTBALL?

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Introduction and Purpose: Football is a very intense sport and to meet the required physical state to be a competitive team, training sessions must be planned to be intense, however allowing sufficient recovery. In this sense, there was an increased concern of researchers and practitioners to find tools that exactly represents the requirements of the game and how to control the training load throughout the season. Although the external and internal load are very important variables, the recovery state of the athletes is vital for the performance maintenance. These patterns of physical efforts differ between playing positions, however it is not known whether perceived recovery behaves the same way. In addition, the physical engagement in the match is thought to affect match outcome (winning or losing). Thus the following question emerges: recovery, external and internal load differ between playing position and match outcome in professional football? The aim of the present study was to compare the internal and external load and the recovery by playing position and the match outcome (wins, losses or draws) in professional football.

Material and Methods: Twenty-three male professional football athletes from a team of the first division of the Brazilian Championship took part in the study (age 26.1 ± 3.8 years old, weight 77.5 ± 5.0 kg, height 177.6 ± 5.1 cm). During the games, athletes were monitored by GPS and the variables of external loads were taken. Additionally, the session rating of perceived exertion (session RPE) and the perceived recovery scale (PRS) were collected 30 minutes and 40h after the end of the matches, respectively.

Results: The external load was greater on fullbacks and defense midfielders ($p < 0.05$). The full-backs cover higher total distances compared to attackers, and, compared to all the others positions, they have more stimuli > 20 km/h, covering higher distances > 20 km/h; these stimuli makes them to perceive less recovered than defenders, defense and attack midfielders ($p < 0.05$). Moreover, the defenders are those who cover lower distances by the minute and the defense midfielders are those who present the lower Peak Velocity ($p < 0.05$). There were no significant differences between GPS variables, internal load and recovery. In addition, it was found a correlation between the external and the internal load ($r = 0.66$; $p = 0.001$).

Discussion: The decelerations after sprints (eccentric contractions) causes great muscle damage, which negatively affects the perceived recovery. It might explain why the fullbacks, that are those who sprint more and cover greater high intensity distances, had a lower perceived recovery. In relation to the match outcome, the actions performed in the defense and in the offense aim to take the lead. That is, when the team is losing, the actions are performed to score a goal and when the team is winning, the actions are performed to avoid the opponent's goal. This behavior makes recovery, external and internal loads similar regardless the team is winning, drawing or losing.

Conclusion: The GPS variables and the perceived recovery are influenced by the playing position, but not by the match outcome.

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USE OF THE SCAT - SPORT CONCUSSION ASSESSMENT TOOL IN THE INITIAL POST-CONCUSSION EVALUATION

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Introduction and Purpose: Sports concussion occurs from forces applied directly or indirectly to the skull that result in rapid acceleration and deceleration of the brain. The sudden change in cerebral velocity elicits neuronal shearing, which produces changes in ionic balance and metabolism. The consequences of post-traumatic changes in the brain can be severe and even fatal and may be related to future neurological sequelae. Recognition and diagnosis of SRC based on symptoms alone may be challenging. The objective of this study was to describe the main findings in the first attendance of athletes from a multisport club who suffered concussion during training and / or competitions in the year 2017.

Material and Methods: The athletes were evaluated using a sporting concussion evaluation tool, symptom and symptom severity score, third edition (SCAT3), standardized according to the age range, pediatric, from 5 to 12 years old, and adult, older than 13 years. Shortly after suspected concussion during the specific training, the following questions were assessed: Signs of potential concussion; Glasgow coma scale, Maddocks score, for secondary diagnosis of concussion; evaluation of symptoms; general appearance of the athlete; cognitive evaluation; immediate memory evaluation and concentration assessment. Statistical analysis, descriptive statistics.

Results: We included 12 athletes of different modalities, with ages between 9 and 32 years who had TBI in the season of 2017, all cases occurred during the specific training. The highest number of attendances (75%) were in athletes contact sports, being judo the sport with the highest number of cases (8 athletes). In the initial concussion signs only 1 athlete had loss of consciousness and need to be taken to emergency unit, in the Glasgow coma scale, all obtained 15 points, maximum score for the tracing, indicating normality. The Maddocks Score also all were within the normal range, ranging from 3 to 5. The scores of cognitive evaluation, immediate memory evaluation and concentration were within the expected values. In the symptoms found, the most frequent were "headache", "dizziness" and the perception that there is "something is wrong". Among those evaluated, two athletes reported having a previous concussion episode. All the evaluated athletes were followed up on consecutive days post trauma and showed good evolution and were able to return to the training.

Discussion: Post-traumatic headache is one of the most prevalent post-concussion sequelae is one of the longest lasting post-concussion symptoms, causes significant morbidity, and might be associated with slower neurocognitive recovery.

Conclusion: Scat 3 was an important tool for initial assessment and stratification of symptoms and risk, contributing to professional decisionmaking for referral to tertiary care. In these sequential evolution of the patient the use of this tool helps in the identification of remission or worsening of the initial symptoms post trauma. In April 2017, experts conducted an international conference and published the SCAT 3 update titled SCAT 5.

RELATIONSHIP OF THE LEVEL OF PHYSICAL ACTIVITY WITH THE LEVEL OF DEPRESSION OF THE ACADEMICS OF MEDICINE

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Introduction and Purpose: Depression affects millions of people around the world and will be the second largest cause of disability on the planet by 2020. It is a chronic disorder of multifactorial etiology associated with high levels of stress, being considered a public health problem and requiring a high number of investments for the health system. According to Cheick et al. (2003), the physiological and biochemical changes involved in the release of neurotransmitters and the activation of specific receptors arise from the practice of physical activity, which helps to reduce the scores indicative of depression and anxiety, since certain neurotransmitters contribute to the onset or reduction of these pathologies. The objective was relate the influence of physical activity level on the depression index of medical students.

Material and Methods: It is a quantitative, descriptive study, with a cross-sectional design, carried out at the Faculty of Medicine of Valença/RJ. The sample consisted of 100 academics, 59 women and 41 men, aged between 17 and 26 years and who were regularly enrolled in the Faculty of Medicine of Valença. The level of depression among medical students was assessed using the Beck Depression Inventory (BDI), an internationally validated questionnaire widely used in anxiety studies. The physical activity level was evaluated through the International Physical Activity Questionnaire (IPAQ), validated in 2001 in Brazil by Matsudo, and widely used by several researchers for such assessment. The classification was adapted by creating 2 groups that included the active and very active classifications in group 1, while in group 2 the classifications of insufficiently active and sedentary were included. Descriptive statistics were used to characterize the sample. Spearman's correlation test was used to find the relationship between the variables, considering $p \leq 0.05$ for significance. In the data analysis the statistical package SPSS version 23.0 was used.

Results: In the evaluation of the level of depression, 78 academics (78%) have minimal depression, while 18 academics (18%) have mild depression, 3 academics (3%) with moderate depression and 1 academician (1%) with severe depression were found. In the evaluation of the level of physical activity, we found 24 academics (24.0%) classified as sedentary or irregularly active. In the active and very active classification were found 76 academics (76.0%). In the statistical analysis, there was no correlation between the level of depression and the level of physical activity, with $p = 0.207$.

Discussion: The present study did not show a relationship between the physical activity index and the level of depression, however, it was observed that individuals who practice physical activity have a lower propensity to develop depression. In a recent study on depression and physical exercise in the elderly, the authors concluded that the active elderly have a tendency to be less depressive, which is in line with the current study, but it is worth highlighting the age difference between the groups. In another study also performed with the elderly, Reichert et al. (2011) concluded that elderly people who exercise at greater intensities are less likely to be depressed.

Conclusion: No correlation was found between levels of depression and levels of physical activity, however, individuals who practice physical activity have a lower risk of developing depression.

MINIMALLY INVASIVE RECONSTRUCTION OF ACUTE ACROMION OF THE ACROMION-CLAVICULAR JOINT WITH A SINGLE MINIACCESS: A SERIES OF CASES

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Introduction and Purpose: Acromioclavicular dislocation is one of the most common traumatic shoulder injuries and typically occurs in young individuals who participate in contact sports, which can generate a long recovery time, interfering with the athlete's training routine and performance. In this perspective, the minimally invasive anatomical reconstruction of the acromioclavicular joint is a technically challenging procedure, and there is no gold standard treatment for these dislocations. The repair should be strong enough and reconstitute the joint as close as possible. This includes restoration of both upper-inferior stability and anterior-posterior stability of the acromioclavicular joint. Objective: To present and evaluate the clinical results of a series of patients diagnosed with acute acromion of the clavicular joint treated with a minimally invasive approach with a single miniaccess and using the Tight Rope technique.

Material and Methods: Twenty-one patients with a mean age of 37.4 years (ranging from 19 to 62 years) with recent lesions of the acromioclavicular ligaments were observed. To determine the type of damage, the Rockwood classification was used. In this context, patients with damage types I and II were referred for conservative treatment, while those with class III, IV, V and VI damages underwent surgical treatment. The method of choice for the surgical treatment was the Tight Rope technique, which consists of a double endobotton system with nonabsorbable material, without K-wire fixation of the acromioclavicular joint, with a superior single access in the clavicle and guided by radioscopy.

Results: We obtained satisfactory results in 19 of the 21 patients; the deformity disappeared, full pain-free shoulder movement was regained with motor weakness, with a mean follow-up of 17 months (ranging from 6-26 months). Our patients returned early to work and sports activities (mean period of one month).

Discussion: Several recent studies have shown that the choice for the treatment of acute lesions of the acromion-clavicular joint is still not a consensus among orthopedists, and more than 150 different therapeutic techniques have been identified in reviews carried out during this decade. There is still no gold standard for its treatment. In this perspective, our results showed that the use of this surgical technique to restore the acromioclavicular joint allows to reduce the surgical trauma and reduce the time of immobilization, to predict positive results in the long term and to restore movement of the shoulder joint completely in a short post -surgical.

Conclusion: In our study, it was possible to observe that the reconstruction of the coracoclavicular ligament with the minimally invasive technique, by the fixation of the Endobotton is a safe and easy method to treat the dislocation of the acromion-clavicular joint, providing reliable fixation, causing little trauma and fast recovery, allowing the return to work activities and sports in a short period of time.

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STREET-RACE INJURIES: PREVALENCE AND ASSOCIATED FACTORS**Autores:** SANTOS, L L M D, Ovando, R G d M, Vasconcelos, R, Sartori, A C, Silva, D B M, Oliveira, L P**Instituições:** Unicesumar - Maringá - Parana - Brasil, Unigran Capital - Campo Grande - Mato Grosso do Sul - Brasil

Introduction and Purpose: The street race has become popular, considered a contemporary sociocultural phenomenon, presents itself as one of the modalities with a large number of fans, and are exposed to the possible associated risks, such as injuries, that prevents the good performance of an individual or prevents his sports practice. The aim of the research is to investigate the prevalence and the factors associated with injuries in the street race.

Material and Methods: Cross-sectional observational study, convenience sample with 26 individuals, where 14 were women and 12 men. The data on the prevalence of injuries and associated factors were collected through a structured questionnaire with questions about the profile of each participant, analyzing their attitudes, care and fitness.

Results: Sixteen (23.1%) of the 26 participants took part in the practice of the practice of street racing, from six months to one year, four (15.4%) between two and three years, four (15.4%), (11.5%) between three and five years, and six (23.1%) practiced for more than ten years. Among the objectives, 9 (34.6%) scored to improve quality of life, 7 (26.9%) improved health, 5 (19.3%) decreased stress, 2 (7.6%) leisure, 2 (7.6%) for weight loss and 1 (3.8%) for high performance. 9 (34.6%) practiced running twice a week, 8 (30.8%) practiced three times a week, 3 (11.5%) practiced for four days a week, 5 (19.3%) three times a week, and only 1 (3.8%) practice seven days a week. Number of training per day, 26 (100%) practice once a day. Regarding some kind of guidance on training, 19 (73.1%) participants sought guidance from practitioners to understand the principles of race training, and 7 (26.9) participants did not seek any guidance. Regarding the type of terrain that the participants practice the race, 23 (88.5%) participants run on mixed terrain, while 3 (11.5%) run only on flat terrain. As for proper running shoes, 26 (100%) claim to wear. On pain during training, 22 (84.6%) did not feel anything and 4 (15.4%) claimed pain, and after training, 19 (73.1%) did not feel pain and 7 (26.9%) did not feel pain. feel pain. To prevent future pains, 4 (15.4%) self-medicate, 8 (30.8%) performed stretching, 13 (50%) did nothing, and 1 (3.8%) did cryotherapy, it was noted that 8 (30.7%) participants sought a physician for pain diagnosis, and 18 (69.3%) did not seek medical advice. Regarding the occurrence of injuries, 11 (43.2%) were already injured in the practice of street racing, and 15 (56.8%) were not. Regarding the search for treatment for some lesion 13 (50%) participants already sought some type of treatment for injury, while 13 (50%) never sought.

Discussion: Most of the participants have been practicing street racing for less than a year, which indicates that the habit of running on the streets has recently erupted with the purpose of seeking quality of life and as a consequence is a form of leisure to relieve stress, seeking more and more high performance, and there is concern for physical and mental well-being, seeking guidance on training for street racing, assisting the race with stretching, breathing mode, running mode in the race, functional training, bodybuilding to strengthen the musculature as a whole, to achieve a good performance in the proposed activity.

Conclusion: The understanding of the factors associated with greater occurrence of injuries is of great importance for possible preventive measures to be performed with greater effectiveness, it is concluded that the occurrence of injuries in participants of the street races was small and that the work of a professional in front of such problematic, acting in the physical preparation of the participants of the street race.

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SPORT PELVIC SCHOOL: EDUCATION AND HEALTH PROGRAM FOR PREVENTING PELVIC FLOOR DYSFUNCTION IN FEMALE ATHLETES.**Autores:** Wu, L L

Introduction and Purpose: High performance, high impact exercise causes a threefold increase of the risk of urinary incontinence. Studies show that athletes often use devices to minimize urine leakage, as the symptom interferes with performance. Exercises which specifically target the pelvic floor muscle have proven to be effective for preventing pelvic floor dysfunction in sedentary women. However, there are generally few studies specifically assessing women. To assess the safety, efficiency and adherence to a health and education program for preventing pelvic floor dysfunction in female athletes.

Material and Methods: Study carried out on 142 female athletes, with an average age of 27 ± 5 years. The Sport Pelvic School was held once a month, lasting about 60 minutes. In this period, athletes received guidance on: anatomy and physiology of the pelvic region, water intake, urinary frequency, exercises for the perception and awareness of pelvic floor muscles and positioning during urination. For the purpose of this study, all athletes were assessed for maximum contraction capacity of their pelvic floor, graded from 0 to 5. The diagnosis of urinary incontinence was made using the International Consultation on Incontinence Questionnaire (ICI-SF), considering values greater or equal to 3 as positive. The subjective evaluation of the acceptance of the protocol was made via direct questions, such as whether athletes liked the guidance or not, as well as the possibility of maintaining the protocol during the week (yes or no).

Results: The functional evaluation of the pelvic floor showed that most athletes had good contraction capacity (values between 4 and 5). Overall, only 17% of them had correct knowledge of their pelvic floor muscles. Results from the ICIQ-SF questionnaire diagnosed urinary incontinence in 27% of athletes. Acceptance of the protocol was excellent and a large part of athletes would continue using it in their day-to-day activities.

Discussion: The perception that participants did not know the pelvic region and had urinary incontinence justifies the need for a program for education and prevention of pelvic floor dysfunction in athletes. A lack of perception of isolated contractions can damage muscle response under conditions of exertion, overload and resistance, interfering with the continence mechanism. The Sport Pelvic School was accepted by the majority of athletes and can be used routinely in sports teams.

Conclusion: The health and education program for preventing pelvic floor dysfunction in female athletes was safe, effective and with good adherence.

CLINICAL AND FUNCTIONAL OUTCOME OF COMMINUTED CALCANEAL FRACTURE 15 YEARS AFTER INJURY: CASE REPORT**Autores:** Lima, D M S, Tanajura, D A**Instituições:** UniCEUB - Brasília - Distrito Federal - Brasil

Introduction and Purpose: A case report of satisfactory functional readjustment of lower extremity in a 40-year-old male athlete, army major, victim of right calcaneus comminuted fracture after high kinetic energy trauma in the heel bone. Due to the advent of the trauma itself and the subsequent immediate and late postoperative complications, there was a gross deformity of the right calcaneus and hind foot structure, affecting joint spaces and soft tissues in the periphery of the bone. 15 years after the injury, the patient presents with a low degree of functional impairment of the right lower limb and reports few associated comorbidities. Patient then undergoes clinical and biokinetic evaluation, demonstrating changes in the gait and run pattern, responsible for causing forefoot mechanical stress when barefoot. However, when there is a medial longitudinal support of the plantar arch of the patient's right foot, there is a relative good outcome of the forefoot contact pattern, allowing normal walking and running. Bibliographical review of the literature and hypothesis assessment for the outcome are in the paper discussion

Material and Methods: Analysis of medical records from the patient

Results: The radiologic evaluation revealed an important bone deformity of the calcaneus, characterized by loss of posterior and inferior convexity, central areas of sclerosis and cystic, loss of bone volume in the medial and lateral aspects, associated with degenerative changes regarding the posterior and middle subtalar joints, with prominent intra-articular bone fragments. In addition, there is evidence of bone porosity of the hind and midfoot, which, by interpreting the set of radiological findings already mentioned, suggest stigmas of chronic osteomyelitis. Then, the patient undergoes biokinetic and biomechanical evaluation. In the range of motion test, we were able to observe restriction of dorsiflexion in closed and open chain, restriction in plantar flexion, eversion and inversion of the right ankle. The evaluation was able to highlight some marked changes in the gait pattern of the patient - the initial contact of the gait is performed with the forefoot, generating an excessive knee and hip flexion and the entire support phase, altering the distribution of loads in the lower limbs which, At the same time, there is an insufficient eversion of the right ankle, resulting in an insufficient internal rotation of the knee, resulting in a marked and generalized restriction of the ankle movement. However, In the three-dimensional evaluation of the gait with insole, the patient was able to normalize the initial contact pattern for the heel, with the use of a medial longitudinal arch support, thus affecting the increase of the functional dysmetri evidenced in the patient

Discussion: The literature review was able to identify two important factors to be considered during the long-term functional clinical evaluation of calcaneal fractures: (1) A good or excellent radiographic result does not always coincide with good functional results and good subjective evaluation; (2) The poorer subjective scores in younger patients result from their inability to return to pre-injury levels of activity. These two statements corroborate with the findings of this case report. The anatomical and articular relations of the calcaneus bone in the patient after 15 years are roughly deformed; however, their functional, biomechanical and subjectivity results, present excellent results compared to the common outcome in this type of lesion, mainly because the patient can mimic his walking and normal running, when there is support of the longitudinal plantar arch, with the insole. This important factor dictated the return of the patient to levels of pre-injury activities, improving the results of the questionnaires of subjective evaluation of functionality

Conclusion: This case report provides additional data that may help establish new guidelines and to better understand the outcome of calcaneus fracture and it's late outcomes

FUNCTIONAL AND BIOCHEMICAL RECOVERY IN ATHLETES TRAINING PROCESS**Autores:** Rozenstoka, S, Suna, D**Instituições:** Riga Stradins University - Látvia, Sports laboratory – physical health, sports medicine and sports traumatology centre - Látvia

Introduction and Purpose: Good performance in high dynamic sports is based on the endurance and strength endurance abilities what helps to resist to the fatigue. Intensive training regime requires the adaptation processes in the body to physical exercise, high functionality of cardiovascular and respiratory systems, valuable physical working capacity supported by muscle glycogen stores in the body and adequate instant and long term functional and biochemical recovery. During the physical exercise and recovery all changes in the body are mediated by the balance between sympathetic and parasympathetic nervous system. Increased cardiac output and oxygen uptake should satisfy the increased work load of involved skeletal and respiratory muscles. During the aerobic load oxygen uptake is adequate to ATP resynthesis and supplement of the engaged muscles, if the oxygen uptake is not adequate, starts the processes of anaerobic ATP resynthesis and gradually developed the metabolic lactic acidosis. It can induce changes in blood biomarkers what could confirm the damage of muscles and inflammatory reaction. The recovery is dependent on increased tonus of parasympathetic nervous system, higher oxygen supply for muscles, decreased heart rate and demand of arterial blood flow of engaged muscles and improvement of biochemical processes in the muscles. The purpose of the study was to evaluate the functional indices during the physical exercise and instant recovery process after physical exercise.

Material and Methods: In the research were involved 50 adult male athletes: 23±2 years old with average weight 74.2±1.9 kg, height 183.2±1.9 cm, Body mass index 22.1±0.2, who do high dynamic load kind of sports and have regular training regime 6 days per week, 1-2 times per day, 2-3 hours. They underwent maximal cardiopulmonary exercise testing on ISO certified Master screen CPX system. Standard descriptive statistical analyses were conducted (SPSS version 22.0 software - IBM SPSS, Corp., Armonk, NY).

Results: The athletes reached the functional indices: Aerobic threshold 139±2 rpm in relative Work-rate 3.1 ± 0.1 W/kg with relative Oxygen uptake 37.7±1.3 ml/kg/min and Metabolic units 10.8; Anaerobic threshold 173±2 rpm in relative Work-rate 4.4 ± 0.1 W/kg with relative Oxygen uptake 51.9 ± 1.3 ml/kg/min and Metabolic units 14.8; Reached Maximal Heart rate 186 ± 2 rpm in relative maximal Work-rate 5.1 ± 0.1 W/kg with maximal Oxygen uptake 56.7 ± 1.0 ml/kg/min and Metabolic units 16.2 MET. After the physical exercise the recovery of athletes was not found good but only satisfied 6.minute 110±2 rpm. In blood analyses there were unaffected count of erythrocytes, leukocytes and haematocrit, increased only creatinine kinase of biomarkers.

Discussion: The performance of muscular work requires that physiological responses of cardiovascular and respiratory systems to be coupled to increase metabolic rate. Too intensive training regime in pre-competition period could increase the biochemical changes in the body and prolonged the recovery. It could decrease the adaptation of the athlete's body to the physical exercise. Muscle injury and a catabolic effect on exercising muscle could be proved by increased creatinine kinase biomarker (Kyung-A Shin, 2016). It also could help differentiate between pathological conditions and physiological response to exercise in each individual case.

Conclusion: Regular training regime with adequate, enough long and in right intensity recovery after each training provides faster long-term recovery and better adaptation to the physical load. In the pre-competition screening, blood tests should also be used to estimate transient changes in hematologic, biochemical and inflammatory markers and overload effects.

INCIDENCE OF INJURIES IN RUGBY AMATEUR PRACTITIONERS PARTICIPANTS IN THE BRAZIL NORTH CIRCUIT OF RUGBY SEVENS 2016**Autores:** Marques, M, Reis, M, Henrique, N, Gordo, M**Instituições:** Universidade de São Paulo - São Paulo - Sao Paulo - Brasil, Universidade do Amazonas - Manaus - Amazonas - Brasil

Introduction and Purpose: Rugby has shown a significant increase in the number of players in Brazil, with more than sixty thousand subjects at different levels of skill. In this sense, the recreational practice of rugby has also increased. However, given its intense physical contact characteristic, rugby practice is related to high injury rates, especially in this kind of practitioner. In addition, factors such as differences in practitioners' skill, position in the field and physiological stress, may contribute to the high incidence of injuries during a game of rugby. Despite the recent increase of the researchers in sports sciences, only a few investigations have analyzed injuries that affect amateur level rugby practitioners. Thus, the aim of this study was to analyze the incidence of injuries in amateur rugby players participating in the North Circuit of Rugby Sevens Tournament, 2016 – Manaus-AM/Brazil Stage (NCR7s).

Material and Methods: Sixty-five subjects of both sexes (24.82 ± 4.61 years; 75.11 ± 17.13 kg; 166.0 ± 0.095 cm; $BMI 26.82 \pm 5.18$ kg/m²) composed the sample. A structured questionnaire was applied to collect data. The main variables were: injury at NCR7s, experience time in rugby, the practice of others physical activities and position in the game field. To characterize the injuries occurred at the NCR7s, injury type, location, diagnostic and tournament moment were collected. The inclusion criteria were: adult individuals; amateur rugby players enrolled in the NCR7s. The exclusion criteria were: own record as a semi-professional or professional athlete; be a minor and not enrolled in the circuit. To analyze the variables, a Pearson's chi-square test and student's t-test were used. The level of significance was set at 5%.

Results: The results present that 18 subjects (28%) reported having suffered an injury and 47 subjects (72%) does not report any injury at NCR7s. The practical experience time of injury group was lower than the no injury group (25.71 vs 37.58 months, respectively). Further, 48 individuals who engage in others physical activities, only 13 suffered an injury in the NCR7s. Within the 18 injured amateurs players, subjects who played in backward position reported more injuries when compared to the forward position (61,1 vs 38,9%, respectively). Joint injuries occurred more frequently when compared to muscle and bone injuries (56%, 39%, and 5%, respectively). Lastly, the most affected region was upper limb (56%).

Discussion: The lower average time of practice (experience) of the injured players in the event could be considered a factor favoring injury. Thereby, it can be inferred that less skilled practitioners engage in bruises, sprains or strains by not positioning the body properly to absorb force or to perform certain abilities. This could be related to the position since the defenders goes straight to physical contact. Regarding practicing other in physical activities (besides rugby), exercises such as strength training are widely accepted as beneficial for strength improvements. In the other hand, exercises with high volume and low intensity (i.e.: long-term running) may favor the occurrence of injuries due to the total volume of weekly physical practices. Thus, depending on the type of physical activity, it can be inferred that extra physical activities play a role in injuries events. Lastly, upper limb joint injuries can possibly be explained due to the direct impact on the shoulder caused by the opponent's attack (tackle) or by contact with the ground when falling.

Conclusion: Thus, experience in rugby seems to be the most influencing factor to the occurrence of injury. In the other hand, the involvement in other physical activities emerges as a possible protector risk factor to injury events. Injuries resulting from rugby practice can be avoided and this can help to stimulate the practice in leisure time, promoting social and health benefits.

ANALYSIS OF THE ASSOCIATION BETWEEN PRE - ATHLETIC SCREENING PROTOCOLS AND SUDDEN CARDIAC DEATH DUE TO CONGENITAL CORONARY ARTERY ANOMALIES AMONG ATHLETES.**Autores:** Piagkou, M, Kostares, M, Pantazis, N, Lyrztis, C, Piagkos, G, Natsis, K**Instituições:** Department of Anatomy and Surgical Anatomy, School of Medicine, Faculty of Health Sciences, Aristotle University of Thessaloniki, Greece - Grécia, Department of Anatomy, School of Medicine, Faculty of Health Sciences, National and Kapodistrian University of Athens, Greece - Grécia, Department of Hygiene, Epidemiology and Medical Statistics, Medical School, 68989, National and Kapodistrian University of Athens, Athens, Greece. - Grécia, First Department of Propædeutic Internal Medicine, School of Medicine, National and Kapodistrian University of Athens, Greece - Grécia

Introduction and Purpose: Sudden cardiac death (SCD) is defined as an instantaneous and unexpected death occurring during, or immediately after exercise. Many studies have shown a strong association between physical exercise and SCD. In the present analysis, our purpose was to investigate if there is an association between the implementation of pre-athletic assessment protocols and SCD due to CCAAs in different countries by analyzing the data of specific bibliographic sources, in a preset time range.

Material and Methods: A total of 25 studies presenting the SCD in a population of professional and amateur athletes were identified from the electronic databases Pubmed, Google Scholar, Medline, Embase, and the Cochrane library. We identified 25,119 cases of SCD with 7,145 of them concerning sports related SCD (srSCD). Of them, 6,505 were associated with cardiovascular causes and 5504 had available data suitable for the current analysis. Twenty out of 25 studies were divided into 2 time period groups (1st group=1968-2000 and 2nd group=2001-2016). The specimens from the remaining studies were excluded, as their data fitted both 1st and 2nd group. The 1st group consisted of 7,765 SCD cases (30.91% of the total sample) with 4,339 of them being srSCD (4,339 out of 7.765 cases, 55.88%). Cardiovascular causes were identified in 58.21% of the 1st group total cases. Available data (ECG, TTE etc.) were found for the number of 3,874 cases (49.89% of the 1st group total cases). The mean age of the 1st group population was 13.18 years of age, while males to females' ratio was 10:1. After a detailed literature review, we observed that in Italy which consists the 50% of the investigated studies due to the existence of a law, an extensive pre-athletic assessment took place. The 2nd group consisted of 9,113 SCD cases (36.28% of the total sample) and 2,216 cases were srSCD (2,216 out of 9,113 cases, 24.32%). Cardiovascular causes were identified in 16.02%, in 1,460 out of 9,113 cases. Available data (ECG, TTE etc.) were found for the 11.79% of the current sample (1,074 cases). The mean age of the 2nd group population was 16.71 years of age, while males to females' ratio was 20:1. Only 2 out of the 10 studies included a pre-athletic assessment. References and details are provided as supplementary material.

Results: Concerning the 1st group, the two most common cardiovascular causes for SCD were hypertrophic cardiomyopathy - HCM (224 cases – 5.78%) and CCAAs (99 cases – 2.56%), while the least common causes were coronary artery disease - CAD (73 – 1.88%) and arrhythmogenic right ventricular dysplasia - ARVD (52 – 1.34%). Other causes of SCD, such as myocarditis, long QT syndrome, dilated cardiomyopathy and cardiac sarcoidosis consisted the 88.44% of the sample (3,426 out of 3,874 cases). Regarding the 2nd group, the two most common cardiovascular causes for SCD were CAD (166 – 15.66%) and HCM (124 cases – 11.55%), while the least common causes were CCAAs (39 cases – 3.63%), and ARVD (27 – 2.51%), while the rest of the causes previously mentioned consisted the incidence of 66.85% (718 out of 1,074 cases).

Discussion: Over the 41% of European citizens are engaged in some form of physical exercise or sports at least once a week, 46% of whom practice vigorous physical activity at least once per week. Meanwhile, in the general population, the occurrence of CCAAs varies between 0.2% and 5.6%.

Conclusion: SCD in young athletes is usually driven by physical activity. Sports, per se, it's not the actual cause of the increased mortality rate. In fact, it acts as a trigger for cardiac arrest when underlying cardiovascular disease exists. According to the current analysis, when a pre-athletic assessment protocol was implemented, a lower incidence of SCD due to CCAAs has been observed. Results from the present study can be evaluated by Ministries of Health in order to decree rules concerning the medical prevention from SCD.

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PHYSICAL ACTIVITY IN PEOPLE WITH MOTOR DISABILITIES AND QUALITY OF LIFE

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Introduction and Purpose: Adapted Physical Activity (AFA) is defined as “all movement, physical activity and sport in which special emphasis is placed on the interests and capabilities of people with limiting conditions, such as disability, health problems or elderly people”; The social participation of people with disabilities depends on the accessibility of the environment. This is how accessibility becomes important, as a condition that enables people to travel, arrive, enter, leave and make use of the spaces and services available to the community in general. Objectives: to demonstrate if physical activity in the motor disabled improves the quality of life. Quantify, through a validated quality of life survey, the state of health or recovery and / or maintenance of functions with physical activity. Recommend healthy life habits through active lifestyles.

Material and Methods: A descriptive, cross-sectional, prospective study. Universe / sample: 32 individuals with motor wheelchair disability, 16 to 35 years old, both sexes, investigated with EQ-5D prior to physical activity and six months; period 1/7/2016 to 7/31/2017. Variables: Age, Sex, Personal care, Activities, Pain discomfort, Anxiety upset, Current status.

Results: Regarding personal care, disability increased ($p=0.0134$). Daily activities, disability (pre 38% vs post 78%, $p=0.0007$). Having pain / discomfort after physical activity increased ($p=NS$). Perception of anxious state: decrease of the moderate state ($p=0.0312$) and much ($p=0.0029$). Survey (visual scale) current status: improvement ($p=0.0075$). Global score: overall improvement ($p=0.0004$).

Discussion: The disability generates personal and social impact, produces changes in lifestyle and in the way they perceive their quality of life in terms of a health condition that affects their functioning. The assessment of people with disabilities must go beyond the clinical and functional aspects related to human functioning and quality of life related to health, the latter that explores dimensions such as physical function, physical role, pain body, general health, vitality, social function, emotional role and mental health. To evaluate the quality of life has become in recent years an important objective to achieve in the area of health. Its evaluation is considered as a new strategy introduced for the analysis of the results of the therapeutic programs reinforcing the consensus that indicators of the area of health, such as control of symptoms, mortality rates and life expectancy, as we have done in our study.

Conclusion: When analyzing the overall results of the sample, it can be affirmed that the improvement showed statistically significant differences ($p=0.0004$) with respect to the quality of life. Individually, when assessing the start of physical activity, in these individuals as in the case of a person without disability, pain and discomfort increase due to the regulated mobilization proposed by sport, temporarily decreasing daily activities and personal care; However, there was a clear improvement in the state of anxiety, which leads us to believe that the active lifestyles provided by physical activity significantly improve the quality of life.

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MUSCULOSKELETAL PAIN IN A GROUP OF STREET RUNNERS

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Introduction and Purpose: Running practice is an activity that has been growing significantly in the last years, mainly by people who seek the health benefits in the regular practice of physical exercise, in an activity of easy execution and of low cost. Besides the various benefits, a significant increase in the injuries in runners has been observed, thus increasing the prevalence of musculoskeletal pain in these athletes, especially in the lower limbs. To evaluate how musculoskeletal pain interferes in running practice.

Material and Methods: A cross-sectional study was performed through the analysis of questionnaires of musculoskeletal pain in exercise practitioners (Q-ADOM), applied to 30 amateur runners, at the Ginásio Poliesportivo da Universidade de Fortaleza (UNIFOR), located in the Edson Queiroz neighborhood of the city of Fortaleza, CE, on December 17, 2016. The questionnaire is composed of open and closed questions, the collection and analysis of data was done by members of Liga de Fisiologia e Medicina do Esporte (LIFIME), made up of medicine students of UNIFOR.

Results: The analysis of the obtained results were grouped according to the following aspects: age range of the corridors interviewed, prevalence of the most common musculoskeletal pain sites found in this group, relation of the number of people with and without pain, relating to the age group, and people who felt pain during rest and during exercise. It was observed that most of the corridors that participated in the collection were in the age group of 31 to 40 years, being 16 males and 14 females. In the category of pain sites, it can be perceived that most of the individuals had pains in the knees (10), followed by the spine and feet (5), the latter in equal quantity. Among the group of people who reported feeling pain, 15 reported feeling during exercise and 8 at rest. Therunners in the age group of 31 to 40 years were those that obtained the biggest number of practitioners who reported absence of pain in the last 4 weeks.

Discussion: With regard to the sex most adept to the race, the incidence rate of women who join the race groups is 75% and men is 40%, contrasting with the result that was found. Women are currently more concerned with improving physical fitness and health, making the demand for sports biggest. Running requires intense use of the muscles of the lower limbs, which can cause an imbalance of strength between joints and muscles, having the knee joint as the most affected, as it suffers a greater body overload. In this way, rates and injury sites in running athletes can vary widely as they are influenced by some determinants such as age, weight, practice time and category of running. In summary, it is necessary to take simple preventive measures to reduce the existence of future injuries, such as stretching, warm-up, supervision and joint mobility tests, since this exercise had a high incidence of injuries and the consequences could be serious, if are not treated correctly, deserving a greater attention of the athletes and their respective professionals.

Conclusion: From what has been exposed it is permissive to observe a strong relation with pains in the knee, the spine and the feet in street runners with musculoskeletal pain and that these complaints increase significantly because of a greater adherence to the practice of this exercise by the population, relating them with other factors that were already mentioned above. In addition, preventive measures are the best way to prevent futures injuries.

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CHANGES IN HEART RATE VARIABILITY WHILE EXERCISING IN HUMID AND HIGH TEMPERATURES

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Introduction and Purpose: During competition in hot environments, endurance athletes often exercise/compete at intensities that stress their cardiovascular system. The primary aim of the study was to quantify the effect of increased core temperature (while exercising in a hot and humid environment) on autonomic cardiac control and to determine if heart rate variability (HRV) indicators may be indicative of a rise in core temperature. HRV is the oscillation around a mean value, between consecutive R-waves and can be quantified by different analysing techniques.

Material and Methods: After ethical approval was obtained an interventional study was performed where each participant acted as his own control. The study was conducted in a climatic chamber where healthy male volunteers (n=14) exercised in a hot and humid environment for 120 minutes while core temperatures increased from normal, 37°C, to ~39°C. RR interval data was continuously sampled for 120 minutes and compared with recorded baseline values (sampled during exercise in the same environment at normal core temperature: 37°C). Time domain, frequency domain, Poincaré plot analysis, sample entropy (SampEn) and detrended fluctuation analysis (DFA) were employed in the quantification of HRV. from RR interval data sets. Statistical analyses included descriptive data summaries of HRV indicators followed by the Wilcoxon matched paired signed-rank test to compare within each stage (every 15 minutes of exercise) the indicator values with the baseline values. Random effects generalised leased square regression analysis (REGLS) were applied to assess the relationships between core temperature and HRV indicators.

Results: The results showed that increases in core temperature were accompanied with a rise in HR (84 bpm to 124 bpm, p=0.0034) which was largely due to vagal withdrawal and an overall decrease in all HRV indicator values: a) time domain indicators (Mean RR: 663.64 to 502.86, p=0.0034; STDRR: 26.45 to 18.46, p=0.031; RMSSD: 22.83 to 11.07, p=0.03; pNN50: 4.63 to 1.12, p=0.02), b) frequency domain indicators (LFms2: 437.86 to 141.50, p=0.011; HFms2: 197.29 to 45.89, p=0.0085) and c) non-linear HRV indicators (SD1: 16.34 to 8.09, p=0.036; SD2: 64.03 to 22.44, p=0.0099). However, indicators of autonomic balance all showed non-significant changes: LFNU: p=0.504; HFNU: p=0.517 and LF/HF: p=0.395. Indicators of complexity and self-similarity gave heterogeneous results (SampEn and DFA). From the exploratory regression analyses, it was observed that MNRR (R²=0.463), MNHR (R²=0.59) and DFAa1 (R²=0.350) show the most promise with regards to HRV indicators that could act as predictive indicators of elevated core temperature.

Discussion: The novel finding of this study indicates that, in young and healthy athletes, the ANS is able to maintain the autonomic balance in cardiac control during increases in core temperature while exercising, even though the variability is significantly depressed. No increases in sympathetic cardiac control was measured in this study, which would have indicated increased risk for myocardial infarction and sudden death. Due to increased risk to the participating athletes, the study did not investigate HRV response to core temperatures above 39°C.

Conclusion: Quantification of HRV indicators in young and healthy athletes indicated that increases in core temperature, during exercise, decreased all variability measures while maintaining autonomic balance. Furthermore, HRV indicators such as MNRR, MNHR and DFAa1 may have potential to indicate a rise in core temperature as there is a clear association between core temperature and these HRV indicators.

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ROLE OF PSYCHOLOGY IN AN ATHLETE WITH RELATIVE ENERGY DEFICIENCY FOR SPORT. RED-S. CASE REPORT

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Introduction and Purpose: Introduction: The Syndrome of Relative Energy Deficiency in Sport (RED-S) is an inefficient of energy disponibility to attend the metabolic demandings of the body and the practice of physical activities. There is an unbalance between the amount of calories ingested and the calories burned, causing physiological and psychological alterations. Objective: Show the part psychology plays in the treatment of a patient with RED-S

Material and Methods: 22-year-old female patient, medicine student and athlete, went to the multiprofessional team in October of 2017 presenting a stress fracture on the left shin and an irregular menstrual cycle. She was diagnosed with RED-S and was oriented to proper training, monthly nutritionist consults and psychological monitoring with the Beck Anxiety Inventory (BAI), Beck Depression Inventory (BDI), Recovery-Stress questionnaire for athletes (Rest-Q) and general mood evaluation.

Results: It was observed a moderate degree of anxiety, elevated stress level in the sport and her private life and lack of emotional preparation. It was noticeable a difficulty of the patient had in activities that require discipline, causing guilt, drastic mood swings and alterations in her eating habits. Psychological interventions and reduction of external pressure due to interruption of training resulted in improvement in the psychological picture, with a decrease in anxiety and depressive state according to the evaluation of scales.

Discussion: Psychology deals with the performance of the athlete, about the issues related to the sport in which she practices and how she relates to eating. The approach of psychology is fundamental in this scope, being able to perceive tendencies or even eating disorders, acting directly on the question and favoring its confrontation and / or prevention. The ambulatory is ideal for the overall health of the athlete, therefore, we work with symptoms related to pathologies linked to the sport, such as RED's and Overtraining syndrome, as well as personal demands prioritizing the patient's overall well-being. The work developed with the patient by the psychology team allowed for an improvement in emotional and behavioral control, allowing mechanisms to deal with adverse situations, self-knowledge and limits. There are still no protocols for evaluation and psychological follow-up for RED-S patients, which is why this unpublished case report.

Conclusion: The role of psychology is crucial in the treatment of an athlete with RED-S.

INCIDENCE OF INJURIES IN CROSSFIT PRACTITIONERS FROM A FORTALEZA-CE BOX

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Introduction and Purpose: Crossfit sport is a relatively new physical activity, since the early 2000s when it became popular in France. Such sport encompasses one of the fastest growing fitness and fitness programs in the world. In view of this, the interest of health professionals and of the practitioners themselves regarding the injuries associated with this high-intensity sports modality, which submits the tissues to a great overload, increasing the predisposition of the damages occurring in the various structures body. Objective: To investigate the incidence of injuries in Crossfit practitioners from a Fortaleza-CE box.

Material and Methods: A descriptive study was carried out transversely and with a predominantly quantitative approach. The sample consisted of 26 individuals of both genders, over 18 years of age, randomly selected in a Crossfit stall in the city of Fortaleza-CE. The data were collected from a semi-structured questionnaire containing four objective questions. The volunteers were informed about the scientific nature of the research, they had to sign an informed consent form (TCLE). The data was tabulated in an Excel 2007 worksheet and presented in the form of tables.

Results: The findings revealed that the incidence of lesions between male and female evaluated was 26.9%. Regarding the gender, no lesions were found among the participating practitioners, so all reports of injury were found exclusively in the male sex (50%), as the study had the participation of 14 men, of which seven reported having suffered some type of injury. The lesions reported with the highest incidence were in the hip (N = 2) and in the shoulder (N = 2), each corresponding to 28.5% of the mentioned injured sites. In addition, isolated lesions were reported in the lumbar, elbow and knee, each representing 14.28% of the total lesions.

Discussion: In our analysis, the shoulder and hip were the most affected sites in Crossfit practice. Similar results were found in the study by Lisboa et al. (2015), in which the shoulder was the most affected site, corroborating with the results found in our study. According to this same study, the lesions were more prevalent in women, differing from the data obtained in the present analysis. In addition, the percentage of hip lesions found in our analysis was 28.5%, diverging from another study with a similar sample, in which the percentage of hip injuries was lower, corresponding to 3.7% of the total lesions, being present, even, to a lesser extent than lesions in the elbow and knee, diverging again with the current study.

Conclusion: Thus, from the results found, it can be concluded that Crossfit practice was not harmful, considering the low incidence rate of injuries found among the participants. It can also be affirmed that Crossfit lesions had a higher incidence in males, and the sites most affected by the lesions were the shoulder and the hip, in an equivalent manner. In addition, because Crossfit is a relatively new sport practice, there are still a limited number of studies on this subject, making it necessary to carry out new studies related to the theme in question, addressing variables such as age, sex and time of practice.

PHOTOTHERAPY APPLIED DURING COMBINED TRAINING ON MAXIMUM AEROBIC SPEED AND BLOOD LACTATE CONCENTRATION: A RANDOMIZED PLACEBO-CONTROLLED TRIAL

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Introduction and Purpose: Phototherapy or photobiomodulation (PBM) is one of the recovery techniques used for post-exercise recovery. Previous studies have been shown positive results in clinical, functional, and biological outcomes. However, the PBM associated with training is little investigated, and the results remained unclear. Thus, the aim of this study was to analyze the effects of phototherapy associated a combined training on maximum aerobic speed and blood lactate.

Material and Methods: This randomized placebo-controlled trial involved 39 healthy male participants. Participants performed six-weeks (12 sessions) of combined training with sprints and squats. After a randomization, participants were allocated into three groups: phototherapy, placebo, and non-treatment control. The recovery strategies were applied between sprints and squats. Phototherapy (low-level laser therapy – LLLT and light-emitting diode therapy – LEDT – 30J) was applied in six sites of quadriceps bilaterally. The same procedures as in the active phototherapy group were applied to the placebo group; however, the emitter will be disabled. Before and after six-weeks of training, the participants performed a maximal incremental test on a treadmill starting with 10 km.h⁻¹ with increments of 1 km.h⁻¹ per minute until exhaustion to identify maximum aerobic speed (MAS). Blood samples from the earlobe were collected to lactate analysis before and 1, 3, 5, 7, 9, 11 and 15 minutes after incremental test. Statistical analysis was conducted in SPSS with significant level of 5%. To calculate MAS was used raw values, since to calculate blood lactate was used delta (difference between blood lactate peak and baseline).

Results: There was no significant reduction in blood lactate concentration ($P = 0.1256$) or increase in maximum aerobic velocity ($P = 0.1911$) in the group that underwent combined training associated with laser application. There were also no significant results in the placebo and control groups in the analyzed variables.

Discussion: The main findings of the study were that all groups acted in similar way in concerning maximum aerobic speed and blood lactate concentration. Thus, the initial hypothesis that phototherapy applied during the combined training improve these markers was not confirmed. There are a few evidences of phototherapy associated with training. The present results agree with those reported by Ferraresi et al., 2011 and Paolillo et al., 2014 that observed a significant time effect after training but no differences between groups for different outcomes. Regarding time to exhaustion and blood lactate removal the findings remain uncertain. In a recent study, Nampo et al., 2016 found superior effects for time to exhaustion and blood lactate removal only for laser therapy; however, the results are not confirmed when LED therapy is applied.

Conclusion: The findings of study suggest that phototherapy associated with combined training is not superior to placebo condition or training alone to improve maximum aerobic speed and blood lactate concentration.

ESTABLISHMENT OF AN OPTIMAL TRAINING LOAD IN MULTISPORT ACTIVITIES

Autores: Junior, D R P

Introduction and Purpose: The aim of this paper is to suggest an approach capable of assisting the optimization of load allocation and training intensity in multisport activities. In the development of this paper, triathlon will be used as the example, but the methodology and concepts presented can be applied to any multisport activity. The final objective will be the allocation of the optimal training load, aiming for the best relationship between training and performance, based on the three modalities of the sport of triathlon. Our work will seek to optimize performance, with a focus on injury prevention. To do so, based on the concepts of optimization, the use of partial derivatives and the imposition of restrictions, we will seek the construction of a model capable of responding to the object of the study under certain conditions restrictions that are imposed. The restrictions can be in relation to the total time available to training, the percentage to be trained by physiological zones, or the percentage to be allocated by discipline to be trained (swimming, cycling and running).

Material and Methods: In high performance sports, the search for overcoming and improvement performance is a constant. In general, a lot of effort is required to obtain marginal results, because the more trained the athlete, the less trainable the athlete will be. The study of performance is complex and subject to numerous variables. Performance can be seen through a mathematical function and is a function of training, mindset, recovery and nutrition for a general approach. In this way: Performance = f (training, mindset, recovery, nutrition) [eq. 1]

Results: Allocation of training load can be considered a strategic aspect of performance. Despite this, the subject is still treated in a very simplified way on the part of coaches and athletes, perhaps due to the difficulty of modeling the subject in question. It is important to emphasize that, in the present study, the determination of the training zones (the intensity of the training) will not be discussed. That is, the modeling to be done will be as follows: given a training zone, predetermined through physiological or field tests, what is the ideal load allocation to be established for each activity?

Discussion: From the mathematical point of view, what will be sought will be the development of a model that will help in obtaining a portfolio of training – that is, the division of volume between swimming, cycling and running, with a goal to maximize performance and, simultaneously, minimize fatigue. One should consider the total of resources to be allocated to training, in terms of volume, conditioned to the total volume available, as well as maximum and minimum volumes to be allocated by modality. The correlation between the trainings is another aspect to be considered, i.e., what the transference rate between the trainings is. In this case, optimization models with constraints, such as what is being proposed here, are more precise

Conclusion: Assuming the case of an olympic triathlete who has the function of performance and fatigue as described and evaluated over time, we can relate the percentage variations of performance, as well as fatigue (which will be indicative of the potential for injury, for example). The analysis will be made taking into account the three disciplines of the triathlon and will be important for determining the optimal volume to be allocated for training in each activity. In order to do this, besides the individual variabilities, both the performance and the fatigue, the correlations – or alternatively, the covariance – between the three disciplines (swimming, cycling and running) will be observed. To do so, it is enough to build an algorithm that is capable of optimizing the performance x fatigue relationship, with the restrictions to be imposed according to what has been presented here. It is important to emphasize that each athlete will have a specific model, since the answers will probably be different from athlete to athlete.

ASSOCIATION BETWEEN HIGH DENSITY LIPOPROTEIN (HDL) AND PHYSICAL ACTIVITY LEVEL IN MEDICINE ACADEMICS

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Introduction and Purpose: According to Fasku (2011), about one-third to one-fourth of cholesterol is carried by high-density lipoprotein (HDL). Elevated concentrations of HDL appear to protect the individual from myocardial infarction, while low values of less than 40 mg / dl increase the risk of cardiovascular disease. Several strategies have been used to increase the concentration of HDL, including regular physical activity and decreased smoking, are the main medical recommendations to raise HDL values. The objective was to verify the interaction between plasma levels of HDL and the level of physical activity in medical students.

Material and Methods: This is a quantitative, descriptive, cross-sectional study, carried out at the Faculty of Medicine of Valença/RJ. The sample consisted of 100 academics, being 59 women and 41 men, with aged between 17 and 26 years. To evaluate the HDL values, 5 ml of blood was collected by venipuncture for the biochemical dosage of the lipid profile. The analyzes were performed by the laboratory of the Luiz Gioseffi Jannuzzi School Hospital, by the vacuum system, BD Vacutainer®. For this, the patients were asked to undergo a fasting meal of ten to twelve hours. HDL classification was divided into reference groups as low (≤ 40 mg / dL) and acceptable / desirable (> 40 mg/dL) according to the American Heart Association (AHA). The physical activity level was assessed through the International Physical Activity Questionnaire (IPAQ), validated in 2001 in Brazil by Matsudo, and widely used by several researchers. Classification was adapted by creating 2 groups that included the active and very active classifications in group 1, while in group 2 the classifications of insufficiently active and sedentary were included. Descriptive statistics were used to characterize the sample. To verify the relationship of dependence of the variables, we used Chi-square test, considering $p \leq 0.05$ to determine the differences. Data analysis was performed using the statistical package SPSS version 20.0.

Results: The average of the HDL values found in the academics was 49.9 ± 9.0 with a minimum of 32 and a maximum of 77. In the classification of the HDL values, according to the AHA, 18 academics (18.0%) with level of low HDL and 82 academics (82.0%) with acceptable / desirable HDL values. In the evaluation of the physical activity level, 24 academicians (24.0%) classified as sedentary or irregularly active were found, with a median HDL value of 48 ± 7 . In the active and very active classification, 76 academics were found (76.0 %) with median HDL values of 50 ± 10 . In the statistical analysis, it was verified that there was no association between the values of HDL and the level of physical activity, with $p = 0.679$.

Discussion: The present study verified that there is no association between HDL values and the level of physical activity, however, it has been found that individuals who regularly practice physical activity tend to have a positive variation in HDL values. In the study by Fernandes et al. (2011), the author also found higher values of HDL in active individuals when compared to sedentary ones, however the study did not do analysis of association between the variables. A meta-analysis evaluating about 51 studies showed that there is no direct relationship between physical exercise intensity and improvement in the lipid profile (DONNELLY et al., 2009). Other studies have shown that the effects of physical exercise would primarily be on the control of body adiposity and, subsequently, on obesity prevention, which would lead to an improvement in the lipid profile.

Conclusion: Although studies point to an increase in HDL with regular physical activity, the results of this research showed that HDL values do not present physical activity levels in medical students, however, the study identified that individuals who practice physical activity regularly, tend to have a positive variation in HDL values.

EVALUATION OF THE PLACEBO EFFECT IN ELITE AND AMATEUR ATHLETES

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Introduction and Purpose: The placebo effect is extremely interesting for sports practice. The big question to be asked is can placebo be effectively as an ergogenic resource? The answer to this question is not so simple, because in general, in the surveys conducted the volunteers do not know if they are receiving placebo, or the ergogenic resource (caffeine, beta alanine, for example). The objective of the present study was to test the placebo effect effectively. This was made possible by the research design. In this way the impact of the placebo effect could be effectively measured. In order to this research be more applicable, elite athletes and recreational athletes were selected.

Material and Methods: 22 athletes were selected for the experiment. Out of this total 16 recreational and 6 elite. The classification between elite and recreational was made based on performance in previous races, as well as the fact that the athlete competes professionally. The test was performed on a Biotec cycle biometer from CEFISE, with the help of Ergometric 6.0 software. The tests were performed in 2 days, with a 72-hour interval between one and the other. All tests were performed at the same time of the day. Volunteers were advised to avoid strenuous activities the day before the test and to try to maintain a similar routine, including nutritional considerations. Such care was taken in an attempt to try to standardize to the maximum the conditioners of the performance in the test. The load of the test was adjusted by the weight of the athlete in order to work with the same load relative to the weight (watt / kg). The dosage of the load was made so that the test had a short duration. By the imposed load a maximum time of 12 minutes of activity was expected for the elite athletes. The load was kept fixed throughout the test and the test ended after exhaustion and voluntary request of the athlete. During the evaluation, the heart rate was continuously measured and the subjective perception of effort (Borg scale) was measured minute by minute. On the first day the athletes received 30 minutes before the test a supplement. This supplement was actually placebo. There was no ergogenic feature in the capsule, but they received the information that it was a new, very powerful supplement. In the second encounter, the athlete did the test without any capsule. He was informed that the goal was to compare how much the supplement, offered in the first encounter, would lead to a better performance.

Results: The results found in the present study were very interesting. Overall, in the supplement test (which was actually placebo) there was an average increase of 9.66% in performance, measured by a longer time to exhaustion. This result was obtained with all 22 athletes. In the case of elite athletes, the result was lower, showing an increase of 4.39%, on average. In the case of amateur athletes, the increase was 22.87%.

Discussion: Analyzing the data in a global way it seems that there is a significant placebo effect detected in the present study. An average increase of 9.66% in the average is something very relevant. The fact that the increased impact of the placebo effect was greater in amateur athletes seems quite reasonable and may be explained by their greater susceptibility to placebo. In the case of elite athletes, who are more accustomed to harder trials, in a greater effort, the impact of the placebo effect was smaller, but can be considered as important from a practical point of view, since a performance increase of 4.39% a professional athlete, seems to be something fantastic.

Conclusion: The present study showed that the placebo effect is important to be considered even in the case of elite athletes. The way the study was designed allowed a more reliable measurement of the real dimension of the placebo effect. Such information can be used in applied terms, in order to seek a better performance.

CORRELATION BETWEEN LOW-DENSITY LIPOPROTEIN (LDL) AND PHYSICAL ACTIVITY LEVEL IN MEDICINE ACADEMICS

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Introduction and Purpose: Low-density lipoprotein (LDL) is responsible for ensuring the transport of cholesterol through the body. For the proper functioning of the body it is important that the values of this lipoprotein remain controlled, so it is necessary to have healthy life habits. The regular practice of physical exercises aligned with balanced diet, are directly responsible for changes in LDL values. The effect of physical exercise on lipid metabolism has gained relevance in recent years, highlighting the difference in lipid profile for active and sedentary individuals. The objective was to verify the interaction between plasma levels of low density lipoprotein (LDL) and the level of physical activity in medical students.

Material and Methods: It is a quantitative, descriptive study, with a cross-sectional design, carried out at the Faculty of Medicine of Valença/RJ. The sample consisted of 100 academics, 59 women and 41 men, aged between 17 and 26 years and who were regularly enrolled in the Faculty of Medicine of Valença. To evaluate the LDL values, 5 ml of blood was collected by venipuncture for the biochemical dosage of the lipid profile. The blood collection was performed by the laboratory of the Luiz Gioseffi Januzzi School Hospital, by the vacuum system, BD Vacutainer®. For this, the patients were asked to undergo a fasting meal of ten to twelve hours. The physical activity level was evaluated through the International Physical Activity Questionnaire (IPAQ), validated in 2001 in Brazil by Matsudo, and widely used by several researchers for such assessment. The classification was adapted by creating 2 groups that included the active and very active classifications in group 1, while in group 2 the classifications of insufficiently active and sedentary were included. Descriptive statistics were used to characterize the sample. The point-biserial correlation test was used to find the relationship between the variables, considering $p \leq 0.05$ for significance. In the data analysis the statistical package SPSS version 23.0 was used.

Results: The mean LDL values found in the academics were 103 ± 31 with a minimum of 50 and a maximum of 206. In the classification of LDL values, according to the AHA, 14 academicians (14.0%) with a high LDL level and 86 (86.0%) with optimal / desirable LDL values. In the evaluation of the level of physical activity, 24 academicians (24.0%) were classified as sedentary or irregularly active, with a median LDL value of 103 ± 26 . In the active and very active classification, 76 students were found (76.0 %), with a median LDL value of 96 ± 33 . In the statistical analysis, it was verified that there was no correlation between the LDL values and the level of physical activity, with $p = 0.799$.

Discussion: The present study verified that there is no correlation between the LDL values and the level of physical activity, however, it has been found that individuals who regularly practice physical activity tend to have a positive variation in LDL values. Studies show that physically active adults have a higher plasma HDL cholesterol concentration, lower LDL-cholesterol and triglyceride concentrations when compared to individuals. In another study, the authors concluded that the effect of physical exercise acts on the reduction of the subsequent body composition in the prevention of obesity, which would lead to improvement of the lipid profile.

Conclusion: Although the studies showed a high level of LDL with regular practice of physical exercises, the results of this study showed that LDL values did not correlate with levels of physical activity in medical students. Future research should be developed seeking answers about the relationship of LDL and the time of practice of physical activity performed on a regular basis.

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GENE DOPING METHOD FOR ERYTHROPOETIN (EPO) COMPLEMENTARY DNA DETECTION: IMPLEMENTATION, IMPROVEMENTS AND VALIDATION AT RIO LABORATORY FOR RIO2016 OLYMPIC GAMES

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Introduction and Purpose: Development of molecular technology and gene therapy are promising to healthcare but implies a potential risk to be used as non-therapeutic approaches to improve athletic performance through the use of cells, genes and genetic elements. The recent advances and proved safety and benefits of therapeutic gene transfer in humans have increased the probability of the pursuit of gene doping by athletes. The state of art of the Erythropoietin (EPO) Gene Doping analysis is based on the EPO expression. EPO is expressed in renal cells and only the EPO protein is secreted into the bloodstream. The identification of any copy of EPO DNA sequences in blood is considered a positive result for gene doping. Since 2003, several groups have been trying to standardize or create gene doping detection methods for EPO. However, none of these methods demonstrated detection and quantification EPO GD copies and to date in the literature, only qualitative methods have been proposed, leaving room for controversial results. In addition, since there is no guideline with defined parameters verified in interlaboratory tests, questions such as sample storage time and temperature, extraction time after collection, ideal collection matrix and contamination problems are essential to be addressed and defined. Thus, in this work, blood samples were analyzed with the developed gene doping method during the pre and post-Olympic period using the reference material recommended by WADA (EPO-RM).

Material and Methods: Twenty blood samples were obtained from healthy controls with age between 30-40 (9 males: 11 female). After centrifugation, the buffy coat was separated from plasma and both samples were stored at -20°C until use. The DNA extractions were made with 0.5 mL and 0.1 mL of plasma using the DNA Blood kit midi (Quiagen) with minor modifications. The extracted DNA was quantified with Quibit fluorometric approach and quantification curves were also made. The samples were analyzed qualitatively and quantitatively with 2 amplification assays for the EPO cDNA using the real-time PCR instrument QuantStudio 12K (Thermo Fisher). For the analysis, we used Taqman-MGB and BHQ probes with modified cycle conditions. Additionally, several storage time and temperature, as well as matrix conditions were analyzed.

Results: With the standard curves dilutions we were able to detect 1 copy of EPO gene doping at Ct 33 for the screening assay and 1 copy of EPO gene doping Ct 34 for the confirmation assay. The efficiency of the screening assay was 103.84% and the confirmation assay 113%. All the amplicons obtained for the screening and for the confirmation assay had their sizes confirmed with the E-Gel electrophoresis system together with precast agarose gels with sybersafe dyes (2 and 4%). The comparison between MGB and BHQ probes showed similar results and no statistical differences as expected. The storage analysis showed that DNA extractions performed up to 24 hours and -20°C produce more efficient results and EPO RM detection in appropriated Cts.

Discussion: The Rio Lab has created a specific molecular biology laboratory for the development and application of molecular biology methods, forensic analysis and cellular biology applied to doping control for the Olympic Games. In the absence of official guidelines, we developed, applied and validated modifications due to the need of updating the instruments and protocols chosen in the first published method (Baoutina A et al 2013).

Conclusion: Taken together our results shows important and new issues regarding storage and temperature conditions as well as the need for quantification of EPO gene doping copies, especially in long term storage samples. It is furthermore clear that is extremely necessary to follow good laboratory practices related to molecular biology analyzes and the need for a specific environment for carrying out molecular biology assays in the detection of any molecular target.

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ACCEPTABILITY AND PERFORMANCE OF THE MENSTRUAL CUP IN TEAM SPORT ATHLETES

Autores: Araújo, D M P d

Introduction and Purpose: The menstrual cup is a non-absorbable barrier device whose function is to collect the menstrual blood internally into the vaginal canal. There is currently no report in the literature evaluating the use of "menstrual products" (conventional pads, tampons, or menstrual cup) in athletes. Objectives: To study the effectiveness and safety in relation to any discomfort, discommodity, leakage of the menstrual blood and no local response with the use of the menstrual cup during sports.

Material and Methods: A study of 49 college female handball players with a mean age of 22 ± 2 years and a body mass index of 23 ± 3 kg / m². The majority had active sex lives (84%) and was nulligravid (96%). The Softcup® disposable menstrual cup was used. The athletes used the device during three menstrual cycles, and evaluated general parameters and related to the sports training. Data was collected on: ease of insertion and removal of the device, pain, discomfort in sexual intercourse, blood leakage and / or loss of the menstrual cup during exercise. The comparison of the continuous variables was performed by the t-test and the comparison of the qualitative variables by the chi-square test. The null hypothesis was set at 5% ($p < 0.05$).

Results: The insertion and removal of the menstrual cup was considered easy by most users, and the degree of satisfaction increased in subsequent cycles. Most participants (81.6%) said they liked the device a lot and would continue to use it even after the end of the study. The complaint of menstrual flow leakage occurred in 63.3% of the athletes in the first cycle and fell to 42.9% in the last cycle ($p > 0.05$). Of the athletes who had sexual intercourse with the collector, 90.9% of them had no discomfort. The use of the menstrual cup during training or competition was very well accepted by most users. However, during the exercise there was loss of the device in 36.7% of the athletes in the first cycle, 30.6% in the second and 26.5% in the third cycle ($p > 0.05$).

Discussion: Menstrual cups have been gaining market share due to the practicality they offers. The device allows maintaining sexual relations and practicing physical exercise, in a comfortable and practically imperceptible way. In addition, since the devices do not absorb vaginal fluids, the pH and vaginal microbiota remain unchanged, minimizing the risks of mucosal irritation and infections. Leakage of menstrual flow during use occurred in more than half of the athletes in the first cycle but fell in subsequent cycles. This finding is in line with the "FLOW - Finding Lasting Options for Women" study, which demonstrated that improved insertion technique, positioning and removal of the device reduces casual menstrual leakage. Loss of the device during exercise may be related to handball biomechanics in which jumps and changes of direction occur, with a constant increase in intra-abdominal pressure. Even so, there was a significant drop in menstrual cup loss in subsequent menstrual cycles.

Conclusion: The menstrual cup was effective and safe in college athletes causing minimal discomfort. Menstrual leakage and menstrual cup loss may occur during exercise, but tend to decrease with subsequent use of the device.

BODY COMPOSITION: GENERAL, CENTRAL ADIPOSITIES, AND FUNCTIONAL FITNESS OF WOMEN ENGAGED IN PHYSICAL ACTIVITY AT THE SOLANGE NUNES BIBAS - BUTANTÃ SPORT CENTER – SEME/SP

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Introduction and Purpose: Exercise and nutrition are integrated into the conceptual model of healthy aging. The relationship between physical activity and health status involves modulation of body composition through the usual pattern of its practice associated with nutritional intake, factors that may influence components of functional fitness reflecting on functional performance and independence over the course of age. The aim of this study was analyze the impact of the body composition (general and central adiposities) on the functional fitness in adult women population attended at the Sports Centers of SEME/SP.

Material and Methods: Cross-sectional study with data collected in 2017, involving 69 voluntaries women engaged in oriented physical activity (mean time participation: 3.0 years) at Butantã Sport Center, divided into two groups according to anthropometric characteristics: Adequate group - 28 women (mean age: 65.3 years) with body mass index (general adiposity): BMI \leq 24,9 kg/m², waist circumference (central adiposity): WC \leq 79.9 cm and waist-height index (central adiposity): WHI \leq 0.49; Non adequate group - 41 women (mean age: 64.6 years) with BMI \geq 25.0 kg/m², WC \geq 80.0 cm and WHI \geq 0.50. Functional fitness was measured by means of tests involving horizontal and vertical displacement of the body: 4 meters usual gait speed (4mUGS); 8 foot up-and-go (8FUG); 30-second chair stand (30sCS). The performance in each functional test was compared between the Adequate and Non Adequate Groups (unpaired Student t, $p \leq 0.05$). Written informed consent was obtained from all participants.

Results: Mean values obtained in the functional tests indicate better performance of the Adequate Group: 4mUGS: 1.61 m/s; 8FUG: 4.82 s; 30sCS: 17.1 repetitions, compared to the Non Adequate Group: 4mUGS: 1.50 m/s; 8FUG: 5.11 s; 30sCS: 15.2 repetitions, however, with statistical significance verified in the test involving vertical displacement of the body (30sCS).

Discussion: In the present investigation, was evaluate the functional tests involving lower limb motor actions that required agility, dynamic balance and, in particular, muscular strength of the various active muscle groups, referred in previous studies as a factor that evidences, with aging, rate of decline more accelerated compared to upper limb strength, being identified as one of the main predictors of subsequent functional disability. Allied to this aspect, is reported in the literature the likely negative influence of dealing with a higher body weight attributed to excess adiposity, either general or central, in the execution of daily physical activities, especially in the movement of the body itself as when walking, lifting of the bed or chair, climbing stairs, among others.

Conclusion: Even considering that the Non Adequate Group practices regularly oriented physical activity, a factor that can moderate the negative impact of the anthropometric characteristics evidenced, it is concluded that differences between the groups, mainly regarding the vertical displacement capacity of the body, can indicate the importance of maintaining or achieving an adequate anthropometric profile related to body adiposity, associating physical exercise and nutritional guidelines in the preservation of functional autonomy in the aging process.

EVALUATION OF THE RESULTS OBTAINED WITH THE "ACADEMIA DA SAÚDE" OF THE CENTRO DE SAÚDE ESCOLA BARRA FUNDA OF SANTA CASA DE SÃO PAULO

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Introduction and Purpose: Sedentary lifestyle is a global epidemic and major public health issue. It is associated with weight gain, diabetes, metabolic syndrome, systemic arterial hypertension, cancer, depression and many more chronic diseases. Physical activity practiced regularly can cause a shift on the rates and prognostic of this diseases leading to cost reduction and, in the end, a more effective public health system. The main obstacles for patients to achieve the recommended levels of exercise guidelines are the lack of knowledge of what type of training can be done and lack of adequate public spaces. In order to face this challenge, the Centro de Saúde Escola Barra Funda (CSEBF) associated to the Faculdade de Ciências Médicas da Santa Casa de São Paulo (FCMSCSP), opened a space dedicated to the practice of physical activity.

Material and Methods: Two questionnaires were developed: the first was envisioned to the patients of the CSEBF who use the "Academia da Saúde". 68 patients answered the questions from the total of 106 users of the space. 11 forms were excluded due to their scarce filling. The second was directed to the employees of the CSEBF to evaluate if they oriented their patients to use the space on the daily basis. We got 60 answers. The forms were answered by anonymously and suffered no interference whatsoever by the researchers.

Results: From the questions asked the patients we got many results, some of them were: 54 patients of them referred going only once a week to the gym. 53 of them said they went because their doctors recommended, 49 people referred having less pain, 35 declared having to use less medication, 20 people referred weight loss, only 3 people said nothing had changed. 34 said they did other kinds of activities outside of the center. Also, the questionnaire applied to the employees of the CSEBF showed that 84% of them knew about the existence of the gym, only 36% said they used the space themselves. 100% believed that this habit could improve the treatment of their patients. 44% didn't know how to prescribe physical activity to their patients and all of them showed interest in participating on a capacitation course.

Discussion: Looking at the results we conclude that more than half of the patients have been attending the gym for a year or more. About 90% of the patients referred being recommended to use the gym by their doctors and 50% of them said they did not engage in any other physical activity other than that offered in CSEBF, indicating this is the only option for these users. Even though more than 90% of the patients referred doing activities only once a week, they reported an important improvement of pain, balance and less use of medication. From the standpoint of mental health, the greater sense of disposition and acquisition of new friendships are important achievements for a greater sense of well-being. All of the professionals answered as feeling unprepared to guide patients to start practicing physical activity with 100% showing interest in capacitation courses on the theme.

Conclusion: The world population is increasingly sedentary and the health community needs to find solutions to a problem that is rapidly becoming the worlds biggest epidemic. The "Academia da Saúde" project was a pioneer initiative that aims to address this complex problem. It seeks to integrate the practice of oriented and regular physical activities to prevention, as well as medical treatment. It is a low cost initiative that demonstrates benefits to the physical and mental health of the patients of CSEBF, altogether it intends to raise more awareness inside the health professional class about the importance of the subject. Complex problems demand complex solutions. With this work we aim to evidence that even small initiatives can improve the lives of the people who, before, didn't have the opportunity to access a space where they could practice physical activities with orientation and regularity.

SÃO PAULO STATE HOSPITAL EMPLOYMENTS SPORTS MEDICINE GROUP EPIDEMIOLOGICAL OUTPATIENTS PROFILE STUDY

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Introduction and Purpose: Data released by the Brazilian Ministry of Health show a 7.3% increase in the number of people practicing physical activity in free time between the years 2009 to 2016, raising the search for national sports medicine services and pre-participation evaluation in sports, with the aim of preventing future injuries and allowing the inclusion of people of any age group, level of training and medical history in the prescription of physical activity. Especially in Brazil, where sports medicine is a growing field, with lack of patient's studies, the epidemiological knowledge of who are these target populations became essential. This study aimed to trace the epidemiological profile of São Paulo State Hospital Employments Sports Medicine Group.

Material and Methods: A descriptive cross-sectional study was carried out with all outpatients attended at the Sports Medicine Group from March to October 2017. Informed Consent Form and questionnaire was applied by medical students. The variables age, gender, ethnicity, Body Mass Index (BMI), prior associated disease, physical activity level, reason for consultation and conduct adopted by the doctor were registered.

Results: A total of 101 patients participated in the study from March to October 2017. The average age of the patients was 53.09 (13 to 86 years), median 61.51; 68 (67.32%) females and 33 (32.78%) males, 2 (1.98%) of the patients were considered yellow, 18 (17.82%) black, 11 (10.89 %) brown and 70 (69.31%) white; BMI average 27.76, 56 (55.4%) denied previous diseases, 45 (44.6%) had previous associated diseases, where 65.34% had Systemic Arterial Hypertension (SAH), 45 (44.47%) had pain complaint, 32 (31.31%) have sought orientation for physical activity and 24 (23.22%) were asked to follow-up on exams requested by our physicians; 38 (37.7%) patients fit as sedentary, according to IPAQ (International Physical Activity Questionnaire).

Discussion: We notice that the Sports Medicine Group Ambulatory predominantly attends female patients, over 60 years of age, white, overweight, sedentary (in a lower index compared to the Brazilian population in general), with previous diseases associated, mainly SAH. Pain is another prevalent symptom. A Sample above the average age found in the literature and with a high index of chronic diseases and high BMI, with a different population of most sports medicine population studies. Whereas, we found a tertiary-hospital service profile with great ambulatory flow and interactivity with other hospital specialties, among them geriatrics, medical clinic, endocrinology, neurology and orthopedics, which referred patients to sports medicine, demonstrating the seeking for physical activity orientation as an add on to these specialties treatment protocols. Better results in Alzheimer, Parkinson, and Knee arthrosis with specific physical activity prescription are examples. In this way, it was possible to observe the relevance of sports medicine beyond the search for better performance, in contrast to current literature, where we observed that available studies limit themselves in epidemiologically classifying their results only by sex, age and level of physical activity, focusing on the performance of the goers. In the present study, we added the registry of variables such as presence of previous diseases, complaints, and rate of complementary exams requested during 7 months (period of follow-up superior to the national average) in a search to achieve findings in a public health concern. Sports Medicine focused not exclusively as a tool for performance, but also as treatment or prevention for chronic diseases and prevention of their future complications, generating lower financial costs and higher satisfaction of our target population.

Conclusion: Epidemiological profile of São Paulo State Hospital Employments Sports Medicine Group patients are female, over 60 years old, white race, overweight, hypertensive, sedentary and symptomatic.

PHYSICAL FITNESS LEVEL OF CHILDREN IN AN ATHLETIC TRAINING CENTER FOR ARTISTIC GYMNASTICS

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Introduction and Purpose: The Artistic Gymnastics (GA) is considered one of the most complete sports that presents a great wealth of movements, distinguished by the great variety of artificial movements, dynamic or static, difficult to coordinate, executed in devices, encompasses various physical qualities such as strength, flexibility, agility, coordination, balance, power and rhythm, some more demanding than others in the line of sports performance, for example, important qualities for the child. Motor development during early infancy and early childhood is closely linked to the child's morphological, physiological, and neuromuscular characteristics, depending on the characteristics of each child related to growth, maturity, and everyday influences. Thus, the objective of the research is to evaluate the physical fitness of individuals who were not selected in a training center for athletes of artistic gymnastics.

Material and Methods: It is a quantitative cross-sectional and field survey carried out at the Center for the Training of Athletes - CEFAT in Campo Grande - MS, a real environment in which the problem was generated and contributing to an understanding of the proposed problem. Participating in the research were 19 children who were not selected in a training center for athletes of artistic gymnastics, being 7 boys and 12 girls, aged between 7 and 8 years. Two CEFAT tests, the lower limb explosive force test (horizontal jump) and the displacement velocity test (20-meter run) were applied, and compared to the Brazilian Sports Project (PROESP-BR) table.

Results: In the female tests of explosive strength of the lower limbs (horizontal jump) of CEFAT and PROESP we obtained the following results respectively: very weak 0% and 12,5%, weak 37,5% and 25%, reasonable 37,5% The results were as follows: very weak 50% and 75%, weak 25% and 12,5%, reasonable 25% and very good 0% both and in the displacement velocity test (20 meters run) 0%, good 0% and 12,5% and very good 0% both. In the male tests following the same reasoning, in the horizontal jump the results were: very weak 0% and 25%, weak 25% both, reasonable 25% both, good 25% both and very good 25% and 0%, and in the test of 20 meter race: very weak 50% and 75%, weak 25% and 12,5%, reasonable 25% and 0%, good 0% and 12,5% and very good 0% for both groups.

Discussion: We can observe that in the female horizontal distance jump test both in the CEFAT and in the PROESP were classified in reasonable and in the same test for the masculine it occurred a well divided percentage of 25% classified as weak, reasonable and good. It is also observed that when we compared the 20-meter race test in both the female and the male, the classification was very poor, being 50% in CEFAT and 75% in PROESP in both sexes. Some authors report that up to 14 years of age for girls and 18 years of age for boys, overall jump performance in both sexes usually increases linearly according to age and power strength is defined as the product of the force by the speed of the movement, being fundamental for the development of the gymnastic modality.

Conclusion: We concluded that the children who were not selected for the Training Center of Athletes with the ages of 7 and 8 years, are below the level in relation to the physical fitness and the motor performance, because comparing the tests the results were low for both sexes. Thus, considering that basic motor skills are developed in the course of everyday life, it is suggested that physical fitness should be worked on in the physical education classes in a more consistent way.

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EFFECTS OF MELATONIN SUPPLEMENTATION ON SPORTS PERFORMANCE

Autores: Coutinho, C C D M

Introduction and Purpose: High performance training exerts a pro inflammatory role by increasing oxygen consumption, leading to an increase on mitochondrial free radical's concentration, which threatens cell integrity, leading to tissue damage. Cells have an antioxidant defense activated as a response to high concentration of reactive radicals, involving enzymes and hormones, that attempt to neutralize them. When the cellular homeostatic mechanism is not sufficient, muscle tissue damage calls for an inflammatory and immune systemic response. It is known that mitochondria produces melatonin, a potent antioxidant that it was believed to be exclusively produced by pineal gland in order to control light and dark circadian cycle. Researchers look for manners to attenuate the inflammatory response, to ameliorate fatigue and to increase recovery capacity on athletes, so that they can withstand a new stimulus of overload in next training, generating greater favorable adaptations to the improvement of the athletic performance. The objective of this review is to search on literature evidence on how supplementation of melatonin can improve athletic performance.

Material and Methods: In this narrative review, the bases were consulted in the PubMed literature, using the following descriptors: "Melatonin supplementation and exercise performance", "Melatonin Supplementation in exercise", from the year 2000 to 2018.

Results: The search found 21 +3 eligible articles, and applied the exclusion criteria, leaving only eight experimental design studies, which were used for this review. These clinical trials involved melatonin supplementation prior to exercise, at no more than 2 days ahead from the test.

Discussion: Effects of exogenous melatonin were observed more in mental sphere than in physical tests, with no difference in jumping abilities or maximal strength. Data is consistent that morning melatonin supplementation does not adversely affects physical or cognitive tests, and therefore its hypnotic effects by Central Nervous System suppression did not affect performance in endurance and ultraendurance tests. It was demonstrated that melatonin taken in the evening, shows no hangover effects in the morning to affect athletic performance. In resistance exercises, morning ingestion can lower tests capacity of medicine ball throw and hand grip, and increases reaction time when tested in the morning, but it does not affect afternoon tests. The ingestion of melatonin prior to test had no influence on time trial performance. In controlled studies, no difference was seen on rate of perceived exertion (RPE), alertness or sleepiness. Due to its antioxidant effects on reversing oxidative stress, it prevents DNA damage induced by high intensity training, lipid peroxidation, increasing immune defenses that are diminished from exercise inflammation response. Oral supplementation before exercise produces a protective effect by reducing activation and over expression of pro inflammatory mediators. On cardiovascular system, melatonin lowers heart rate during exercise and lowers systolic blood pressure on post exercise. It magnifies the increase of skin blood flow by exercise. Melatonin supplementation moderates the rise on rectal temperature on a 60 minutes running,

Conclusion: The literature is inconclusive as to the improvement of the athletic performance by the supplementation of melatonin. In spite of concretely demonstrating an improvement in the oxidative homeostasis of cell, protecting DNA damage, reducing pro inflammatory mediators and acting as a pharmacological pre-cooling in endurance sports, there isn't any evidence-based study that demonstrate any effect of exogenous melatonin on athletic performance, on actual date. A longitudinal study comprehending a whole training macrocycle with melatonin supplementation and a greater number of subjects, could bring to light a more conclusive data about its role on performance.

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USE OF EAT -26 AS A TOOL FOR SCREENING EATING DISORDERS IN ATHLETES: A PILOT STUDY.

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Introduction and Purpose: Eating behavior can determine the body composition and nutritional status of individuals, influencing their eating habits and choices in sports practitioners. High-performance athletes may be even more vulnerable to the occurrence of inappropriate dietary attitudes that create risk for the development of eating disorders. The objective of this study is to investigate if there is alteration in eating behavior or presence of eating disorders in athletes who train in a multisport club in Porto Alegre. The choice of this theme is justified by the group of nutritional risk in which high level athletes of physical effort are inserted, since they are in a constant cycle of competitions and training.

Material and Methods: This study is a pilot study conducted among female volleyball athletes. For the identification of food behavior we used the EAT-26 food behavior questionnaire. The EAT-26 dietary behavior questionnaire was composed of 26 questions that were evaluated according to the scores, besides obtaining the weight through a scale and the height through a stadiometer, for the classification of the nutritional status was calculated the mass index (Z score ≥ -2 and <1) and BMI below that expected for age (Z score <-2) and overweight (Z score $\geq +1$), using the WHO Anthro Plus Program for classification. Descriptive statistics and chi-square test were used, using the statistical package SPSS.

Results: Participating in this stage of the study were 18 volleyball athletes of the beginner category with a mean age of 12.1 ± 0.78 years, weight ranging from 41 to 77 kg (mean 57.8 ± 11.8 kg), mean height 1.67 ± 0.6 m and mean BMI 20.6 ± 3 . In the analysis of the nutritional status classification, 7 athletes (39%) were overweight and no athlete was below the expected weight. In the evaluation of the food behavior questionnaire, 3 athletes had a score higher than 20, representing a risk for changes in eating behavior. When stratified by age group the mean values for the questionnaire eat score were higher among 13-year-old girls (18.14 points). In the comparison between the classification of the nutritional status and the EAT questionnaire score, the chi-square test presented a value of 0.027.

Discussion: Eating disturbances may include caloric restriction or excessive food intake, use of laxatives and diuretics, radical diets and induction of vomiting which can ultimately damage an individual's well-being. In athletes the pressure to win and an emphasis on body weight and shape can create a toxic combination. In the studied group the highest scores were among the overweight athletes. Excess weight and pressure to reduce weight and pressure by results may justify the presence of thoughts that lead to unhealthy weight reduction and the risk of food disturbance.

Conclusion: The follow-up of the multidisciplinary health team and the use of traction tools are key to the prevention and early identification of these disorders. Although these conditions are treatable, the symptoms and consequences can be detrimental and deadly if not addressed. Eating disorders commonly coexist with other conditions, such as anxiety disorders, substance abuse, or depression.

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A SYSTEMATIC MODERATE INTENSITY AEROBIC EXERCISE AND ITS IMPACT ON BODY WEIGHT, FASTING PLASMA GLUCOSE, TOTAL CHOLESTEROL AND BLOOD PRESSURE IN ELDERLY WOMEN

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Introduction and Purpose: Studies on the elderly revealed that the negative effects of ageing are limited or even reversed through regular exercise and their well-being can be enhanced by active exercise participation. The exercise frequency and well-being are positively correlated. The benefits of regular physical activity are the increasing of the life average expectancy through its influence on chronic disease development, age mitigation related to biological changes, their associated effects on health and well-being, and functional capacity's preservation. Regarding exercise intensity, low to moderate exercise is more effective and safety for elderly than vigorous exercise. Participation in regular physical activity elicits a variety of favourable responses that contribute to healthy ageing. The current study examines the effects of systematic moderate intensity aerobic exercise, lasting 6 months, on body weight (BW), fasting plasma glucose (FPG), total cholesterol (TCh) and blood pressure (BP).

Material and Methods: Fifty-one elderly women (mean age 69.03 ± 4.16 years) volunteered to participate in a 6-month moderate aerobic and resistance training program after being divided in two age-groups (1st group: 65-75 and 2nd group: 76-81 years old). Each training group performed endurance training, 3 days a week for 24 weeks, at 60-70 % of the maximum heart rate according to the Borg scale. Inclusion criteria: 1) over 65 years old, 2) no administration of medication, 3) complete inactivity (≥ 1 year), 4) maximal oxygen consumption (VO_{2max}) < 25 ml/kg/min, 5) weight stability (± 2 kg) prior to entry (≥ 6 months), 6) absence of restraining orthopaedic/neuromuscular diseases, 7) resting BP $< 160/100$ mmHg and 8) no history of cardiovascular, and metabolic diseases. Statistical analysis was performed using SPSS 20. Student's t-test for independent samples was used to explore intra-groups differences. ANOVA repeated measures including Sidak post hoc analysis was employed to determinate differences in biochemical and anthropometrical parameters. Statistical significance was $p < 0.05$.

Results: BW and BMI were altered only after 6 months of systematic training, at which, the percentage of alterations differ significantly in 1st (pre-training) and 2nd (3 months) evaluations ($p=0.001$). Combination of moderate aerobic exercise and resistance systematic training seems to affect the systolic BP. Particularly, group depended changes were detected between 2nd and 3rd evaluations ($p=0.01$). The FPG was significantly reduced after the 2nd (3 months) and 3rd (6 months) evaluations ($p=0.001$).

Discussion: Thales of Miletus quoted "a sound mind in a healthy body" mostly referred to young population. After the results' evaluation, we conclude that the quote can be also attributed to the elderly people. A six-month of exercise may improve BW, BMI, FPG levels and systolic BP in elderly women.

Conclusion: After a 6-month of moderate intensity training program, a strong association has been observed between exercise and FPG, BMI and BW. Contrariwise, the diastolic BP and TCh were not altered. Larger studies may provide evidence whether moderate intensity exercise programs can offer the same metabolic improvements with vigorous exercise.

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ENGAGEMENT IN COMMUNITY PHYSICAL ACTIVITY PROGRAM AND ITS EFFECTS UPON HEALTH-RELATED QUALITY OF LIFE OF ELDERLY PEOPLE: A CROSS-SECTIONAL STUDY

Autores: Vancini, R L, Taveira, H V, Rufo-Tavares, W, Andrade, M S, Lira, C A B

Introduction and Purpose: In Brazil, there are several initiatives for physical activity promotion among elderly people, for example, community physical activity programs (popular gyms). These community programs are characterized by outdoor activities located in public spaces. Specifically, many Brazilian cities offer the "Academia da Terceira Idade" program (Senior Citizens' Gym program [ATI program]) where are offered activities for improving muscle function, aerobic fitness, coordination and flexibility. Despite the objectives of the program, few studies have evaluated the long-term effects of the ATI program. The main concern with regard to the program is the lack of specialized personnel for the guidance and supervision of the participants. Thus, it is reasonable to assume that variables related to physical training are not strictly controlled. As consequence, the exercise benefits may not be attained and impaired. Considering the importance of ATI program in many Brazilian cities, studies that investigate the effects of participation in ATI program are desirable. In this context, quality of life is an important health-related outcome for elderly people. Therefore, the aim of present study was to compare the HRQL provided by SF-36 between elderly that participated and not participated in ATI program.

Material and Methods: One hundred elderly people of both sexes (>60 years) who were sedentary (sedentary group [S]; $n=50$; 30 males) or physically active who attended a community physical activity program (physical activity group [PA]; $n=50$; 30 males) took part in this study. These participants answered the SF-36 to evaluate quality of life through its domains (limitations due to physical and emotional problems, pain, vitality, social functioning and mental health).

Results: PA group presented higher values for functioning capacity and general health perceptions scales of SF-36 when compared with S group. Conversely, the following SF-36 scales were not different between groups. Ceiling effect was presented in all SF-36 scale in both groups.

Discussion: To the best of our knowledge, no study has investigated the effect of the ATI program on the HRQL of elderly people. Our main findings were that functional capacity and general health perceptions were 6.6 and 4.1% higher for PA group, respectively. While there were no differences between the groups in the other scales evaluated. Some limitations of the study must be addressed. Firstly, this study was cross-sectional and we were therefore not able to assess the responsiveness of the SF-36 over time. Secondly, as this study had a cross-sectional design, we did not assess the time effect of ATI program in physical fitness variables related to health, such as, those variables provided by senior physical test. Thirdly, albeit speculative (since we did not assess physical activity level through direct or indirect methods), it is possible that the range in physical activity level was too narrow between groups (S vs. PA groups), thereby limiting the influence that physical activity may have exerted on SF-36 scales. Fourthly, the current study used a relatively small convenience sample of supposedly healthy older adults. Consequently, the findings of this study cannot be generalized to older adults who have more serious health conditions.

Conclusion: SF-36 scale did not present sensitivity to detect difference between S and PA groups (except for functioning capacity and general health perceptions) probably due to ceiling effect. Additionally, it is suggested that the authorities responsible for the program hire professionals for guidance and supervision of the users, as besides improving the results of the program, the professional supervision can increase the safety of the exercise.

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CHANGES IN CARDIORESPIRATORY PARAMETERS IN SEDENTARY SUBJECTS AFTER AN INDIVIDUALIZED TRAINING PROGRAM AT INTERMEDIATE ALTITUDE.

Autores: Galeano, E E

Introduction and Purpose: There is a great deal of scientific literature written about VO₂max and how it changes when a healthy subject passes through a training program focused on endurance at sea level, nevertheless more knowledge is needed for training on healthy subjects at intermediate altitude (1500 to 3000 meters a.m.s.l), and how their cardio respiratory function values increases with exercise sessions performed under individualized assessment, also to document how their body composition and VO₂max values are affected by a 12-week tailored training program under these environmental conditions.

Material and Methods: 50 healthy sedentary subjects older than 18 years met inclusion criteria, 100 registers were selected from a 763 registers database, the subjects performed a 12-week individualized training program from July 2016 to July 2017. Training sessions were personally tailored and conducted by a physical therapist including 10 to 15 minutes of stretching, 40min of aerobic continuum exercise between 50 to 90% of VO₂ max intensity, plus 25min of muscle resistance exercise between 40 to 80% of a maximum repetition. Every subject went to a medical evaluation prior and after the training program, physical exam, body composition analysis (Body weight, BMI (body mass index) and fat percentage by impedance measurement method) were made using a Seca 514 Medical Body Composition Analysis device (SECA-Germany), Cardiopulmonary exercise test (CPET) was conducted using an Oxycon Mobile (CareFusion-Germany) portable lung function testing system, absolute and relative VO₂max changes measured. The Kolmogorov-Smirnov test was applied on data to estimate normality, bivariated analysis was performed to determinate variable distribution between the groups, Chi-square test was used on cathegoric variables and t-student for continuum variables, p<0.05 value used as significance level with a 95% confidence interval.

Results: 66% of the subjects were men 34% were women. The average weight value after the training program was 1Kg less than that reported at the beginning. The average BMI after the training program decreased 0.3Kg/m². Age groups between 18 to 29years, 30 to 39 years, 40 to 49years and 50 to 59 years were used to analyze VO₂ values and no significant difference were found between them. 92% of subjects improved their VO₂max value, the average absolute VO₂max value was higher 9.8% and the average relative VO₂ value (per kilogram) was higher 11.6%, showing a difference between those two averages values of 1.8%, which represents a statistically significant data difference (p<0.005). VO₂ (Oxygen uptake), VCO₂ (CO₂ production), PETCO₂ at AE (End tidal pressure CO₂ value at first aerobic treshold) showed statistically significant differences (p<0,005) at the end of the training program.

Discussion: Changes on Oxygen consumption values are related to the improvement of functional capacity and the reduction of mortality from all causes by 13% and cardiovascular mortality by 15%. The study shows that the group of subjects increased their average functional capacity 1 MET, which is a good advance in terms of longtime survival related to cardiovascular risk. PETCO₂ is a prognosis factor in subjects with pulmonary hipertension, hearth failure, COPD (Chronic pulmonary obstructive disease and effort dysnea. PETCO₂ values at rest increases 3.2mmHg in men and 2.1mmHg in women. The PETCO₂ value at first ventilatory treshold increased 2,8mmHg after 12-week training in men and 2,9mmHg in women, which means cardiorespiratory fitness status was improved.

Conclusion: Body composition changes after a 12 week training program carried out at intermediate altitude, Body weight and BMI decrease. Major changes in ventilatory parameters are achieved after following a 12-week individualized training program at 2640 meters a.m.s.l conditions in healthy sedentary subjects. 92% of subjects achieved higher VO₂max values after a 12-week tailored exercise program which confirms the effectiveness and power of that kind of intervention.

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PROFILE OF PSYCHOLOGICAL HEALTH/LEVEL OF HABITUAL PHYSICAL ACTIVITY WITH BODY MASS INDEX OF ELITE POLICE OFFICERS

Autores: Vancini, R L, Leopoldo-Lima, A P, Leopoldo, A S, Rufo-Tavares, W, Andrade, M S, Nikolaidis, P T, Lira, C A B

Introduction and Purpose: Police officers need to be alerted to mediate conflicts and react quickly and accurately in extreme situations. This scenario could negatively impact the mental health status of these professionals. Although previous studies have demonstrated an association between obesity and mood disorders in police officers, to the best of our knowledge, no research has jointly evaluated the levels of depression and anxiety (trait and state), physical activity levels (before work routine) and their possible interactions in elite police officers. Considering the large number of those working as police officers and the specific psycho-physiological demands of this job, this topic is of great practical/clinical interest for psychologists and exercise practitioners working with them in order to develop optimal psychological status, exercise programs and life style. Thus, the aim of the present study is to describe anxiety and depression, as well as the levels of habitual physical activity (HPA), and their interactions in male Brazilian elite police officers of the battalion of special missions (who routinely deal with extremely complex and hostile situations) classified according to body mass index (BMI). It is reasonable to suppose that overweight and obese police officers present higher levels of depression and anxiety and lower levels of HPA when compared with police officers with normal BMIs.

Material and Methods: Eighty-seven male police officers classified as normal-weight (NG, 18.5–24.9 kg/m², n=34) and over-weight (OG, ≥25 kg/m², n=53) groups completed the questionnaires: BAECKE (HPA levels), IDATE (anxiety) and BECK (depression).

Results: A slight trend of the OG presenting higher values of anxiety-trait (+5.0%, small effect size - ES) and depression (+16.0%, medium ES), and lower levels of leisure time HPA (-3.7%, small ES) than their NG counterparts was observed, despite these findings did not reach statistical significance.

Discussion: Our findings did not reveal significant differences between the BMI groups regarding the levels of anxiety, depression and HPA. However, there was a slight tendency of the BMI excess-weight group to present higher mean values of trace anxiety (+5.0%, small ES, d=0.24) and depression (+16.2%, small to medium ES, d=0.34) and lower levels of leisure time physical activity (-3.7%, small ES, d=0.15). In addition, considering the general mean (n=87), elite police officers presented moderate levels of anxiety-trait/state and mild depression. This is relevant because in many situations of confrontation, the police officers carry out joint activities. Thus, we can suppose that these professionals have permanent emotional tension and a slight degree of mood disorder which have connections to the nature of the work activity.

Conclusion: The current study demonstrates that over-weight did not impact and cause changes in the psychological health and levels of HPA of male elite Brazilian police officers. Although we did not find significant differences between the variables, the BMI excess-weight group presents higher values of anxiety and depression and lower levels of physical activity in leisure time. Our work opens up the possibility of studying in greater depth the relationship between the level of physical activity and BMI, which could negatively impact the psychological health of male police officers and consequently put them at risk of ill health, thus jeopardizing their on-the-job performance and their provision of service to society.

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ENGAGEMENT AND EFFECTS OF A COMMUNITY PHYSICAL ACTIVITY PROGRAM UPON THE AMOUNT OF ANTIHYPERTENSIVE DRUGS BY PHYSICALLY ACTIVE FEMALE OLDER: A CROSS-SECTIONAL STUDY

Autores: Vancini, R L, Santos, R G, Santos, D A T, Andrade, M S, Lira, C A B

Introduction and Purpose: Aging of the population and the increased prevalence of chronic noncommunicable diseases among older adults are major challenges facing society and medical community. Among these diseases, systemic arterial hypertension is a significant cause and consequence of disability among older adults. Physical exercise is an important tool to manage arterial hypertension. However, less is known about the effects of physical exercise in amount of antihypertensive drugs ingested by older patients. Therefore, our aim was to verify the number of antihypertensive drugs used by a sample of physically active older women adults and how many participants used more than two antihypertensive drugs.

Material and Methods: A cross-sectional study was performed comprising 28 female older participants (a convenience sample) that were recruited using advertisements placed in a physical activity programs for community-dwelling older and consisted of women that used anti-hypertensive drugs. The inclusion criteria were: being physically active (participated in a physical activity programs for community-dwelling older), to use regularly at least one anti-hypertensive drugs prescribed by physicians and aged ≥ 60 years. Sedentary and male older adults was excluded from the sample. Participants that presented lower habitual physical activity (HPA) levels (values below median) were placed in group 1 and those participants that presented higher HPA levels (values above median) were placed in group 2 - according to Baecke Habitual Physical Activity Questionnaire.

Results: The amount of ingested antihypertensive tablets was about 2.0 for both groups investigated. There was no significant difference between groups regards amount of antihypertensive tablets ingested ($p > 0.05$).

Discussion: The main aim of current study was to verify whether antihypertensive drugs intake is different between two groups of female older adults sample with different HPA levels. We hypothesized that the more physical active women older adults use fewer antihypertensive drugs and these participants used two or less antihypertensive drugs. However, we found that there was no significant different in antihypertensive drugs consumption in a sample categorized according to HPA levels. A number of limitations of the study must be mentioned. First, this study was cross-sectional and we were therefore unable to assess the responsiveness of physical exercise participation over time. Second, the cross-sectional data made it difficult to assess the direction of causality. Third, we did not measure blood pressure values; therefore, we did not know the severity of arterial hypertension. Fourth, we did not assess the dose of antihypertensive drugs, it is possible that the dose prescribed may be decrease however the amount of ingested tablets remained the same. Fifth, the current study used a relatively small, convenience sample of female older adults. Consequently, generalizations should be made with caution. Nevertheless, we believe that these limitations do not prevent conclusions being drawn from the study, for the reason that investigations into this kind of community physical activity program have considerable ecological validity because they reflect real situations and scenarios.

Conclusion: Our findings show that the amount of ingested antihypertensive tablets is not different between two groups constituted by female older adults with different levels of HPA. However, we found that the group of participants with higher HPA presented lower proportion of individuals that ingested more than two antihypertensive.

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PROTEIN CONSUMPTION BY BRAZILIAN BODYBUILDING

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Introduction and Purpose: Bodybuilding practitioners seek muscle definition and hypertrophy, factors that lead them to combine a selective diet and strength training. It's recommended that bodybuilders increase their dietary intake of protein to maintain the protein synthesis and positive nitrogen balance. However, excessive protein consumption is also observed, mainly due to the belief that the increase of protein intake above the current recommended dietary allowance promotes superior protein synthesis and, consequently, increased muscle mass gain. In view of the above, the study aimed to analyze the protein consumption of bodybuilders in competition phase.

Material and Methods: An observational study with 13 Brazilian bodybuilding athletes, who answered a questionnaire to describe the sample profile, and carried out the food registration of 3 days to investigate food consumption was created. The total protein intake was compared with the values proposed by the specific protocol for bodybuilding athletes (from 2.3 to 3.1g/kg). The anthropometric evaluation was performed by means of body weight (kg) and body fat percentage (seven skinfold equation). The study was approved by the Research Ethics Committee (CAAE 56619216.0.0000.5237).

Results: The mean age was 28.5 ± 7.3 years, with the majority of male ($n = 10$). Most are in the category of classic bodybuilding ($n = 7$), followed by Men's Physique ($n = 4$), Bikini Fitness ($n = 1$) and Bodyfitness ($n = 1$). The majority reported using pharmacological (84.6%) and nutritional ergogenics (69.2%), and of those who declared the use of nutritional ergogenic 100% consumed at least one protein supplement for athletes. No participant had a diet and train prescribed by a professional, but by coaches, and everyone had at least two training sessions a day. The anthropometry analysis showed an average of 77.2 ± 14.8 kg of total body weight, 1.75 ± 0.10 m in height and $6.7 \pm 1.8\%$ of total body fat. The mean total food intake was 3701.4 ± 793.41 Kcal, with an average intake of 228.4 ± 61.5 g protein, ranging from 0.6g/kg to 4.4g/kg protein.

Discussion: It was observed that 84.6% of the participants had a caloric restriction and, in relation to the protein consumption, there was an excess in 53.8% of the records of the first day and 46.1% in the other food records. The amount of protein in the diet is able to optimize the recovery and preservation of muscle mass in competitive bodybuilding athletes, however, research shows that consumption above recommended dietary allowance does not promote increased hypertrophy compared to a consumption of protein between 1,8 to 2,7g/kg. This information is corroborated by many scientific publications, which emphasize that athletes should be made aware that an excessive consumption of protein does not promote an additional effect of performance or hypertrophy.

Conclusion: It was concluded that, on average, protein consumption was within the recommended range in the literature, however, when evaluating the individual records, most of them consumed more than the recommended dietary allowance on the first day, and in the other registries there was also excessive consumption by the participants.

NUTRITIONAL AND BODY MASS INDEX DIFFERENCES BETWEEN RURAL AND URBAN SCHOOL CHILDREN AGED 12 TO 18 YEARS PARTICIPATING IN SPORTS – INTERIM REPORT

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Introduction and Purpose: This survey was done on two groups of children who participate in school sports, one group was from the rural area, and the other group from an urban area. The purpose of the study was to investigate nutritional and physical differences between the two groups. This pilot study will be followed by interventions where necessary, and annual monitoring of the participants.

Material and Methods: This was a descriptive study. The participants were school children aged between 11 and 18 years. They participated in various activities namely rugby, football, netball, athletics, kho-kho, chess, tennis, hockey and jukskei. The rural children only participated in rugby, soccer, athletics and netball. Participants were measured for weight and height, and answered a questionnaire on their eating habits. Calibrated electronic scales and a measuring tape were used. The participants were asked to be minimally dressed and remove their shoes. Their body mass index (BMI) was calculated as weight in kg divided by height in meters squared (Weight(kg)/Height(m)²).

Results: BMI: The rural group had lower BMI's for both boys and girls, with BMI's of 15 and lower (rural boys 15.7% and 0% urban boys, rural girls 11.76% and urban girls 1.8%). The distribution of BMI'S equal and over 30 (rural boys 1.4% and urban boys 2.1%: rural girls 1.47% and urban girls 3.77%. NUTRITION: The number of meals per day showed a similar trend to the BMI. A number of children reported that they have 1 meal a day (rural boys 1.45% and urban boys 0%: rural girls 4.41% and urban girls 0.53%). Other children have 6 or more meals per day (rural boys 0% and urban boys 1.45%: rural girls 0% and urban girls 1.6%).

Discussion: Rural communities live in historically disadvantaged areas that have poor infrastructure, inaccessibility to modern training facilities, and high poverty levels. Some children have one meal a day that is provided by the school feeding scheme, and these children may be affected negatively in physical performance. Children in these areas do not have proper training facilities, and may face a number of health problems like malnutrition, exposure to teenage pregnancies and associated illnesses, and drugs. It is important to address the nutritional problems and help improve athletic participation and performance in school children. The benefits of participation in exercise and extramural activities in children include combating childhood obesity, improving life skills and better outcomes in education as noted in the decline in dropout rates before matric in children who participate in sporting activities.

Conclusion: There are differences on the extremes of the spectrum both for BMI's and number of meals consumed per day between the rural and urban school going children. A higher percentage of rural children seem to be underfed as evidenced by their number of meals a day and lower BMI. Similarly, the urban group has a higher percentage of obese children, with a higher number of meals per day. Interventions should be planned to address dietary deficiencies in both the lower and higher BMI groups.

SWIMMER'S SKIN

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Introduction and Purpose: Swimming has always been labeled as being a complete sport, which does not cause injuries, indicated for spinal problems and respiratory problems, since there is no physical contact, besides being practiced in the water. Competitive swimming is one of the most demanding and time-consuming sports. Elite swimmers practice 20 to 30 hours a week. The permanence for long periods inside the water causes changes in the skin, so some skin diseases were named by terms that refer to the practitioners of this sport, such as "aquagenic acne", "bikini folliculitis", "shoulder of swimmers", "athlete's foot". In addition to these, there are other pathologies triggered by constant contact with water and products possibly present in it, such as cold urticaria, some mycosis, dry skin and greenish hair. Exaggerated chlorine acts as a skin irritant. The chlorine vapors floating on the surface of the water trigger an intense dryness. Children with topical dermatitis present skin barrier disorders, with reduced structural fats. Chlorine can further decrease this natural skin fat. We aim to deepen the knowledge about the conditions of the skin of the swimmers and how the professionals of nursing can act to prevent that they have some type of injury in the skin because of the chlorine practicing this sport.

Material and Methods: Athletes of both sexes, who practice swimming competitively, were attended at a sports nursing outpatient clinic of a private university in the state of São Paulo. Questions were raised about sports practice and skin care and its attachments. After the nursing consultations, an electrocardiogram was performed and they were referred for consultation with the cardiologist of the sport, who took their conducts.

Results: A total of 43 (± 2.29) years old who started their training at 7 years (± 2.69) were attended, training 5 (± 1,11) times in the week for 3 (± 0.97) hours. 11 declare themselves of non-white race while 32 declare themselves white. In only 2 athletes were identified skin alterations (cracks and suction marks). When asked about sunscreen use only 9 use and 12 use the closed training justification to deny its use.

Discussion: To maintain the skin's integrity standard, swimmers and clubs must follow some basic guidelines. For athletes: Do not stay in wet clothes and apply good quality moisturizers on the skin after training; Use the hair dryer to remove all moisture between the toes and groin; Perform laser hair removal on specific regions of the body; If swimming in open water, do not forget to use a water-resistant sunscreen. At the first sign of prolonged dryness, blemishes or other symptoms on the skin, immediately seek the advice of a specialist so that there is no interruption of training and reduced performance. For clubs: Use ultraviolet radiation, which is capable of inactivating microorganisms, for cleaning swimming pools; Use ozone fighting bacteria, algae, fungi and viruses and is considered the most effective and safe method of water treatment; A combination of several methods, with minimal application of chlorine, also works.

Conclusion: It is possible to see that the athletes interviewed have a high knowledge about their sport practice and their body due to the trainer being a sports nurse, which allows an integral care of their skin. It is necessary, then, a professional that, like the Nurse, acts in the prevention of tissue injuries and other preventive questions.

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EVALUATION OF THE EFFICACY OF TREATMENT OF SUBCLINICAL HYPOTHYROIDISM IN ATHLETES: A INTEGRATIVE REVIEW

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Introduction and Purpose: INTRODUCTION AND OBJECTIVE: Subclinical hypothyroidism is characterized by a serum concentration of thyroid hormones above the upper limit and free thyroxine levels within their standard reference values. It is estimated that 4 to 20% of the population has this disease, being more common among women. There is a direct relationship between subclinical hypothyroidism with heart disease and neuromuscular symptoms. Decreased exercise response associated with this disease is well documented. The aim of the study was to investigate the efficacy of treatment of patients diagnosed with subclinical hypothyroidism in the reduction of related comorbidities.

Material and Methods: This is a systematic review of the literature through the MEDLINE, EMBASE and Cochrane Central Register of Controlled Trials databases, published from January 2000 to April 2018. A search strategy was adapted for each of the databases and included the descriptors subclinical hypothyroidism, treatment, and athletes. Studies in which evaluation of the outcomes was not adequately described, excluded. The methodological quality (A1, A2, B, C, and D) and level of evidence (1, 2, 3, 4) were assessed on a consensus basis using the Dutch Institute for Improved Health Care. D-Level and Level of Evidence Studies of 4 excluded.

Results: Using the search terms, 104 studies were selected, including 42 duplicates, which were excluded. Other 25 studies were excluded because they did not meet the established criteria. The great heterogeneity between the studies prevented the grouping of data. Four articles evaluated the efficacy of thyroid hormone replacement in response to exercise, another four evaluated heart rate kinetics in exercise and rest in euthyroid patients and with subclinical hypothyroidism; three studies evaluated the effects of subclinical hypothyroidism on muscle mass; response to exercise in cardiopathy patients, one evaluated diastolic function versus exercise in patients with subclinical hypothyroidism and controls and, finally, one study evaluated neuromuscular symptoms and exercise capacity in subclinical hypothyroidism.

Discussion: There is limited knowledge about exercise tolerance in patients treated with thyroid hormone replacement in subclinical hypothyroidism, and there are insufficient quantitative studies on the effects of a physical training program. The results of the present study demonstrated that subclinical hypothyroidism may cause impairment in cardiovascular autonomic function and attenuate heart rate response to exercise. Patients with chronic heart failure and subclinical hypothyroidism, once euthyroid, significantly improved their physical performance. There was a significant improvement in diastolic function between patients with untreated and treated subclinical hypothyroidism; this difference disappeared after the restoration of normal levels of thyroid function. Neuromuscular complaints were significantly more frequent in patients with subclinical hypothyroidism than in controls.

Conclusion: More research in this area is necessary to better understand the benefits of subclinical hypothyroidism. Understanding this real scenario is extremely important for health decision making.

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THORACIC OUTLET SYNDROME IN A HANDBALL ATHLETE

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Introduction and Purpose: The term Thoracic Outlet Syndrome (TOS) is used to describe the clinical condition that can be attributed to the compression of the brachial plexus, the subclavian artery and veins in the region called the thoracic outlet. It can be divided into three subgroups: 1. Neurological TOS, in which only the brachial plexus is involved. 2. TOS with vascular involvement, when the condition is associated with the neurological condition. 3. Vascular-only TOS, which affects the subclavian artery and/or vein. The activities that exacerbate the complaints are those that put the upper limb in abduction and over the head (throwing the ball), or with a lower pressure (carrying weights, for example). The symptoms associated with vascular compression are described as infrequent, with arterial compression resulting in Raynaud's phenomenon or vascular claudication and venous compression in thrombosis. The most frequently reported causes of TOS are the existence of a cervical rib or a transverse mega-apophysis of C7, the hypertrophy of the scalene muscles and anterior scalene syndrome, with hypotonia of the shoulder muscles. The objective of this study is to report a clinical case of thoracic outlet syndrome associated with a cervical rib in a handball athlete.

Material and Methods: A case report and literature review on TOS was conducted in the Medline and Scielo databases, reviewing works related to the subject published in the last 10 years.

Results: 21 year-old patient, with pain complaint in the right upper limb, progressing for 6 month and preventing her from participating in municipal handball competitions in the past 2 months. The patient reported pain of an intermittent nature and of strong intensity, with irradiation through the ulnar nerve path on the right, accompanied by edema and a change in coloration of the skin, alternating periods of pallor and cyanosis. The examination revealed decreased grip strength in the right hand, without intrinsic muscles atrophy. The palpation maneuvers of the radial wrist on the right followed by abduction and elevation of the limb revealed a complete loss of pulse. The Doppler ultrasound confirmed the finding of the absence of pulse in the radial artery in maneuvers and the cervical radiography revealed the presence of a complete cervical rib, fused to the first homolateral costal arch. The tomography confirmed the findings of the previously described images. With the diagnosis of thoracic outlet syndrome associated with cervical rib, a surgical treatment was proposed, which consisted of the resection of the cervical rib and first costal arch, associated to the scalene myomectomy. The patient had a satisfactory progression, with significant reduction of the symptoms, returning to train the sport movement 60 days after the surgery and returning to competitions after 120 days.

Discussion: The vascular variant corresponds to approximately 5% of TOS cases and can be sub-divided into the arterial and venous forms. Arterial compressions are typically accompanied with cold extremities, weakness, fatigue in the involved limb, diffuse pain and a decrease in the amplitude of the arterial pulse, while the venous type often occurs with venous thrombosis, distension of the superficial veins and varying degrees of pain. The neurogenic type is classified as true or classic when there is clear sensory and motor impairment and it is usually associated with the presence of cervical ribs or elongated transverse processes of the seventh cervical vertebra (1 to 3% of TOS cases). There are several therapeutic modalities, with surgical treatment being the best choice when there is a cervical rib and a failure of the conservative treatment.

Conclusion: The importance of correctly identifying the cause of TOS becomes clear, in addition to the option of surgical treatment as an alternative that provides relief of symptoms and enables a return to sports practice

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ELECTROCARDIOGRAPHIC PROFILE OF JUDO ATHLETES FROM MORUMBY PAINEIRAS CLUB

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Introduction and Purpose: High performance physical training is associated with adaptive physiological cardiovascular changes in order to meet the metabolic demand imposed by the exercise. Besides to possible electrocardiographic changes that are independent of the morphological changes of the cardiovascular system and appear to be due to volumetric and pressure overloads, as well as the adaptations of the autonomic nervous system. Judo is a high intensity modality with dynamic and static components, and its practice is often associated with adaptations of the cardiovascular system, which are largely reflected in electrocardiographic changes. In 2012, the Seattle Criteria for interpreting the electrocardiogram (ECG) of athletes were published, and in 2014 the Refined Criteria for ECG analysis of athletes were published in order to reduce the number of false-positives. The objective of the study was to evaluate the prevalence of electrocardiographic changes in judo athletes of the Morumby Paineiras Club, according to the Refined Criteria for ECG analysis of athletes.

Material and Methods: From the pre-participation sports assessment at the beginning of the 2018 season, 42 12-lead resting ECGs (PIXAR) were performed on judo athletes from the Paineiras do Morumby Club. The exams were performed before the training period, after complete recovery of the training session of the previous day according to the subjective perception of the athlete. All ECGs were evaluated according to the Refined Criteria and all athletes were classified as asymptomatic from a cardiovascular point of view and without comorbidities.

Results: The sample of 42 athletes consisted of 30 (71.4%) male judokas and 12 (28.6%) female, with a mean age of 18.2 years (SD=4.9). Among the ECGs evaluated, 14 (33.33%) cases of sinus bradycardia were found, 9 (21.43%) of first degree atrioventricular block, 9 (21.43%) of right bundle branch block, 25 (59.52%) of early ventricular repolarization, 1 (2.38%) of right atrial enlargement, and 2 (4.36%) of T wave inversion in addition to V1 in a white athlete. In the studied sample, no axis deviation was found, as well as no left atrial enlargement, right ventricular hypertrophy, T-wave inversion elevation beyond V4 in black athletes, ST-segment infra-leveling, Q waves, ventricular pre-excitation, branch block (left and right), Brugada signs, ventricular arrhythmias or atrias, long QT or more than 2 ventricular extrasystoles within 10 seconds of tracing.

Discussion: Only one female athlete needed complementary investigation for presenting T-wave inversion in addition to V1 in whites. And only one male athlete presented right atrium enlargement also having been carried out additional investigation. None of the evaluated athletes presented cardiac pathology in which it was necessary to interrupt the sports practice.

Conclusion: Considering the ECG as an important tool of the pre-participation evaluation, we can observe that the physiological changes predominate in the population of judoka athletes of the Paineiras do Morumby Club. Thus, due to the ethnic diversity of Brazilian athletes, we believe it is important to form a database with the electrocardiographic patterns of the Brazilian athlete, in order to reduce unnecessary disqualification and reduce the costs of a supplementary investigation.

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ANALYZE THE CORRELATION BETWEEN BODY COMPOSITION, CARDIORESPIRATORY PARAMETERS AND PERFORMANCE IN MILITARY PENTATHLON ATHLETES

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Introduction and Purpose: The military pentathlon is a typically military sport created more than 70 years ago and is practiced in more than 30 countries around the world. Despite this, few studies have been carried out on the subject and little is known about the physical valences involved in its practice or the best body composition for its practitioners to obtain better performances. In this context, the purpose of this work was to analyze the correlation between body composition, cardiorespiratory parameters and performance in the military pentathlon obstacle run.

Material and Methods: Seven male athletes participated in the present study, aged between 20 and 30 years old, all members of the Brazilian Military Pentathlon team world champion in 2016. For this purpose, an analysis of the body composition by dual X-ray absorptiometry (DEXA) was performed, and the cardiorespiratory parameters were measured by VO2000 gas analyzer during a rampa protocol on a treadmill, verifying maximum heart rate and maximal oxygen consumption (VO2max.). Performance on the military pentathlon obstacle run was verified in the competition by runway run time. For correlation analysis between body composition, cardiorespiratory parameters and performance in the military pentathlon obstacle run, the Pearson correlation coefficient was used (SPSS software, $p < 0.05$).

Results: Body composition by DEXA: Fat mass (8,60±1,57 kg); Lean mass (59,73±4,22 kg); Total body mass (71,60±4,22 kg); % fatness (12,06±2,36 %). Cardiorespiratory parameters: maximum Heart Rate (HR) 188,29±9,93 bpm; Total test time (12,10±0,91 min.); Maximum speed treadmill achieved (22,71±0,95 km/h); Maximum Pulmonary ventilation (114,68±10,93 l/min); VO2 max. (73,91±5,14 ml/kg/min). Performance in the military pentathlon track: time (146,80±7,47 secs.); score (1092,40±71,96 points).

Discussion: The athletes presented values of maximum oxygen consumption and percentage of fat above average and like high performance athletes of other sports. No significant correlation was observed between the variables of body composition, cardiorespiratory parameters and PPM performance in the group of athletes evaluated.

Conclusion: The lack of correlation between studied variables may be related to the great variation of time and score presented in the military pentathlon obstacle run, perhaps due to the training time of the athletes in the military pentathlon or the various techniques used by them in the execution of their military pentathlon obstacle run performance.

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LUMBAR PAIN AND ITS REFLECTIONS IN THE QUALITY OF LIFE, COMPARISON BETWEEN GENDERS

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Introduction and Purpose: Low back pain is a factor that often culminates in morbidity and physical disability in individuals who has it. The possible etiologies leading to this symptom are: degenerative, oncological, infectious, traumatic, congenital, inflammatory, among others. Among these causes, common mechanical low back pain, which has no substrate for it and make part of the group "degenerative mechanics", is the most prevalent. In a study carried out in Brazil, 76.7% of individuals with low back pain said that their work activities were compromised. In addition, according to IBGE, low back pain represents the second health condition with the highest number of cases in the country. With the purpose of analyze the quality of life of these individuals, the work in question made a survey about how much the low back pain, interferes in their daily tasks, making a comparison between gender. For this, the level of incapacity generated was considered.

Material and Methods: We evaluated 70 individuals from the city of Valença / RJ, 43 women and 27 men, without age restriction. Data were collected in the first semester of 2018, in basic health units and in the outpatient clinics of the Luiz Gioseffi Jannuzzi School Hospital. In order to verify the degree of incapacity generated by low back pain, the Oswestry questionnaire was used, following the classification: minimum disability (0% to 20%), moderate disability (21% to 40%), intense disability (41% to 60%) crippled (41% to 60%) and invalid (81% to 100%).

Results: The largest share falls within the category of minimum or moderate disability, representing respectively 31 and 28 individuals. Few were classified as having severe disability, 9, and crippled, 2. No one was defined as invalid. When we differentiate the results by the genre, a discrete difference is noticed. In men, minimal disability prevails, with a small predominance over moderate disability. Among women, this situation is reversed, but it is important to highlight the 9.3% classified as having severe disability and 4.7% as crippled, while there is only 1 male subject with severe disability.

Discussion: Demonstrated in several studies, such as that of the Regional University of the Northwest of the State of Rio Grande do Sul in 2008, the majority of the sample was female, similar to that found in the population of Valença / RJ, that representing 61.4%. This can be explained by the fact that this gender is associated with the accumulation of occupational and domestic tasks. That make them more susceptible to skeletal muscle pathologies. This can also be explained by the lower tolerance to pain and by a greater concern with health and the search for health care, as Martins and Longen (2017) have already reported. Still according to the study carried out in Santa Catarina, we inferred the low relation between the intensity of low back pain and the incapacity. That was ustified by the fact that several individual and subjective factors, previously mentioned, influence the pain process. In national studies, the result of physical incapacity was generally low, similar to the data found in the population of Valença and representing a minimum disability of 44.3%.

Conclusion: Based on the results found, it was observed that that was a discrete difference between levels of disability between genders. The women had reported a higher degree. However they representing the majority of the sample that was randomly selected. This fact was justified in the previous topic. This show how necessary are further studies with this population group in order to understand if the vulnerabilities and physiological differences of the gender justify the result found.

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THORACOLUMBAR IDIOPATHIC SCOLIOSIS IN ADOLESCENTS – SURGICAL APPROACH IN ATHLETES: CASE REPORT

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Introduction and Purpose: The scoliosis is a cause of non paralytically thoracolumbar disorder. The deformities most commonly situates in the thoracic and lumbar areas and as a disorder of difficult comprehension, presents an important therapeutic complexity.1,2. In the sports practice, it's a relatively common disease and may be related to the movements of a sportive gesture. 5,6. The goal of this case report is evaluate the return to sports after a surgery procedure in a adolescent patient with symptomatic idiopathic scoliosis.

Material and Methods: Case report of female patient, 16 years old, swimmer in state and national competitions, with complains of low back pain and postural disorder, without other comorbidities, and no response to clinical treatment, that was initiated in April 2017. (non steroidal anti-inflamatorys, physiotherapic practice for pain and low back straight increasing.). The diagnosis of idiopathic scoliosis with an initial Cobb angle of 58º associated with a flaw of the clinical treatment led us to indicate a surgical procedure. The surgery proposed was a poster lateral arthrodesis of T11 to L4, with selective fusion technique, performed in August 2017. It was also proposed physiotherapic treatment until the surgery (May to July) for analgesia and low back straight improvement. After the surgery, physiotherapic treatment was provided according to the post operatory time and patient pain symptoms. (global stretching, low back straight, pain to perform exercises). The physiotherapic techniques used were miofascial and cinesiotherapy, which the association has been proved as efficient in the treatment for low back pain.12,13.

Results: The patient has returned to sports with 120 days post surgery, with a good maintenance of performance. To evaluate pain and limitation in general, we apply the Oswestry Disability Index.11. In the initial evaluation, the patient was considered by this questionnaire with a severe disability (46% of 41-60%) and after the 120 days of the procedure, the patient was graduated with minimal disability (2% of 0-20%, although she doesn't referees symptoms at the time), and presenting a good back lining observed by the physical exam and the radiographic studies (Cobb angle: 18º).

Discussion: This case, initially, was a common report in the sports medicine physician routine. The disorder caused by the sportive gestures of swimming training can be related to scoliosis and lordosis in until 30% of female swimmers. 5,6, 7,8 Multifactorial causes as genetics, gender, age and sportive gestures are related to the etiology of this disorder. 1,2,4,5,6 However, less than 1% of the cases need a surgical treatment, which makes the return to competitive sports in this cases questionable.1,2. The recovering protocol integrated a multi-professional work of physiotherapic rehabilitation, based on gaining low back and core straight, before and after the procedure, surgeon experience and subjective perception of straight gain and pain decrease by the patient. In 45 days, the cicatrization of soft tissues is expected, as the transition of the soft callus to the hard callus. Therefore, is hoped that the patient is allowed to start receiving partial charges and be able to start working on flexibility, without risks to the surgery recovery.1,5,6, 7,8, 9,10 According to the subjective perception of straight and decreasing of pain, the exercises were reintroduced to the athlete's routine until achieve her normal practice and competitive calendar return with 120 days of the surgery.

Conclusion: This case report has showed that a pre and post surgery work, with a sooner return to sports practice may allow a good maintenance of athlete's performance in the procedure evaluated. The report of more cases and protocols of treatments will make the literature among this theme more valuable, making easier to treat futures similar cases.

EFFECTS OF AN AQUA-GYMNASTIC PROGRAM ON THE FUNCTIONAL SKILLS OF THE ELDERLY

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Introduction and Purpose: Aging, caused by biological and socioenvironmental factors, is a process that affects all people in a slow and gradual way, causing biological imbalance and restrictions to the activities of daily life. Physical activity is an intervention that promotes good health and quality of life and its regular practice is useful in the treatment and prevention of several diseases, as well as improves the functional capacity of individuals, mainly in elderly. Functional capacity is defined as the physiological ability to perform daily activities normally, safely, without undue fatigue. The evaluation of the functional capacity of the elderly is important because, through them, it is possible to find ways to prevent or delay the onset of physical fragility that occur in advanced ages. Thus, interventions that have the power to improve these physical capacities can contribute to improve the quality of life of the elderly, since they feel able and independent to perform tasks of daily life. In this sense, water gymnastics presents several advantages compared to other types of physical exercise for the elderly and can contribute to independence in the daily life of individuals. The objective of the present study was to verify if a 12-week hydrogymnastic program could alter the functional skills of the elderly.

Material and Methods: The study population consisted of twelve volunteers aged between 50 and 80 years. The variables analyzed before and after the 12-week hydrogymnastics (60 minutes, twice a week) intervention were muscle strength, flexibility, cardiorespiratory endurance, agility and balance. Prior to the experimental procedures, all individuals received and signed an informed consent form. Data were tabulated and analyzed by the statistical package SPSS 21. The statistical test applied was the paired t-test and $P < 0.05$ was considered statistically significant.

Results: Statistical analysis (paired t-test) of pre and post parameters of the same individuals revealed that the 12-week hydrogymnastics (twice a week) program improved agility, balance, cardiorespiratory endurance, increased flexibility and lower limb strength and upper limb strength. However, lower limb flexibility was not influenced by a 12-week hydrogymnastic program.

Discussion: Based on the present results, it is possible to note that a twelve-week hydrogymnastics program was effective in improving several parameters associated with functional skills related to daily life activities, even at a frequency of twice a week and a relatively small population of twelve individuals ranging in age from fifty to eighty years. It is possible that a greater frequency of physical exercise than the one performed in this study may present even more promising results. As a limitation of the study it can be highlighted the small sample group, and the age variation of the individuals.

Conclusion: For future studies certain biochemical parameters can be considered as well as hemodynamic parameters such as heart rate and blood pressure, known to be influenced by physical exercise and aging.

HIP STRENGTH BALANCE RATIOS IN ATHLETIC PUBALGIA SYNDROME

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Introduction and Purpose: Hip and groin pain are a common issue for professional and amateur athletes. Athletic Pubalgia (AP) is characterized by chronic pubic or groin pain, associated to exercise, mostly in sports requiring sudden changes in direction, kicking, accelerating. It is more frequent in soccer, ice hockey, football, athletics, basketball, tennis and swimming, decreasingly. Data from Soccer and Ice Hockey Leagues suggests that 9 to 18% of these athletes have presented pain compatible with AP. Recent studies show some risk factors for this lesions such as previous injury, body mass index, lower abduction and rotation range of movement. Decreased hip abductor strength was found as a risk factor for groin pain, but there are no consensus about the strength balance between abductor and adductor hip muscles among athletes with or without AP. Therefore, the present study aims to evaluate if athletes diagnosed with AP presents abductor and adductor muscles peak torque (PT) ratio difference compared to non-injured athletes.

Material and Methods: Participants were selected at a reference Sports Traumatology Center and separated in two groups for this preliminary data obtention. Diagnostic criteria for AP were: insidious and progressive pubic and/or groin pain; clinical tests such as squeeze-test, resisted adduction arousing patient's pain; pelvic radiography showing hyperdensity in the pubic symphysis with or without osteophytosis or flamingo view showing symphysis asymmetry larger than 2mm; ultrasonography revealing chronic echogenicity alterations along the adductor longus tendon and excluding abdominal wall hernias. Control group volunteers could not have current or previous injury of hips or pelvis. All participants were informed of the intent and procedures of the study and signed an informed consent form before data collection. Controls ($n=9$) had 78.75 ± 5.25 kg body mass and cases ($n=9$) 72.10 ± 5.61 kg ($p=0.019$). The first group was 180.44 ± 5.41 cm and the second 173.55 ± 8.21 cm tall ($p=0.518$). Body mass index was 24.18 ± 1.60 kg/m² and 23.97 ± 1.90 kg/m², respectively ($p=0.795$), and age 29.0 ± 3.3 versus 30.4 ± 6.5 years, controls and cases ($p=0.558$). Evaluations occurred at an Exercise Physiology Laboratory in a Biodex System 3 isokinetic dynamometer and data was analyzed with Biodex Advanced Version 4.X software. A side-lying hip abduction-adduction protocol was set. Five maximal concentric repetitions for both gestures were performed at 30 and 150 °/s after a proper low intensity running warm-up and familiarization tests in the device. For statistical analysis T tests were runned to compare groups.

Results: Abduction/adduction (Abd/Add) PT ratio at 30°/s of the dominant member was $80.32 \pm 22.01\%$ for the control and $96.67 \pm 27.34\%$ for the case group ($p=0.181$, power=0.67); for the non-dominant member $80.17 \pm 22.28\%$ and $94.84 \pm 24.52\%$ ($p=0.202$, power= 0.68) for controls and cases, respectively. At 150°/s ratios obtained were $84.54 \pm 29.22\%$ for control versus $94.89 \pm 21.84\%$ for case group, dominant member ($p=0.408$, power=0.72) and $82.12 \pm 25.17\%$ versus 87.68 ± 28.11 , respectively, ($p=0.664$, power= 0.78) non-dominant member.

Discussion: Strength balance between Abd/Add PT were not different between groups, however statistical analysis power were lower than 80%. This are preliminary results and probably a larger sample size will improve the power of analysis. Moreover, mean values difference for ratios assessed at 30°/s ranged around 15%, which may have an important clinical relevance. Relative adductor muscles weakness findings would be consistent with a recent study that demonstrated 41% lower groin complaints in professional soccer players submitted to an adductor strengthening programme.

Conclusion: Although promising, preliminary results fail to show statistical difference comparing Abd/Add concentric PT ratio between groups at the velocities tested, but the sample is still small and tests power are low. It will be necessary to expand the sample to achieve more conclusive data.

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THERMOREGULATION DURING EXERCISE IN THE HEAT OF BRAZILIAN PLAYERS INVOLVED IN AMERICAN FOOTBALL MODALITY

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Introduction and Purpose: American football players often practice under heat environment and the use of heavy uniforms impose higher risk of developing exertional heat illness compared to other modalities. Two other factors that increase the metabolic heat production of these players, and therefore the risk for heat illness, are their large body size and the intermittent high intensity efforts under such heat stress. The majority of field and lab based studies or case reports verified outcomes mostly in not heat-acclimatized athletes from the northeastern of the United States. Less information is derived from players who practice and compete American Football in other countries besides USA. **PURPOSE:** To verify the body temperature and sweating responses in Brazilian players of American Football while exercising at a moderate-high intensity effort as prescribed by their metabolic heat production per unit body mass.

Material and Methods: Seven heat-acclimatized American Football players participated in the study. Players cycled 4x20-min bouts at moderate-high (7.0-8.0 W.kg⁻¹ of metabolic heat production) exercise intensity, with 10 min rest between them, totalizing 110 min of heat exposure. All sessions occurred in a climate chamber (39°C, 50% relative humidity and 1.0 m.s⁻¹ air velocity) without fluid intake and players wearing only shorts, shoes and socks. Rectal (Tre) and skin (Tsk) temperatures were measured continuously using rectal probe and skin thermistors, placed on the upper back, arm and thigh. Δbody mass was used to calculate dehydration prior and post exercise, after voiding their bladders.

Results: Mean ± SD characteristics were: 24.1 ± 2.6 years, total body mass 87.8 ± 9.9 kg, lean mass 70.7 ± 9.6 kg, body fat 16.7 ± 3.8% (measured by DXA), body surface area 0.68 ± 0.036 m².kg⁻¹, VO₂peak 51.3 ± 5.0 mL.kg⁻¹.min⁻¹, resting heart rate 77 ± 9 bpm, maximum heart rate 188 ± 9 bpm and maximum bike workload was 355 ± 25 W. Players began exercising euhydrated, as assessed by urine specific gravity (1.014 ± 0.008) and urine color (2.4 ± 1.4). Initial Tre and HR were 37.0 ± 0.3°C and 80 ± 9 beats.min⁻¹. During experimental trial, core temperature increased overtime resulting in a ΔTre of 2.2 ± 0.6°C. Average weighted Tsk was 36.7 ± 0.5°C. Total sweat volume was 2.6 ± 0.3 L, resulting a % hypohydration -3.1 ± 0.4% reflecting a moderate level of hypohydration. Final urine specific gravity and color were 1.024 ± 0.009 and 5 ± 1.0. The experimental trials were interrupted at the end of the third and the fourth exercise bouts in two players due to the respective adverse conditions: leg muscle cramps, and excessive Tre increase - final Tre reached 39.7°C.

Discussion: The present data showed that American Football players that practice the modality in a tropical country, such as Brazil, had a considerable increase in body core temperature at a moderate-high intensity exercise in the heat. Although they were naturally acclimatized to the heat two participants showed symptoms and signs of heat illness. Other two relevant points must to be considered in the present study: (1) players were not allowed to drink any fluids during exercise trials, as often happen in the field; and (2) players were not wearing uniforms and helmets, factor that may have attenuated these results.

Conclusion: Thermoregulation and hydration must be a major concern for American Football players, mainly related to greater exercise intensities and long-time practice, inducing high hypohydration levels and risk of hyperthermia. As practice and competitions at a professional level of American Football increase worldwide, advices to prevent risk of heat illness must be promoted both for players and health professionals.

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THERAPEUTIC EFFECT OF HIGH-INTENSITY PHYSICAL EXERCISE IN THE CLINICAL EVOLUTION OF MULTIPLE SCLEROSIS-10-YEAR FOLLOW-UP

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Introduction and Purpose: Multiple Sclerosis (MS) is an autoimmune inflammatory disease of the central nervous system (CNS). The triggering factors for the disease are still under investigation, but a multifactorial cause is currently the most accepted. Over 100 years ago, due to a publication by Uththoff (1890), physical activity was restricted or proscribed in this disease. In the last decades, with the perception of the deleterious role of sedentarism, there was a shift in this paradigm. Report the impact of high-intensity training on a patient with relapsing-remitting multiple sclerosis.

Material and Methods: A 36-year-old female diagnosed at age 26 with multiple sclerosis (MS) started drug treatment with Interferon B1a 44 µg. In the first 3 years of after diagnosis, even with drug treatment, she presented successive flares. According to the Expanded Disability Status Scale (EDSS) the international scale, she reached a score of 5.5/10, and had multiple brain and spinal cord lesions, with disease activity (contrast uptake). At the beginning of the fourth year after diagnosis, she began high-intensity physical training (12 hours moderate aerobic exercise/ week). The following years she got more intense exercise (4hours high-intensity and 8 hours moderate/ week of aerobic exercise and 2hours of resistance exercise/week).

Results: At the end of the first year of training, her EDSS score was 1.5/10. After 6.5 years of drug treatment and 2.5 years of high-intensity training, the medication was discontinued. For 3.5 years, she has been relapse-free, and maintaining high-intensity training.

Discussion: As proven in the last decade, high intensity exercise is harmless for people with multiple sclerosis. The practice of this type of activity is the limiting factor. When the patient can reach the high intensity it seems to be an immunomodulatory factor, and aid controlling the progression of the disease.

Conclusion: In this case report with a follow up of 10 years of disease, we sought to highlight the beneficial effect of regular and high-intensity exercise. The possibility that there is an immunomodulatory and neurogenic role allows us to think of high-intensity exercise as a possible.

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MAJOR INJURIES AFFECTING ATHLETES WITH PHYSICAL DISABILITY IN DIFFERENT MODALITIES: A SISTEMATIC ANALYSIS**Autores:** Araujo, A S

Introduction and Purpose: In the world of sport, when athletes reach the high-yield stage, they face constant demands of maximum effort within the limits of physiological and psychological capacities. Thus, they are exposed to the risks of injuries that can interrupt competitive cycles or lead to premature closure of the athletic career. Athletes with disabilities are exposed to these same factors, however, face the problems resulting from the lack of knowledge of the adaptive response to the training due to the condition of their disability. daily training can induce the athlete to stress and lead to injuries secondary to disability. (MAUERBERG-DECASTRO, E. et al). Adapted sport is one in which rules and adjustments are introduced that allow their practice by people who cohabit with some form of physical disability In Brazil, a large part of these athletes are those work, such as police officers; and traffic accident victims, especially in some modalities such as sitting volleyball (GONÇALVES; ALBINO; VAZ, 2007).

Material and Methods: The methodology applied to this study follows the steps of the Systematics. The GRADE was applied to the included studies to evaluate the quality. The bibliographic search in the databases was performed after the survey of the official terms, having as reference the Descriptors in Sciences of the Health - Decs. The Search Strategy was developed using the terms DeCS related free words in multiple languages: adapted sport, sports for persons with disabilities The theoretical study was based on a review of the literature with data on platforms: Scientific Eletronic Libraty Online (SciELO), Public Medline or Publisher Medline (PubMed), Latin Literature American and Caribbean Health Sciences (Lilacs) and the available databases in the Regional Portal of the Virtual Health Library - VHL. For greater reliability and value of the bibliography of this systematic review Equator Network tools and recommendations were used.

Results: Lesions of the upper limbs are common and more studied in athletes who use a wheelchair to compete (eg: wheels, wheelchair basketball,) whose movements move loads for chair propulsion and transfers, which increases the risk of overload injuries, especially on the shoulders. Among the affections The most common are tendinitis of the long biceps cord, impact of the rotator

Discussion: Most of the authors agree that the adapted sport in Brazil has been developed especially after the Paralympics Athens in 2004, when the country had the largest delegation until then seen and with expressive conquest of medals. From there to here, there was greater dissemination and encouragement, which culminated in the number of athletes, which, in turn, promotes greater number of lesions. "According to Vital et al. (2007), over the years the adapted sport ceased to be seen as a therapeutic activity and became recognized as a by society as a top-class sport, attracting more and more media attention, sponsors and sports professionals. With this change of perspective, there were also the excessive numbers of training and competitions, which resulted in an increased risk of trauma and injuries (Ferreira, 2013). But it is also with this evolution that important contributions technologies for the creation of orthoses, prostheses and other devices more adaptable to sports practice and performance. Studies show that the aspects of the lesions are closely related to the related to the sporting modality practiced, and that they occur more often on the healthy limb as observed in only one side's amputees.

Conclusion: The adapted sport passed with time to be considered a means of inclusion, functional and competition training. Many scholars to interpret the pathophysiology of the lesions associated with the to improve treatment techniques and to equipments that help the practice of exercise and the own daily life. However, specific searches for each modalities are necessary to uncover important aspects of the epidemiology of sports injuries, and thus enable appropriate implemented.

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CARDIOVASCULAR RISK AND AEROBIC FITNESS AMONG BRAZILIAN NORTHEAST SOCCER AND AMERICAN FOOTBALL PLAYERS AND ENDURANCE RUNNERS**Autores:** Lopes, C L, Lopes, A V S L, Silva, A R S, Numata Filho, E S, Santos, G A, Santos, G L L D S, Carvalho, F O, Gurjão, A L D**Instituições:** Instituto Valler - Medicina Integrada - Juazeiro - Bahia - Brasil, Universidade Federal do Vale do São Francisco UNIVASF - Petrolina - Pernambuco - Brasil

Introduction and Purpose: The aim of this cross-sectional study was to assess the cardiovascular risk among athletes of soccer, football and athleticism in the Brazilian Northeast by means the waist-height ratio (WHR) and to correlate the WHR with their aerobic capacity

Material and Methods: Fifty-six athletes were enrolled in the study (14 soccer players, 24 football players, 18 runners). Cardiorespiratory fitness was assessed using the Lèger test. Cardiovascular risk was assessed through changes in blood pressure and waist-to-height ratio measurements. Statistical analysis: the normality and homogeneity of the data were verified. Data are presented by mean and standard deviation. One-way ANOVA was performed and the Bonferroni adjustment was used for multiple comparisons. Pearson's correlation coefficient was used to verify the relationship between aerobic fitness and WHR. Data analysis was performed using the Statistical Package for Social Science (SPSS®) version 22.0 and an alpha of 0.05 was adopted.

Results: the VO₂max of the athleticism group (61.52 ± 11.01 ml.kg⁻¹.min⁻¹) was 39.88% higher than the soccer athletes' and 52.57% higher than in the American football group's (p <0.05). The WHR of the American football group (0.48 ± 0.06) was about 11.62% higher than in the other two groups (p <0.05). The values of WHR had negative correlation (p <0.05) with VO₂max (r = -0.33 p=0.02) and significant positive correlation (p<0.001) with %Fat (r = 0.87 p <0.001).

Discussion: The results of this study showed that soccer and football players and long distance runners had a low cardiovascular risk by means the low average values of the WHR found among the athletes. These findings are in line with our initial hypothesis. In addition, a weak negative correlation was found between WHR and VO₂max, as well as a strong positive correlation between WHR and %Fat. In the current study, the correlation between WHR and %Fat was 0.87 in male athletes with mean age of 24.1 ± 7.1 years. These data are consistent with those published by Flegal et al (2009) who reported a correlation of 0.87 between WHR and %Fat in men aged between 20 and 39 years. On the other hand, Lutoslawska et al (2014) found a weak correlation between WHR and %Fat among active young men. The reasons for inconsistency of the findings between the current study and those of Lutoslawska et al (2014) are unclear, although Lutoslawska et al argue that more studies with a larger number of participants are needed to recognize if the findings are true for the population studied.

Conclusion: Athletes were considered to have a low cardiovascular risk by means of the WHR and there was a weak negative correlation between WHR and cardiorespiratory fitness and a strong positive correlation between WHR and %Fat.

DIFFERENCES IN SHOULDER STRENGTH PARAMETERS IN RECREATIONAL WEIGHTLIFTERS WITH OR WITHOUT PAIN

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Introduction and Purpose: Weightlifting training has gained many adherents throughout the last decades in Brazil and around the world. The Centers for Disease Control (CDC) estimates that about 20% of American adults between the ages of 18 and 65 engage in some type of Weightlifting training more than twice a week, demonstrating the epidemiological relevance of this mode of physical exercise. There is a transversal study that postulates that the typical pattern of Weightlifting training with emphasis on large muscle groups could produce shoulder force imbalances, especially in the agonist/antagonist ratio of the shoulder rotators and this would be a predisposing factor of injury. However, there is a lack of data on the prevalence of shoulder joint injuries related to Weightlifting training and its biomechanical impact on strength expression parameters. Considering previous data from our laboratory analyzing untrained and painlessly trained individuals, which could not confirm the presence of these supposed muscular imbalances as an inherent trait, we aimed to analyze if these differences in shoulder force parameters could exist between individuals trained with shoulder pain (TCD) in relation to trained individuals without pain (TSD).

Material and Methods: We selected individuals trained in Weightlifting for more than twelve months continuously, not practicing other sports, with or without chronic shoulder pain. Chronic pain was defined as pain for more than four weeks, which harms but does not preclude the training. We included men aged 18-40 years without previous orthopedic surgical procedures in the upper limbs and who denied the use of anabolic steroids in the last three months. All were submitted to physical examination, isokinetic shoulder dynamometry and ultrasonography.

Results: There was no difference in continuous training time between groups, but the TCD group was significantly older (30.77 vs. 26.53 years). Height, weight and supplement intake did not differ between groups. Although the TCD group presented a significant decrease in range of motion (66.6° vs 54.2°) and external rotation (74.47° vs 66°), none of the shoulder force parameters presented differences between groups, including peak torque, average peak torque, total work performed, average power, time to peak torque, angle of peak torque, fatigue index or agonist/antagonist relations.

Discussion: The characteristics that generate the increased risk of injury resulting from Weightlifting training do not seem to be related to changes in the expression of strength. From these results, we can theorize that the causal factors related to the incidence of injury in Weightlifting training are related to the inadequacy of the training progression, biomechanical failures in the execution of the exercises, as well as risk factors inherent to the patient.

Conclusion: The expression of isokinetic strength is not altered between trained individuals with shoulder pain in relation to trained individuals without pain.

EVALUATION OF NUTRITIONAL PROFILE OF TAEKWONDO ATHLETES IN SETE LAGOAS-MG

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Introduction and Purpose: Taekwondo is an ancient Korean martial art present in the Olympics since 2002. These modality athletes require greater nutritional support given the intense training load and search for improvement. The nutritional profile of athletes connected to various sports are well documented in literature, however little is known about the Taekwondo athletes. The objective was to evaluate the nutritional profile of Taekwondo athletes in Sete Lagoas-MG.

Material and Methods: This is a cross-sectional study, performed with 42 athletes being 22 teenagers and 20 adults, from both genders. An anamnesis form was filled in to obtain personal, socioeconomic, clinical history and family data. An anthropometric evaluation was performed including weight and high gauging, arm (AC) and waist (WC) circumference, besides the Body Mass Index (BMI) calculations and the body composition ascertainment.

Results: 64,2% of the athletes are males. The average age was 20,0+8,4 years old. None of the athletes reported smoking. 16,6% consume alcohol. 4,8% of the athletes take supplements (creatine and albumin). 80% of the athletes reported the training time was up to 90 minutes and 45,2% train 4X a week. 35,7% include aerobic activities and 50% include working out in their training routine. The weight was 63,9+14,2kg and the BMI 23,4+3,9kg/m². 59,5% of the athletes were eutrophic according to the BMI and 23,8% overweight. AC showed the average of 27,7+4,2cm while WC was 76,5+11,1cm. By the AC 52,4% of the athletes were eutrophic and 35,7% with some degree of muscular mass deficiency. The WC showed that 88,1% of the athletes showed low risk in developing heart diseases, 7,1% showed moderate risk and 4,8% high risk. Among male teenagers the body fat (BF) was 26,3% and females 27%. As for the adults it was 21% among females and 35% among males. The BF rating showed that 40% of the females and 37,1% of the males are in risk of diseases associated to excess of fat and inflammation; 33,3% of females and 29,6% of males are with the BF increased and only 26% of females and 29,6% of males have the ideal BF for their ages.

Discussion: The data in the present study is innovating, given the shortage of information about the Taekwondo athletes' nutritional profile. The athletes have good life habits and training dedication, complementing with endurance and strength exercises. Despite this, a high index of BF was found among the athletes. According to ACSM (2015), the excess of BF, can compromise the athletes' physical and active performance, lowering the strength and agility. Besides, a high BF index increases inflammation, causing stress, unwanted muscle injury and increase of oxidative stress, causing the athlete to be more predisposed to diseases, injuries and compromising the efficiency and physical performance. The increasing size of the WC is a reflex of the elevated BF, finding that makes the athlete predisposed to diseases. Important muscle depletion was observed by the AC parameter, suggesting that the athlete can use this tissue as a way to produce energy to sustain their activity, which requires a research about their feeding. Inadequate feeding throughout the day and in the pre-training and post-training phases can reflect in higher degradation of protein mass, increase of BF and compromise the muscle and hepatic glycogen reserves.

Conclusion: The data shows that the Taekwondo athletes present anthropometric profile with increased BF index and very suggestive evidence of muscle mass depletion, which could be related to inadequate and insufficient feeding to their needs. It becomes necessary an intervention and following by an interdisciplinary team aiming reducing the risk of diseases and injuries, and offer better physical performance and efficiency to the athletes.

EFFECTS OF WHEIGHTLIFTING TRAINING ON SHOULDER STRENGTH PARAMETERS

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Introduction and Purpose: Weightlifting training has attracted many adepts in recent decades, reaching great popularity among individuals in the United States, where an estimated of one in five adults is regularly engaged in this type of activity. In Brazil, although this proportion is less expressive, the number of practitioners reaches about 3% of the adult population, still being a physical activity of great relevance. There is little literature about the impact of bodybuilding training on shoulder strength parameters. A previous study by Kolber et al postulated that the resistance training pattern with emphasis on large muscle groups could produce shoulder strength unbalance and be a predisposing factor of injury. This work reported muscular imbalance in athletes compared to the untrained controls in relation to agonist/antagonist balance of shoulder rotators, as well as upper and lower portions of the trapezius muscle, using a portable dynamometer. These findings would have the important implication of suggesting that Weightlifting training would be intrinsically related to potentially pathological changes. Based on these data, this study aimed to evaluate the impact of Weightlifting training on shoulder strength parameters, as well as to assess the supposed muscular imbalances generated by the training.

Material and Methods: Recreational Weightlifters (TSD) who trained more than twelve months continuously and did not practice other sports were compared with individuals not involved in any sports activities (UNT). Were included men aged 18 to 40 years, without previous orthopedic surgical procedures in the upper limbs, without complaint of shoulder pain and who denied the use of anabolic steroids in the last three months. All were submitted to physical examination, isokinetic shoulder dynamometry and shoulder ultrasonography.

Results: Our data demonstrated superior strength parameters in the TSD group, represented by the statistically superior average peak torque in the external rotation (20.86 vs 24.6), internal rotation (35.12 vs 39.89), extension (53.97 vs 63.09), flexion (41.32 vs 50.17) and abduction (36.6 vs 41.3). Although the adduction average peak torque was higher in the TSD group (53.65 vs 57.24), there was no statistical difference ($p = 0.15$). Results of the same pattern were observed when analyzing average power. When analyzing the agonist / antagonist relationships, there were no differences in the external / internal rotator ratio (69% vs 74%, $p = 0.09$), but it was observed in the flexion / extension ratio (80% vs 90%, $p = 0.008$).

Discussion: Unlike the literature, our data indicates the preservation of rotators ratio with Weightlifting training. We observed an increase in the extension / flexion ratio, but remained within the limits of normality, without indicating a pathological connotation.

Conclusion: In the parameters analyzed in this study, Weightlifting training does not seem to systematically involve pathological changes in strength expression.

SCAPHOID FRACTURE IN A TRIATHLETE TREATED WITH K-WIRE TECHNIQUE: CASE REPORT

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Introduction and Purpose: The scaphoid is the most lateral bone of the proximal carpal layer and the most commonly fractured bone in this area. The radial artery provides the necessary local irrigation and, when blood flow is impaired, there is a chance of developing avascular necrosis (NAV) - one of the main complications of this type of fracture - as well as bad consolidation and non-consolidation, carpal instability and radiocarpal pseudoarthrosis. The diagnosis is obtained by radiography. If fracture is suspected and X-ray results are inconclusive, computed tomography (CT) and magnetic resonance imaging (MRI) should be considered as adjunctive diagnostic methods. The treatment can be performed in two general ways: surgical and non-surgical. Non-surgical procedures consist of immobilization and should be used primarily when the radiograph does not clearly show any fractures. The surgical method can be performed by open surgery or combined percutaneous and arthroscopic technique. Kirschner (K-wire) and screw techniques are the two most accepted types of surgery for the treatment of scaphoid fractures in young people, especially those in need of rapid recovery, such as athletes and manual workers. When speaking of triathletes, most of the time, their fractures occur during the practice of cycling, being fractures of the hand, wrist, elbow and shoulder the most frequent. Often, the diagnosis of scaphoid fracture is forgotten or not performed, since sometimes the radiography may not show fractures, and in these cases a new radiograph should be performed after 10 days. In addition, the early return of athletes is important and the correct diagnosis is necessary. Objective: report the K-wire surgical approach performed in a triathlete diagnosed with a scaphoid fracture.

Material and Methods: The authors describe the early diagnosis of a scaphoid fracture in an athlete of the 19-year-old Brazilian triathlon team. A dorsal approach was used to reduce and fix the k-wire fracture. Early controlled mobilization was prescribed postoperatively. In the indication of the method of fixation of the fracture, would be used compression screw or k-wires, but, due to the stability of the fracture, age of the patient and the possibility of new injuries due to the characteristic of the sport practiced, we opted for K-wire.

Results: In the postoperative evaluation for the K-wire technique, the patient presented a recovery of the scaphoid fracture in 6 weeks, when the athlete was fourth in the Pan-American Games. This therapeutic result was analyzed by bone consolidation, which was complete in the mentioned time. In addition, the patient was accompanied by a physiotherapist to perform early controlled mobilization.

Discussion: In our analysis, the K-Wire technique proved effective at 6 weeks, specifically for the 19-year-old athlete, diverging from other studies that found a recovery time of 9 weeks overall. In addition, the technique used in our study obtained the same recovery time stipulated for the screw technique, 6 weeks, which encourages a more detailed evaluation of the most beneficial technique for athletes according to age, gender and other variables.

Conclusion: Early diagnosis, correct indication of surgical treatment, and early controlled mobilization resulted in excellent clinical outcomes with a return to training overall in six weeks. Studies of a greater comparative approach between K-wire and screw technique, involving sample of different ages and injuries, are necessary for the best individual evaluation of the therapy of each athlete.

EFFECTS OF STRENGTH TRAINING IN PATIENTS WITH MILD TO MODERATE PARKINSON'S DISEASE: A SYSTEMATIC REVIEW OF LITERATURE

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Introduction and Purpose: Current clinical evidence shows that exercise has therapeutic value for patients with Parkinson's disease. However, the literature reviews are controversial about the real benefit of isolated strength training for patients with Parkinson's disease. To identify the benefits of strength training for patients with mild to moderate idiopathic Parkinson's disease, performing an overall assessment of motor, cognitive, cardiovascular and quality of life effects.

Material and Methods: Literature research was conducted in December 2017 in the following databases: PUBMED, LILACS, PEDRO and SCIELO. The research was conducted in the English language with the following terms or key words: resistance training, parkinson's disease, strength training, muscle strength, rehabilitation and randomized controlled trial.

Results: 18 articles were included in the qualitative analysis of this systematic review. All articles were randomized, published in magazines and newspapers online. Systematic reviews of literature and meta-analyses were excluded. Participants included in the studies were patients with mild and moderate idiopathic Parkinson's disease (stages 2 and 3) of any age and gender. The intervention used is isolated strength training (progressive or not), with a minimum training time of 8 weeks and a minimum of 2 hours a week. Patients in the intervention group may be compared with another type of intervention or control group. The results of the motor standard, cognitive evaluation, quality of life and cardiovascular evaluation will be evaluated.

Discussion: Falls are common and disabling in Parkinson's patients. Studies show that half of the patients may fall at least once a year. The analysis of the results shows that strength training can be considered a good strategy to prevent falls, and it should be emphasized that it is not the only intervention capable of reducing the number of falls and analyzing the balance and walking pattern, as well as individualize the treatment of each patient. The unified scale of evaluation of Parkinson's disease is used to evaluate motor and non-motor aspects related to daily life experiences and the symptoms of patients with Parkinson's. According to three recent systematic reviews, we can conclude that strength training can have a positive impact on UPDRS III and is an excellent form of rehabilitation treatment for patients with mild to moderate Parkinson's disease. Regarding the effects of strength training to improve balance and postural stability, it can be affirmed that there may be a functional improvement of patients with strength training, but more studies will be necessary to conclude whether this type of intervention is superior or complementary to strength training. balance training, now critical to the rehabilitation of patients with Parkinson's disease. Evidence suggests that bradykinesia, one of the cardinal signs of Parkinson's disease, is a deficiency mediated by both basal ganglia change, mass loss and muscle strength mediated by physical inactivity as well as by age. All articles that evaluated the relationship between bradykinesia and strength training in this systematic review reported that resistance training improved bradykinesia when compared to control and other interventions. Studies evaluating quality of life, cognition and functional performance have concluded that resistance training is important in functional improvement, quality of life and cognition.

Conclusion: Strength training has a positive effect in several motor aspects such as improvement of muscular strength, bradykinesia, UPDRS III, with consequent impact on the gait, balance, and stability. This may lead to a reduction in the risk of falls and improvement of functional independence. The studies also show the positive impact of strength training on the improvement of the life quality as well as improvement of the functional autonomic cardiovascular disease.

APPLICATION OF THE SEATTLE CRITERIA IN THE ELECTROCARDIOGRAPHIC ASSESSMENT IN FEDERATED ATHLETES

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Introduction and Purpose: The assessment of the electrocardiogram (ECG) in athletes remains controversial, with lack of standardization and difficulty in applying specific criteria in its interpretation. The main purpose of pre-competitive screening of athletes is to enable early (pre-clinical) identification of pathological conditions associated with increased risk of serious clinical events, including sudden death. The majority of disorders associated with an increased risk of sudden cardiac death (SCD) are suggested or identified by abnormalities on a resting 12-lead ECG. Whether used for the evaluation of cardiovascular-related symptoms, a family history of inheritable cardiac disease or premature SCD, or for screening of asymptomatic athletes, ECG interpretation is an essential skill for all physicians involved in the cardiovascular care of athletes. The purpose of this study was to assess variability in the interpretation of the ECG in athletes.

Material and Methods: The ECGs of 480 federated athletes were assessed, prospectively according to Seattle Criteria and the training in their reading provided by the British Journal of Sport Medicine. The study was performed from January 1st to May 31st 2018 in Morteros city (Córdoba province-Argentina) and was part of the medical examination of medium and high competence (EMMAC), mandatory by law since 2010.

Results: The average age of athletes was of 16.51 years old (se = 0.40, min = 7, max = 64, N = 480). The most frequent sport practiced by athletes was soccer (71% of the cases) followed by basketball (14%) and volleyball (11%). The rest of the sports (eg. swimming, tennis, gymnastics) were scarcely represented (<2%). Of the 480 electrocardiograms evaluated, 333 were normal electrocardiograms, 128 presented normal findings in athletes including sinus bradycardia and isolated voltage criteria for left ventricular hypertrophy (LVH), 9 were borderline and 30 presented pathological findings, 10 of these with signs of LVH. The borderline and pathological cases were derived to perform complementary studies such as Doppler echocardiogram, 24-hour holter, myocardial perfusion, etc.

Discussion: Studies demonstrate that without further education the ability of many physicians to accurately interpret an athlete's ECG is relatively poor and may lead to an unacceptable rate of false-positive interpretations and unnecessary secondary evaluations. However, providing physicians standardized criteria with which to evaluate an ECG considerably improves accuracy. While the ECG increases the ability to detect underlying cardiovascular conditions that place athletes at increased risk, ECG as a diagnostic tool has limitations in both sensitivity and specificity. Even if properly interpreted, an ECG will not detect all conditions predisposing to SCD. In addition, the true prevalence of specific ECG parameters in athletes and in diseases that predispose to SCD is often unknown and requires further study. The Seattle Criteria was developed with thoughtful attention to balance sensitivity (disease detection) and specificity (false positives), while maintaining a clear and usable checklist of findings to guide ECG interpretation for physicians, including new learners.

Conclusion: -Cardiac adaptation and remodeling from regular athletic training produces common ECG alterations that could be mistaken as abnormal. -The ECG interpretation guidelines presented and the online training program serve as an important foundation for improving the quality of ECG interpretations and the cardiovascular care of athletes. -The interpretation of ECG according to the Seattle Criteria allowed recognizing patients with pathological findings and deriving them for their complete evaluation.

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ASSOCIATION BETWEEN ASYMPTOMATIC SHOULDER INJURY AND STRENGTH

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Introduction and Purpose: Inadequate resistive exercises can cause or complicate musculoskeletal injuries. The shoulder is one of the most affected joints, up to 36% of all weight training injuries. However, there is a lack of information about the prevalence of shoulder injuries associated to weight training and its impact on strength. Purpose Evaluate the prevalence of asymptomatic shoulders injuries, diagnosed by ultrasonography, and its association with strength of men who perform or not weight training.

Material and Methods: This is a cross-sectional study, which included men between 18 and 40 years old, in two groups: a) Trained Without Chronic Pain (TWCP): men who perform weight training with no complaints of shoulder pain; b) Control Group: untrained men with no complaints of shoulder pain. The participants were submitted to shoulder ultrasonography, physical exam and isokinetic dynamometry. The torque peaks at 60°/s and 180°/s were evaluated for external and internal rotation, extension, flexion, adduction and abduction of shoulder.

Results: In the control group, greater strength in the isokinetic tests was observed in individuals with shoulder injury diagnosed by ultrasonography, when compared to individuals without injury. Torque peak at 60°/s without injury vs with injury (N-m): external rotation (27,9 vs 33,38; $p < 0,05$), internal rotation (39,87 vs 50,48; $p < 0,05$), extension (68,97 vs 86,20; $p < 0,05$), adduction (59,76 vs 74,29; $p < 0,05$), abduction (50,15 vs 60,62; $p = 0,063$). Torque peak at 180° without injury vs with injury (N-m): external rotation (21,93 vs 30,63; $p < 0,05$), internal rotation (36,06 vs 45,89; $p < 0,05$), extension (58,72 vs 77,40; $p < 0,05$), flexion (45,42 vs 54,68; $p < 0,05$), adduction (56,53 vs 67,88; $p < 0,05$), abduction (40,28 vs 50,31; $p < 0,05$). In TWCP group, the without injury subgroup presented greater strength when compared to the with injury subgroup. Peak torque/bw at 60°/s without injury vs with injury (N-m): extension (111,85 vs 92,77; $p < 0,05$), flexion (96,67 vs 83,90; $p < 0,05$), adduction (104,39 vs 76,16; $p < 0,05$). Torque peak/bw at 180° without injury vs with injury (N-m): extension (99,76 vs 85,14; $p < 0,05$), flexion (81,89 vs 67,36; $p < 0,05$), adduction (96,81 vs 71,33; $p < 0,05$).

Discussion: Considering that the design of this study does not allow us to generate definitive conclusions, we can only suppose that the higher strength of the untrained group with asymptomatic lesions is due to greater use of the shoulder muscles, which generate greater strength gains and more susceptibility to injury. In the TWCP, the higher strength in without injury subgroup, when compared with injury subgroup, could hypothetically be explained by: a) preexistent injuries can compromise the training and gains; b) individuals who had less strength were more susceptible to injury; c) the presence of an injury, even if asymptomatic, may reduce the strength.

Conclusion: In untrained men, asymptomatic ultrasound injuries are associated with higher strength of the shoulder in isokinetic tests. On The other hand, in trained men, this feature is associated with less strength.

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EFFECTS OF PLYOMETRIC TRAINING IN SWIMMERS

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Introduction and Purpose: If we consider that in most sports gestures, every concentric contraction is preceded by a muscular stretch, we will realize the importance that is currently given to the plyometric mechanism of muscular work, also known as the Stretch-Shortening Cycle. The objective of our work was to assess the effects induced by a plyometric train program of the lower and upper body in the team of federated swimmers of a sport club through the measurement with jumps using Axon Jump platform and Bosco test battery.

Material and Methods: From October to December 2017, a comparative observational study was conducted over time. The study involved 10 subjects, all federated athletes belonging to "Club Tiro Federal y Deportivo Morteros". The group under study consisted of 5 males and 5 females, with an average age of 14.5 years old and an average weight of 50 kg. Jumping batteries with Axon Jump platform were performed before and after the 12-week plyometric training program which consisted of 36 sessions in total of one hour each. All the sessions, with an average of 163 supports, were carried out on a concrete surface. Paired sample T-tests were used to detect possible differences between the jumps of the first and second periods (level of significance 0.05).

Results: There was an improvement in the whole battery of jumps and even push up after the training. The average of squat jump after training was significantly ($p = 0.0068$) higher (34.41 cm) than before training (29.7 cm). The counter movement jump was before plyometric training of 30.41 cm whereas after training was of 34.97 cm ($p = 0.0032$). The results of Abalakov test also follow the same pattern and registered the highest difference (32.4 cm versus 41.92 cm after training with $p = 0.0007$). The drop jump was 1.1 higher after training (mean before = 38.43, mean after = 43.04, $p = 0.0117$). The improvement in the swim times along different styles was an average of 20%.

Discussion: When comparing the results obtained with the literature, most of previous studies have showed significant improvements in jumping ability after plyometric training programs, especially in countermovement jump. Even so, there are works that have not found significant improvements in such capacity after a training program of 6 weeks (18 sessions). The lack of statistical significance in the increments of the jump height usually found in this kind of studies may be due to the short duration of the program applied. This was the reason why we extend our work to 12 weeks. We agree with the majority of studies inspected in which the test most sensitive to the adaptations induced by plyometric training is the CMJ. In addition, we consider that by improving both the explosive strength of upper and lower limbs, we have contributed to the improvements in times in the field tests of swimming.

Conclusion: 1) A 12-week plyometric training program applied to federated swimmers, at a rate of 3 sessions per week and with an average of 163 supports per session, caused significant increases in explosive strength. 2) The training program produced significant improvements in all the battery of jumps, especially for the Abalakov test.

RHODIOLA ROSEA EXTRACT AS AN ADAPTOGEN FOR EXERCISE PERFORMANCE: A REVIEW OF THE LITERATURE

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Introduction and Purpose: Adaptogens are substances that can improve the body's nonspecific resistance to a variety of stressing factors exposure, promoting a state of adaptation to exceptional situations. Rhodiola rosea extract (RR) is a plant adaptogen that has been studied for exercise performance improvement, through evaluation of biomarkers, physiological and performance parameters. The aim of this study was to summarize evidence regarding RR adaptogenic properties for exercise performance.

Material and Methods: Literature searches on MEDLINE/Pubmed database was performed in May/2018 with filters set to humans and English, Spanish or Portuguese language, and no filters for date. Key search terms were "Rhodiola rosea" and sport or endurance or performance or exercise or lactic acid. The search term at SCIELO was "Rhodiola rosea", with no filters.

Results: 66 studies were retrieved; upon and selection of randomized controlled or observational clinical trials, 7 studies remained for evaluation, being 1 observational, 2 crossover and 4 randomized controlled trials. A total of 136 subjects was included. RR dose in selected studies ranged from 170 mg to 600 mg daily, and supplementation time, from 1 to 30 days. Upon acute or prolonged RR intake, when compared to placebo, statistically significant changes were identified in performance parameters like reduced time to exhaustion and rating of perceived exertion (Borg Scale), higher perceptions of arousal and pleasure and mood state score for vigor. Physiological parameters significantly changed by RR included enhanced pulmonary ventilation, VO₂, VCO₂, peak O₂ and CO₂ output, and decreased heart rate. Reduced post-exercise biomarker levels were blood lactate and C-reactive protein, plasma creatinine kinase, superoxide dismutase activity in erythrocytes, and free fatty acids; on the other hand, biomarkers related to antioxidant capacity increased with RR use. No improvements were seen in exercise-induced muscle damage, delayed onset of muscle soreness, time to complete exercise, energy expenditure, cognitive functions after exercise, extracellular HSP72, carbohydrate or fat oxidation, blood glucose, inflammatory and oxidative damage biomarkers, salivary cortisol or alpha amylase levels.

Discussion: RR extract supplementation for exercise performance improvement was evaluated using a variety of dosages and posology regimens, for different exercise profiles, with evaluation of diverse biomarkers, physiological and performance parameters as endpoints. Statistically significant superiority of RR extract supplementation was evidenced for time to exhaustion, rating of perceived exertion, perceptions of arousal and pleasure, mood state score for vigor, pulmonary ventilation, VO₂, VCO₂, peak O₂ and CO₂ output, and decreased heart rate, as well as for biomarker levels as blood lactate, C-reactive protein, plasma creatinine kinase, superoxide dismutase activity in erythrocytes, free fatty acids, and biomarkers related to antioxidant capacity.

Conclusion: These data evidences RR extract capability to improve exercise performance parameters; however, further large-scale studies with aligned exercise profiles and endpoint parameters are warranted to clarify the most effective dosage and posology regimen for this purpose.

RESPIRATORY MUSCLE STRENGTH AND THORACIC MOBILITY IN PROFESSIONAL WHEELCHAIR BASKETBALL ATHLETES

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Introduction and Purpose: Trauma in spinal cord (TSC) is an injury that entails sensory, motor, autonomic, metabolic and respiratory complications. The degree of spinal cord injury is directly related to respiratory muscle strength and thoracic mobility. It is known that these conditions lead to reduced ventilation and consequent reduction in cellular oxygenation. Thus, the objective of the study is evaluate the respiratory muscle strength and thoracic mobility of professional wheelchairs basketball athletes.

Material and Methods: Eight athletes with spinal cord injury and 10 participants without injury were evaluated, all aged 21-60 years. The cirtometry at the axillary, xiphoid and abdominal levels were measured from rest to inspiration and from rest to expiration three times and the mean of the measurements was used for analysis. Respiratory muscle strength was expressed by maximal inspiratory pressure (MIP) measured from the residual volume and maximal expiratory pressure (MEP) from total lung capacity. Participants performed three forced maneuvers. Data analysis was used Shapiro-Wilk test for normal distribution and t-Student non-paired to compare two groups. Significance level considered was <0.05.

Results: The lesion time was 15.31 (15.76) years. The mean of respiratory muscle strength, both MIP (Athletes: 89.9 ± 24.4 cmH₂O, participants without injury: 114.80 ± 25.64 cmH₂O, p = 0.05) and MEP (Athletes: 89.3 ± 37, 7 cmH₂O, participants without injury: 151.54 ± 26.98 cmH₂O p = 0.003) were reduced in athletes with spinal cord injury compared to individuals without injury. The thoracic mobility was not within of the predicted (4 to 7 cm) in any of the athletes. Five athletes had an inverted respiratory pattern at the axillary level, four at the xiphoid level and four at the abdominal level. When compared to the thoracic mobility between individuals with spinal cord injury (0.8 ± 1.7 cm) and no lesion (2.6 ± 1.7 cm) at the xiphoid level during inspiration, there was a significant difference (p = 0.03).

Discussion: The results of this study are similar to those in the literature, which also showed that both MIP and MEP presented values below of the predicted in people with spinal cord injury indicating reduced global respiratory muscle strength. However, the aforementioned researches were not athletes and their sample had male and female participants. In contrast, there is evidence that the respiratory muscle strength of 15 male wheelchair basketball athletes who were divided into two groups (with and without trunk control) presented values within the predicted for MIP and MEP. Regarding thoracic mobility, the majority of the athletes presented the paradoxical respiratory pattern that can be explained by the absence of voluntary control of the respiratory muscles, sensorial alterations resulting from the TSC and the maintenance of the seated posture.

Conclusion: Spinal cord injured athletes have reduced respiratory muscle strength when compared to individuals without injury. The thoracic mobility of all evaluated were below predicted values and the inspiratory measure at the xiphoid process level was lower in athletes with TSC.

ADVERSE EFFECTS OF CAFFEINATED ENERGY DRINKS AMONG ATHLETES. A SYSTEMATIC REVIEW OF THE LITERATURE.

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Introduction and Purpose: The term "energy drink", which first appeared in Japan in 1960, refers to any kind of product in a form of a drink or concentrated liquid, believed to reduce or prevent fatigue, enhance physical performance, enhance disposition and improve cognitive performance. It contains a mixture of ingredients, such as caffeine (CAF), taurine, guarana, and Vitamin B, and have become the new way for adolescents, athletes, and students all over the world, to achieve an immediate energy boost or a heightened sense of awareness. The purpose of this review is to emphasize on the adverse consequences of caffeinated energy drinks usage among young athletes which may be related to concomitant situations, especially when an over consumption is occurred.

Material and Methods: A search of the scientific literature was performed primarily by accessing all major sources, such as PubMed, Google Scholar, Medline, Embase, and the Cochrane library, using keywords, like: "energy drinks", "sports drinks", "caffeine", "taurine", "adverse effects", "side effects", "athletes", and "adolescents", to identify articles related to energy drinks' consumption during the time period 2013-2016. Manufacturer Web sites were also reviewed for product information related to our search. The articles' citations were used to identify relevant papers in order to obtain a whole over approach of the subject. A total of 10 articles were reviewed in detail related to the possible appearance of each of the following main clinical outcomes: headache (H), gastrointestinal effects (GIE), tachycardia (T)/ palpitations, vigor (V)/ activeness, anxiety (A), muscle soreness (MS), insomnia (I), and increased urination (U). Each athlete of these studies, (240 athletes in total) participated in two different groups (Group-1: CAF, Group-2: without CAF-w/CAF). In the first group, each participant consumed a CAF energy drink, while in the second group each participant consumed an energy drink w/CAF before athletic activity.

Results: In the 1st group (CAF), the most frequently observed adverse effects were MS (57 cases, 23.82%), I (36 cases, 14.94%), V (33 cases, 13.72%), increased U (20 cases, 8.33%) and H (18 cases, 7.51%). Phenomena, such as T (6 cases, 2.50%), GIE (9 cases, 3.74%) and A (4 cases, 1.66%) occurred in a lower percentage. In the 2nd group (w/ CAF), the most frequently observed adverse effects were MS (72 cases -29.88%), increased U (23 cases, 9.39%), H (21 cases, 8.79%), and I (11 cases, 4.61%). Other adverse effects, such as, V (7 cases, 2.91%), T (2 cases, 0.83%) and GIE (8 cases, 3.30%) occurred in a lower percentage, while A was not observed. Comparing the two groups' results, we can conclude that after CAF energy drinks' consumption, I, V, A, H, GIE and T, may have a higher incidence, while MS, U, seems to have a lower incidence.

Discussion: Energy drinks consumption may potentially be harmful, due to their high CAF concentration. CAF, as a stimulant, affects the body by stressing the central nervous system, and can be responsible for many adverse effects that can be occurred, during or after a sport activity without being considered as the main cause for these effects.

Conclusion: Despite the plethora of positive effects that energy drinks may provide in athletic performance, they can also lead to apparently minor, but important side effects when they are not consumed on the right way. These results, suggest the need to plan a public information strategy to create awareness among athletes about the side effects of excessive intake of energy drinks.

REHABILITATION AFTER ANTERIOR CRUCIATE LIGAMENT RECONSTRUCTION IN A YOUNG ATHLETE: CASE STUDY

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Introduction and Purpose: Reconstruction of anterior cruciate ligament (ACL) is a common and difficult problem of the con temporary sport traumatology. This problem concerns not only the elderly population, but mainly young people with immature skeletal systems who have sustained ACL injuries. Through the last decades much attention has been directed toward various anatomical and biomechanical risk factors contact ACL injury, and important information have been retrieved about the influence of external loading factors on ACL injury risk during given sports-specific movements. The most important goal in patients with unfinished bone growth is selection of the surgical technique which could minimize possible damage of the epiphyseal cartilage, combined with directed, individual physiotherapy.

Material and Methods: CASE STUDY A 16-year-old athlete female had a complete ACL tear during a football match. The imaging revealed patella alta, III-rd degree ACL damage with the stub at the level of the intercondylar eminence, hindering extension. The patient was subjected to intrastratal, single-bundle ACL reconstruction.

Results: During the early post operative period the management was focused on anti-inflammatory therapy, assurance of optimal healing conditions and graft securing. During later stages, the range of movement and muscle exercises as well as proprioception improving exercises we reapplied. During the period the lowest ACL resistance particular attention was focused on protection of the ligament using rehabilitation, mainly in closed kinematic chains, which was focused on the exercises of knee joint flexor muscles and co-contraction of the se muscles. After obtaining a full range of movement as well as mechanical resistance of the graft, physiotherapy was aimed at the increase in muscle strength and control and involved individual sport training.

Discussion: The main goal of the surgical procedure was regaining baseline physical fitness and sport activity level, conditioned by obtaining a full painless range of movement, stability and muscle strength comparable with those of the uninvolved limb (+/- 10%). Across sports, the overall incidence of a first-time non-contact ACL rupture in female high school and college athletes have been reported to be as high.

Conclusion: Adolescent female athletes appear to be at particular high risk of sustaining non-contact ACL injury. Early arthroscopic treatment combined with early individual rehabilitation for patients with immature skeletal systems after ACL tear is an effective approach, enabling the patient regaining full physical fitness and the return to sport. Further investigations of postoperative management strategies are needed to determine the optimal balance between promoting full knee range of motion and protecting healing tissues in injuries of the ACL in young athletes with immature skeletal systems. ACL injury prevention therefore seems of outmost importance in young female athletes, which prompts for a strong need for optimized prophylactic training regimes targeting this specific age- and sex- group.

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TESTOSTERONE BOOSTERS: A SYSTEMATIC REVIEW

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Introduction and Purpose: Athletes and non-competitive exercisers have been constantly seeking for ways to increase their performance, including using dietary supplements and anabolic steroids. However, the use of exogenous testosterone has both ethical and health implications, given its numerous side effects previously described in the literature. These implications have led to an increased interest in substances that potentially can raise serum testosterone levels without the harmful effects of anabolic steroids, which have become widely prescribed and purchased in recent years, regardless of the availability of scientific evidence of its efficacy. This study aims to conduct a systematic review of all available scientific evidence on a select list of potential stimulators of testosterone production, which are used in clinical practice.

Material and Methods: Twenty-five substances were chosen to be included in the study. Have been selected herbal products, microelements and amino acids found in dietary supplements, which necessarily are available in the market with properties alleged to increase serum testosterone: Aspartic acid, Avena Sativa, Boron, Bulbine Natalensis, Catuaba, Passiflora caerulea, Epimedium, Fenugreek, Gamma Oryzanol, Ginkgo Biloba, Ginseng, He Shou Wu, Yohimbine, Peruvian Maca, Marapuama, Mucuna Pruriens, NMDA, Piperine, Selenium, Saw palmetto, Tongkat Ali, Tribulus Terrestris, Urtica Dioica, Withania somnifera, Zinc Magnesium Aspartate. The research was limited to the review of clinical trials in humans, since the 1990s, with no language restriction and found by searching for various synonyms for these substances together with the term "testosterone".

Results: At the Beginning were obtained 268 articles and were excluded the duplicates. After this step, had initially been analysing the abstracts and then the complete texts. Sixty-one articles were selected for final inclusion in the study. Nine substances had no studies that evaluated their action on testosterone in humans.

Discussion: After evaluating the available data, we observed that the vast majority of substances did not provide solid evidence to justify their use for this objective, especially in the context of sports and physical activity. The substances that in our review appeared to have some benefit with regard to physical activity were Fenugreek, which had five articles comparing it with placebo, four of which showed a slight but statistically significant increase in serum testosterone in the intervention group, and Withania somnifera, which showed increases of 14-17% in serum testosterone levels, although only in a single study without methodological complications. All the studies analysed had small samples and short duration.

Conclusion: Our review demonstrates that most of the substances studied do not have a scientific basis that justify their prescription to athletes and exercisers in order to increase serum testosterone levels. The only two potentially beneficial substances require further research with larger samples to confirm their findings.

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UNILATERAL AND BILATERAL SYMMETRY ASSESSMENT AFTER RECONSTRUCTION OF ANTERIOR CRUCIATE LIGAMENT IN THE LANDING MOVEMENT.

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Introduction and Purpose: The reported incidence of 0.7 to 2.5 tears per 1000 athletic exposures in the young and athletically active people makes the anterior cruciate ligament the most frequently being injured of all knee ligaments. For patients with functional knee instability and wishing to return to cutting and pivoting sports, the arthroscopic reconstruction of the ligament remains a gold standard of treatment. One of the main success indicators of the surgical procedure is the return to preinjury sporting level. The aim of the study is the biomechanical assessment of unilateral and bilateral jump symmetry in the landing phase in post-operative anterior cruciate ligament reconstruction rehabilitation patients.

Material and Methods: A group of 20 post-operative anterior cruciate ligament reconstruction males athletes underwent 4-stage physiotherapy-based rehabilitation. A platform force was used to measure vertical ground reaction forces during unilateral and bilateral jumps in operated and non-operated lower limbs. Maximum and mean peaks vertical ground reaction forces values and the number of jumps performed were recorded on average at 15, 25 and 35 weeks post-operative anterior cruciate ligament reconstruction. We calculated the deficit of these parameters between the lower limbs.

Results: At 15 weeks post-operative anterior cruciate ligament reconstruction, vertical ground reaction forces during the landing was significantly lower, and unilateral and bilateral jumps on operated limbs in comparison with non-operated limbs. Vertical ground reaction forces of operated limbs was noted to increase at 25 weeks with significant differences between the study parameters. Protection of the involved limb by shifting the body weight to the contralateral was also confirmed in an analysis of drop jumping in Anterior Cruciate Ligament Reconstruction patients.

Discussion: The deficit of vertical ground reaction forces max between the limbs decreased to approximately 10% for the unilateral jump and 13% for the bilateral jump. The author also noted that the limb symmetry bilateral vertical jumps occurred later than the symmetry unilateral vertical jumps. However, the mean of 6 best bilateral jumps was 18%. At 35 weeks post-operative anterior cruciate ligament reconstruction vertical ground reaction force values were similar between limbs and there were no statistically significant differences.

Conclusion: The main goal of the two last stages of the physiotherapeutic procedure for group was to gradually and safely develop basic skills to prepare the post-operative anterior cruciate ligament reconstruction patient for physical activity at the level of competitive sport. Between 25 and 35 weeks of physiotherapeutic treatment after anterior cruciate ligament reconstruction, athletes obtained similar values of symmetrical vertical ground reaction force in the landing phase during unilateral and bilateral jumps for operated and non-operated limbs.

COMBAT SPORTS MEDICINE: A REVIEW OF THE MOST PREVALENT INJURIES IN THE DIFFERENT MODALITIES.**Autores:** Beraldini, I F D S, Valladares, L M P, Pinto, M C, Louredo, G D S, Marzullo, A C D M**Instituições:** Escola de Medicina Souza Marques - Rio de Janeiro - Rio de Janeiro - Brasil

Introduction and Purpose: Many people seek the fight, aiming for an improvement in the quality of life. Franchini et al provides three types of classifications for the martial arts: 1) Dominion, in which the fighting grip technique predominates (e.g.judo and jiu-jitsu; 2) Percussion, in which there is a predominance of the use of touch punch (e.g.boxing and karate). 3) Mixed of modes, it is a combination of percussion and dominion modalities (e.g. MMA). The fighting practitioner is subject to accidents in the recreational and professional sphere. The amount and severity of injuries are higher among professional athletes due to the intensity of training. These trainings generates a greater overload in the limbs, causing injuries like tendinitis, dislocations, fractures among others injuries. The present study aimed to evaluate the prevalence of different injuries in combat sports.

Material and Methods: A non-systematic review was performed on the most prevalent injuries in combat sports. The bibliographic search portals used were: SciELO, sbrate and Lilacs. Were selected 17 articles that dealt with the different martial arts. The selected articles obeyed inclusion criteria that sought to quantify the lesions in each modality.

Results: The injuries in the different modalities of combat sports are common and due to the excessive and inadequate practice. According to Barroso, the most prevalent injuries among wrestling fighters are sprains (34.5%). Manzato concluded that most injuries among judo fighters had traumatic joint origins. Souza evaluated the most frequent lesions in the jiu-jitsu practice and found that in the blue belt the most common injury was sprain (34.4%), in the purple one were hematomas (30.7%), in the brown there was a tie between sprain and (26.1%), and in the black belt the sprain was 26.3%.Zetarak verified in a study with 114 karate practitioners that most of the injuries occurred by direct trauma predominantly in the hands / fingers in 23 practitioners. In a study with professional boxers, Bernick showed that repeated head trauma is a risk factor for Alzheimer's disease and also a primary cause of Chronic Traumatic Encephalopathy (CTE).Burke showed that 41% of boxers participating in the study reported lesions on the conjunctiva, cornea, lens, and retina as acute consequences of head trauma. In a study by Blesoe about the incidence of injuries in MMA competitions with 220 fighters in 171 matches, 69 fighters (40.3%) finished with at least one injury.

Discussion: In domain fights, joint injuries such as sprains and dislocations prevail. This is explained by these modalities involving direct physical contact of the fighters. Fractures are also common in the sport, especially in jiu-jitsu. Athletes can hold the blow until the muscle does not resist, causing the fracture. The chokes such as the triangle and legbraces contributes to injuries in the knee region. There is a risk of knee fracture when bearings are poorly performed. Most MMA injuries affect the head, followed by legs, arms and back. The head is the main target of traumatic blows, so the face is the most damaged anatomical region reported.Repeated blows to the head lead to concussions that can cause a chronic brain injury, known as pugilistic dementia. The most prevalent injuries in the lower limbs are knee sprains and fractures, since kicks and jiu-jitsu locks are extremely used in MMA. Injuries to the upper limbs often happen by not giving up the fight, causing strains, sprains and fractures.

Conclusion: It is concluded that the professional athlete is more exposed to injuries than the recreational practitioner. Sports involving the domain art are related to osteoarticular injuries, whereas those involving traumatic blows are more related to maxillofacial and cerebral damages, as well as osteoarticular lesions. Therefore, the most prevalent type of injury will be related to the frequency of use or the impact on a particular structure.

VITAMIN C DIET SUPPLEMENTATION IN NON PROFESSIONAL ATHLETES BEFORE INTENSE EXERCISE**Autores:** Guimaraes, P S, Silva, C D, Cunha, M G D S

Introduction and Purpose: By definition, vitamins are organic compounds that are needed to maintain a normal metabolism. There are 13 known vitamins, they are either water-soluble or fat-soluble. Vitamin C is water soluble, meaningthat the vitamin does not stay in the body for long time, also the body cannot store them, and they are soon excreted in urine, thus being the reason for water-soluble vitamins needing to be replaced more often than fat-soluble ones. To get this vitamin, one is required eat special types of food, rich in Vitamin C, as like fruits. Athletes and other individuals who practice physical activities often end up overloading the body, producing excess of reactive oxygen species, called free radicals. When in small quantities free radicals have an important role in the organism, favoring the immunity, however; overproduction induces oxidative stress, which causes damage to the cells, promotes early aging and the onset of diseases. In athletes it can also induce muscle damage. To minimize such consequences, preventing the lesions and to further improve the physical performance, many individuals use antioxidant supplements, especially those of vitamin C.

Material and Methods: For this study we required 25 different articles, from Pubmed, Scielo, RevistaBrasileira de Medicina do Esporte and the International Journal of Sports Medicine on the effects of vitamins of athletes; as key-words for search: acid ascorbic, vitamic c, athletes, sports.

Results: The results Professionals suggested 90mg of Vitamin C daily for men, and 75mg for woman. They considered doses over than 2g, 2000mg, with a small chance of the vitamins having no effect of their bodies, but also that the vitamins are not hurtful to the body because they are eliminated in the urine.A bounch of studies were made, to summarize the average result two studies were take, the first one used 1000mg of Ascorbic acid daily in a group of 80 nonprofessional athletes, half of than got the ascorbic acid, and half of than got some placebo. After four weeks, they came with the conclusion about the reduction of oxidative stress, but the performance of these athletes did not see any benefit. The other study gave individuals with 1000mg, while doing intense exercises weekly, and after six weeks of study, they also had not noticed any improved, even of endurance or oxidative stress.

Discussion: According to the researchers, Vitamin C in some cases is important to athletes as an antioxidant effect; it may help to reverse some of the oxidative damage that may occur from intense exercise. This oxidative damage, caused by free radicals, may interfere with the cells' ability to function normally and is believed to play a role in many different health conditions. On the other hand, some researchers do not found any benefits on the use of the ascorbic acid.

Conclusion: As a conclusion, it was observed, there was no link to the efficacy of supplementation with vitamin C with the purpose to improve the physical performance of athletes. Researches may keep looking for make studies about it benefits, maybe even high doses. It might help a lot the Sports Medicine area.In conclusion, there was no link to the efficacy of supplementation with vitamin C with the purpose to improve the physical performance of athletes.

A REVIEW STUDY ABOUT EXERCISE DURING PREGNANCY

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Introduction and Purpose: Historically, pregnant women were disinclined to make any efforts and were advised to reduce their level of activity. Additionally, studies have consistently shown that women tend to decrease their physical activity during pregnancy. However, American College of Obstetricians and Gynecologists (ACOG) updated their recommendations for exercise during pregnancy to be less restrictive. This review summarizes current guidelines for physical activity among pregnant women worldwide. Since pregnancy itself is a life-changing event for many women, it is also a time when other lifestyle changes may be enacted, such as smoking cessation, adopting a healthy diet, or beginning routine exercise. Additionally, as female participation in sports increases, the safety of training during pregnancy has become an important issue. The reality is that pregnant women don't exercise as normally should've been done because they are uncertain about the types and amount of exercise that can and should be performed. The main goal of this study, is a review about important informations to physicians and pregnant womans about restrictions or not in doing exercises.

Material and Methods: For this review, we searched PubMed, Scielo, ncbi, American Journal of Obstetrics and Gynecology and The American College of Obstetricians and Gynecologists for published guidelines on physical activity during pregnancy. The search was narrowed to peer-reviewed studies published between 2010 and 2018. To narrow the scope of the review, we included only the most recent specific or clinical guidelines.

Results: American College of Obstetricians and Gynecologists recommended that the physical activity developed during gestation, has by characteristics exercises of moderate and moderate intensity, is advised for normal pregnancies. Additionally, pregnant women should be cautioned to avoid exercise in the supine position after the first trimester and exercise involving prolonged standing due to significant decreases in cardiac output exercise with a high risk of contact, falling, or abdominal trauma due to the risk of injury to the mother or the fetus, exercise at altitudes greater than 5250 feet due to concerns for fetal hypoxemia; and scuba diving due to the risk of the fetus developing decompression sickness. The main signs that physical activity should be discontinued are Physical activity and gestation are: loss of amniotic fluid, chest pain, vaginal bleeding, migraine, dyspnea, edema, back pain, nausea, abdominal pain, contractions uterine weakness, muscle weakness and dizziness, of fetal movements.

Discussion: Corresponding with the developing science, recommendations on physical activity during pregnancy continue to be created and updated to provide guidance to health professionals. We can argue that high-intensity physical activity can be dangerous to fetus, and take this information as most than 30 minutes of exercise. Analyzing both situations, on pregnant who does physical activity and those who doesn't, it's evident that accours benefits on doing exercises. however, many health professionals still do not have full knowledge about this, so, many women for lack of information choose not to perform physical activities.

Conclusion: As a conclusion, it was observed that for women without contraindications to physical activity, exercise is safe for both the woman and developing fetus. On the other hand, there is no based study evidence that corroborates exercise prevents gestational perinatal depression, diabetes mellitus or preeclampsia. Generally, women who are physically active prior to pregnancy should be advised to maintain, while physically inactive women should be encouraged to begin doing exercise

EFFICACY OF CAPASITIVE-RESISTIVE THERAPY ON THE TREATMENT OF NECK/UPPER TRAPEZIUS MYOFASCIAL PAIN: A RANDOMIZED DOUBLE-BLIND PLACEBO-CONTROLLED STUDY

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Introduction and Purpose: Myofascial pain syndrome (MPS) is a painful musculoskeletal condition affecting the individuals' daily life presenting with muscle spasm, referred pain patterns, stiffness, restricted range of motion caused by trigger points. Capacitive-resistive diathermy therapy heats deep tissues by transferring energy through radiofrequency waves. Currently, although this modality is used to treat various acute or chronic musculoskeletal disorders, there is no specific data about myofascial trigger points in the literature. We aimed to evaluate the efficacy of capacitive-resistive diathermy on the myofascial trigger point of neck/upper trapezius muscle area compared with the sham intervention of capacitive-resistive diathermy.

Material and Methods: Thirteen female volunteers with active myofascial trigger points in the upper trapezius and neck were included the study after being examined by sports medicine specialists. Exclusion criteria were fibromyalgia, discal hernia, radiculopathy, myelopathy, having received trigger point injection and physical therapy within the last 1 month, neck or back surgery, rheumatismal diseases, pregnancy. Patients were randomly allocated into two groups. Group 1 (n=7) was treated with capacitive resistive diathermy (Winback) and exercise. Group 2 (n=6) was treated with placebo (sham) capacitive-resistive diathermy (Winback) and exercise for 10 sessions at intervals of 24-48 hours. Visual analog scale (VAS), neck disability index (NDI) score, cervical range of motion (cROM), active trigger point numbers were evaluated before and after treatment. The results of statistical analysis were expressed as mean \pm SD (standard deviations). Factorial-repeated ANOVA was used for the statistical analysis. The level of significance was considered $p < 0.05$ for this study. The study was designed as a prospective, randomized, placebo-controlled double-blind trial. The study was approved by the Istanbul Faculty of Medicine Ethics Committee. All participants were informed of the study and signed written informed consent.

Results: All patients completed the study. No significant differences were found regarding the demographic data as well as the parameters evaluated in the study intragroup comparisons. However, in both groups, significant improvement in the VAS ($p=0.013$), NDI score ($p=0.046$), degree of cervical flexion ($p=0.007$), right lateral flexion ($p=0.008$) and left lateral flexion ($p=0.013$) was observed after treatment. Similarly, the number of active trigger points significantly decreased ($p < 0.0001$).

Discussion: Non-pharmacologic treatment modalities for MDS include acupuncture, manual therapy, massage, ultrasonography, application of heat, diathermy, dry needling. Capacitive-resistive diathermy is one of the physical treatment agents used for heating the musculoskeletal tissues and thereby increase microcirculation and vasodilatation. However, clinical application of capacitive-resistive diathermy has been reported to be limited in the literature. A number of studies using capacitive-resistive diathermy demonstrated clinical improvements and pain relief in various musculoskeletal conditions such as osteoarticular pathologies, tendinitis, ligament sprains. But none of these studies focused on homogenous groups as our study. Unlike the studies in the current literature, our study was designed as a randomized double-blind placebo-controlled study. We found no significant difference in intergroup comparisons although we observed significant improvement in the intragroup analyses before and after treatment among the parameters we evaluated.

Conclusion: The results indicate that there is no significant effect of capacitive-resistive diathermy modality in the treatment of myofascial trigger points. The intragroup improvement may be attributed to exercise therapy.

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FOUR-YEAR CLINICAL AND PHYSICAL EFFICIENCY MONITORING OF PRIMARY AND MIDDLE SCHOOL STUDENTS

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Introduction and Purpose: Monitoring children's health is an important element of prevention since incorrect lifestyles can result in adulthood diseases. A low level of physical efficiency and obesity are important risk factors for the development of cardiovascular diseases, whereas regular sport already in pediatric age provides a preventative factor.

Material and Methods: In order to assess the state of health and physical efficiency in developmental age, our study involved children from the third year of primary school (9aa) and from the first year of middle school (12aa) of some schools of Nichelino (Turin) from the s.y. 2010-2011 to s.y. 2013-2014. The study involved 807 subjects, 421 females and 386 males, who were visited in the Institute of Sports Medicine in Turin and carried out the following investigations: clinical examination and postural control, anthropometric measurements, visus control, urinalysis, spirometric tests (CVF and VEMS and Tiffenau), resting electrocardiogram, exercise test with continuous recording of the electrocardiogram, evaluation of the maximum aerobic power according to Astrand, tests of physical efficiency (dynamometry, long jump, test of the hexagon, test of flexibility) and conclusion with a written report.

Results: Since the study lasted four years, middle school kids, already assessed when attending primary school, were the subject of longitudinal study. The results obtained show the increase in body weight compatible with the physiological growth of the subjects, but with an average higher than the 75th percentile at 12 years and the increase in BMI passing from the 80th percentile to 9 years at 85 12 years old. Obese kids at the age of 9 (23 males and 20 females respectively) remained affected by obesity at the age of 12 (14 males and 12 females). The number of those practicing sport remained almost unchanged (about 71% of males and 72% of females, respectively for 5 and 4h/week); 83% of the males and 81% of the females continued to play sports and 16.5% of the males and 18.5% of the females started to play sports between the primary school and the middle school. Functional abilities increased in an absolute sense as a function of growth but decreased in relation to weight. A cross-sectional study of children of the same age allowed us to compare 2014 with previous years. The weight of children increased and the number of obese kids increased even if not significantly. The number of sports practitioners in both sexes among 9-year-olds decreased, while the favorite sports are soccer between males and swimming among females. The strength is physiologically greater in males than females in both age in relation to weight ($P < 0.01$), but with a decrease in 2014 in both sexes. The respiratory function increased in both sexes and for both age groups in relation to the growth of anthropometric parameters ($P < 0.01$), and this explains the improvement of the maximum oxygen consumption at 9 years, which decreases to 12, especially in females as it increases weight.

Discussion: The study conducted was an effective clinical screening tool: approximately one third of the children examined showed pathological findings. Postural abnormalities (flat feet and valgus knees in fat children) were the most frequently found after overweight, but also visual deficits, disodontiasis and cardiocirculatory diseases. Depending on the case, these findings have led to recommendations on corrective orthoses, adequate sports activities, postural exercises, better control of the diet or, in the most serious cases, the need to consult a pediatrician or a specialist. In most cases the pathological findings are not incompatible with sport, on the contrary, they can benefit from it.

Conclusion: It is therefore important to make families aware of the practice of sport and the reduction of a sedentary lifestyle as well as a correct lifestyle, in order to maintain a better health condition in the future.

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EFFECTS OF RESPIRATORY TRAINING WITH SPIROTIGER ON AEROBIC FUNCTION IN YOUNG SOCCER PLAYERS

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Introduction and Purpose: The respiratory system is a significant variable in aerobic intensive exercises. Perceptual effort sensation and respiratory muscle fatigue can limit the athlete's performance. In recent years, several studies investigated the influence of respiratory muscle training during repetitive sprint sports like soccer. The aim of this study is to investigate the effects of specific respiratory muscle training (RMT) with voluntary isocapnic hyperpnea training using Spirotiger (VIH) on aerobic performance, fatigue and body composition in soccer players.

Material and Methods: Fourteen youth soccer players from an elite team (mean age 18,5 years) participated in this study. Participants were assigned randomly to either an VIH or a placebo group. The VIH group received 16 sessions of a 15-minute respiratory muscle training with Spirotiger 2-3 times a week. The placebo group performed 16 session of 5 minutes at 65% of the maximum voluntary ventilation (MVV) 2-3 times a week. All participants performed functional tests: anthropometric measurements, body composition with impedance analysis, resting spirometry including vital capacity (VC), peak expiratory flow (PEF), forced expiratory volume in 1 second (FEV1), MVV and cardiopulmonary exercise test on treadmill (heart rate evaluation, pulmonary ventilation, oxygen consumption and carbon dioxide production with metabolimeter). Functional tests were performed at the beginning and at the end of the study after three months.

Results: No significant differences were observed in anthropometric measures or in body composition between the experimental and placebo group. In the VIH group there was a statistically significant improvement of the MVV (from 148 l/min to 167 l/min), VC (from 5,06 l to 5,25 l) and PEF (from 7,2 l/sec to 8,3 l/sec). Furthermore, the running time before exhaustion increased during maximal stress test (from 55 s to 77 s). There were no statistically significant differences in cardiocirculatory, respiratory and metabolic parameters during sub-maximal load test. At maximal load the pulmonary ventilation has been statistically increased (from 130 l/min to 139 l/min) whereas the maximum oxygen consumption and the respiratory equivalent increased without reaching statistical significance but with close values ($p=0,120$ e $p=0,066$). The value of the oxygen respiratory equivalent was significantly higher ($p < 0.005$) in the experimental group than in the placebo group. Blood lactate concentration after VIH was higher ($p < 0,05$ from 8.2 to 9.3) at exhaustive load.

Discussion: According to previous studies isocapnic hyperpnea training doesn't change the gas exchange mechanism. Spirometry values increased thanks to an improvement in diaphragm and rib cage mobility for increased respiratory muscle strength, as required by Spirotiger exercises. Increased respiratory muscle strength, through a better oxygenation, hold up the development of muscle fatigue during maximal exercises decreases.

Conclusion: These results support existing evidence that RMT isocapnic hyperpnea training with SpiroTiger improves performance in young soccer players.

ASSOCIATION BETWEEN SLEEP ALTERATIONS AND PAIN IN YOUNG ATHLETES

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Introduction and Purpose: Sleep quality and pain play an important role in sports performance. Pain may interfere not only in participation and performance in sports competitions, but also in training quality and quantity. Sports performance and injuries risk has also proved to be affected by sleep patterns. There is a reciprocal relationship between sleep quality and pain, nevertheless, literature analyzing the relationship between these factors in young amateur athletes is scarce. The objective of this research is to explore the relation between sleep quality and pain intensity and duration in young amateur athletes.

Material and Methods: A cross-sectional study was conducted in 71 (32 women) young amateur athletes (16.94 years \pm 1.24) during the journey to the competition venue. Consent form and approval of the study were given to 71 participants and to their parents/guardians for under-aged participants. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI); pain intensity was assessed using the Numerical Pain Scale both at rest (NSPr) and during sports practice (NSPs); pain duration (PL) was assessed in months. This research was approved by the Ethic Committee of the Medicine Department.

Results: Higher scores in NSPr were seen subjects with more severe sleep problems by PSQI categories ($p = .044$), whereas this change was not seen in NSPs ($p = .064$) and PL ($p = .61$). The PSQI score had a weak association with the NSPr ($r_s = .24$, $p = .046$) and the NSPs ($r_s = .248$, $p = .039$). In individuals who slept 8 hours or more, moderate inverse association was found between hours of sleep and NSPr ($r_s = -.435$, $p = .026$), NSPs ($r_s = -.468$, $p = .014$) and LP ($r_s = -.394$, $p = .042$).

Discussion: Although there was no statistical significance, the results show a progressive increase in pain intensity during rest and during practice in individuals categorized in higher levels of sleep quality alterations according PSQI.

Conclusion: Sleep quality in young amateur athletes is related to pain intensity, especially at rest, and sleeping more than 8 hours with lower pain intensity and duration.

EFFECT OF HIGH INTENSITY AEROBIC INTERVAL TRAINING VERSUS STEADY STATE AEROBIC TRAINING ON SKIN MICROVASCULAR REACTIVITY IN MODERATELY ACTIVE STUDENTS

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Introduction and Purpose: A sedentary lifestyle is associated with endothelial dysfunction, leading to vascular pathology and impaired microvascular reactivity (MVR). This has been linked to cardiovascular, peripheral vascular and metabolic disease. Enhanced endothelial functioning has been seen in aerobically trained individuals, providing multiple physiological benefits. Therefore, the purpose of this study was to determine if there was a differential training response of skin MVR to high intensity aerobic interval training (HIAIT) as compared to steady state aerobic training (SSAT).

Material and Methods: The study involved 16 moderately active male students (age: 20.93 \pm 5.05 yrs), as determined by the FIT (Frequency, Intensity, and Time) Index of Kaspari (8.58 \pm 1.3METs). They were randomly assigned to one of three groups: HIAIT ($n=7$), SSAT ($n=3$) and a control group (CG) ($n=6$), using randomizer.org. Baseline testing had been performed in order to determine the participants initial skin MVR, cardio-respiratory factors (VO₂max test), lactate threshold, blood pressure and body composition values. These parameters were reassessed after 3 weeks, then at end of the 6 weeks for all 3 groups. The intervention sessions; the participants in the HIAIT and SSAT groups completed a 6 week training programme (2 times a week). The SSAT performed at 60% of their VO₂max for 30 minutes, whereas the HIAIT performed at 100% of their VO₂max for 30 second intervals, followed by 3 minutes of active rest periods, repeated for 6 bouts. The CG did not perform any exercise training during the 6 week period. The significance of associations between parameters was determined using mixed ANOVA ($p=0.05$).

Results: There were no significant interactions between the variables measured. It was noted, however, that there was a strong but not significant relationship between the SSAT baseline measure of post-occlusive reactive hyperaemia (PORH) max/ time to peak (Tp) ($r=0.998$, $p=0.039$), with a strong, but not significant relationships at the midpoint ($r=0.992$, $p=0.083$), and the post measure ($r=0.987$, $p=0.103$). It was also noted that there was a linear relationship between body fat percentage and PORHmax ($r=0.999$, $p=0.020$), however, this may have been due to one significant outlier in the SSAT. The SSAT showed to have a strong linear relationship at baseline, midpoint, and post testing time points when it came to PORHpeak ($r=0.999$, $p=0.22$; $r=1$, $p=0.006$; $r=1$, $p=0.011$). A significant difference across the groups was found for baseline blood lactate and at the midpoint ($p=0.022$), with the HIAIT group starting values being much lower than the other groups. There were no significant effects found in the CG.

Discussion: The main findings of this study indicated that training in either the HIAIT or SSAT groups had no significant effect on skin MVR. Cardio-respiratory factors were shown to have not augmented endothelial function in this study. However, participants in the SSAT did show a significant linear relationship with PORHmax/Tp, as well as PORHpeak. One study assessed the effects of cardio-respiratory factors on endothelial functioning and found contradicting results to this study. Roche et al. 2008, also found that highly trained adolescent soccer players had possessed greater microvascular endothelial vasodilation as compared to an untrained control group who were matched for age and maturity. In other studies, regular physical activity has shown to be effective in improving endothelial dependent vasodilation.

Conclusion: Training in either the HIAIT or the SSAT group had no significant effect on skin MVR in moderately active individuals. These results differ from most of the literature. However, SSAT did display a positive linear relationship with PORHmax, and PORHpeak, which are variables influencing skin MVR. This indicates that SSAT may increase the PORH, and may therefore improve overall microvascular response. Future studies may consider a longer intervention period and more participants.

INSULIN RESISTANCE, METABOLIC SYNDROME AND CARDIOVASCULAR RISK: EFFECT OF PHYSICAL TRAINING IN SEDENTARY MIDDLE-AGED MEN

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Introduction and Purpose: Centripetal adipose tissue, alterations in the lipid, glycemic and pressure profiles are common issues in modern western world men, increasing cardiovascular risk. Preventing these effects include physical activity as a fundamental part of global health promotion programs. The aim of this study was to analyze sedentary middle-aged men who underwent a guided physical training program, comparing them to a group without training, verifying the metabolic effects and cardiovascular function through this intervention

Material and Methods: A total of 186 sedentary for more than 6 months volunteers, over 40 years of age without heart disease or diabetes, were invited to participate in a group of physical training oriented two to three times a week in aerobic (AT) or resisted (RT) exercises for 12 weeks. The Framingham score was used to estimate the risk of cardiovascular events. Glucose, basal insulin, lipid profile and uric acid were titrated, and insulin resistance was assessed by Homa index.

Results: After the 12-week training only in the AT group, differences in weight, BMI and CVR parameters were observed ($P < 0.05$). The parameters basal insulin ($p = 0.017$) and HOMA-ir ($p = 0.044$) in the AT group had modifications. Differences were observed in the TA group in the parameters Total cholesterol ($p = 0.001$), LDL ($p = 0.008$), glycosylated hemoglobin ($p = 0.001$); in the RT group, differences were observed in the parameters Glucose ($p = 0.002$) and uric acid ($p = 0.05$); in group C, elevation was observed in the parameter Total cholesterol ($p = 0.015$).

Discussion: In the present study, we observed a reduction in body weight and BMI in subjects submitted to aerobic training. Although physical exercise is more associated with weight maintenance than weight loss itself, as demonstrated in a previous study (13), where regular physical activity allowed weight maintenance in individuals aged 50-71 years, weight and BMI reduction may be associated with healthy lifestyle that physical activity favors, although in our sample, there was no dietary restriction. According to previous publications (14), the practice of physical activity not only reduces cardiovascular risk, as observed in our study, but also reduces the overall risk of death, regardless of cause. In our study, this relationship was evident in subjects submitted to aerobic training ($P < 0.00$). The benefit of physical activity on glycemic control is already well defined in the literature, especially in individuals submitted to aerobic training (15). Our study has shown reduction of basal insulin levels, HOMA index and glycosylated hemoglobin in individuals submitted to aerobic training, reflecting the improvement in insulin sensitivity and mitochondrial function (16). These findings were not observed in anaerobic training although there are findings in the literature where resistance exercise also has a benefit in the glycemic profile and body composition (17). The findings of the influence of physical activity on the lipid profile in aerobic activity practitioners are not recent (18), although their magnitude is controversial (4). In a study from 2002 (19), it is evident that the greatest benefits are obtained in high intensity aerobic physical activity, a result also observed in the present study, where there was a reduction of total cholesterol and LDL. The benefits of physical activity seem to influence all types of lipoproteins in other studies in the world population (18, 19, 20, 21). Although there are data in the literature in which both types of exercise have effect on the lipid profile (22), in the present study there was no evidence of improvement in individuals undergoing anaerobic training.

Conclusion: In summary, in our study, aerobic training was associated with an improvement in cardiovascular risk profile, lipid profile and glycosylated hemoglobin levels.

DEGREE OF DISABILITY OF THE DWELLERS OF VALENÇA-RJ DUE TO DOR LOMBAR.

Autores: Vieira, T B

Introduction and Purpose: Low back pain can reach up to 84% of people ever in life, up to 65% of people annually and has a prevalence of 11.9% in the world population. It can be influenced by postural, individual, constitutional and occupational factors. Congenital factors, inflammatory processes, infections, degenerative causes can also be the big reason. Sleep disturbance, irritability and altered appetite may be present together with the symptomatology studied. Pains in the spine are the second most prevalent health condition in Brazil, which shows us the importance of the study and of measures to minimize this social problem, which involves both health and politico-economically. The objective of the present study was to verify the degree of disability related to pain scale generated by low back pain in the residents of the city of Valença / RJ.

Material and Methods: Descriptive study with a cross-sectional design. The sample consisted of 70 individuals of both sexes, without age restriction. The data were collected in Valença / RJ by the members of the present study during the year 2018. To verify the degree of disability generated by low back pain, the Oswestry questionnaire was used. After calculating the percentage, the questionnaire ranks as minimum disability (0% to 20%), moderate disability (21% to 40%), severe disability (41% to 60%), crippled (41% to 60%) and invalid (81% to 100%). The visual pain scale was also used, which considers 0 to 2 as mild pain, 3 to 7 as moderate pain and 8 to 10 as intense pain.

Results: Analyzing the classification of the Oswestry questionnaire, it was possible to observe that 43.3% of our sample fits as minimum disability, 40.0% as moderate disability, 12.9% as severe disability and 2.9% as crippled. No one has been rated invalid. Regarding the visual scale of pain, unlike the data obtained by the Oswestry questionnaire, the minority of people classified their pain as light, only 5.7%. 52.9% of the participants occupied the post of moderate pain and 41.4% classified their pain as severe.

Discussion: The prevalence of pain-related disability in this study was 55.8% (including moderate and severe disability), lower than reported by Marina de Góes Salvetti et al and Marina de Góes Salvetti, who observed adults and elderly individuals and found prevalence results among 68, 0% (Marina de Góes Salvetti) and 80.7% (Marina de Góes Salvetti et al). Concerning the perception of pain in the evaluated participants, 41.4% presented scores above eight, a value lower than that found in Thais Stefane et al, who presented 73.19%. In our study we found no statistical significance between the Oswestry disability index and pain intensity. In the visual scale of pain, 94.3% of the participants reported moderate and severe pain, unlike the Oswestry scale, in which 84.3% of the patients had minimal and moderate disability, as well as that found in Pedro Henrique Brito da Silva et al. And Marina of Góes Salvetti, who also found a weak association between these variables, justifying that the relationship may suffer interference from variables such as depression, emotion and catastrophization, which may overlap the pain aspect as the main disabling factor.

Conclusion: In the middle of the results of our work it is possible to conclude that low back pain really has an importance and participation when it comes to disability. However, it was not possible to find a correspondence between the degree of disability and pain intensity, since the minority classified their pain as mild and the majority was classified as minimal disability. Nonetheless, there is a link between moderate disability and moderate pain.

THE EFFECT OF THE CHRONIC USE OF SUPRAPHYSIOLOGICAL DOSES OF NANDROLONE DECANOATE ON THE HEART OF SEDENTARY WISTAR RATS.

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Introduction and Purpose: Anabolic androgenic steroids (AAS) are widely used by professional and amateur athletes to improve physical performance, muscle appearance and mass. However, many adverse effects have been associated with the abuse of AAS, including disorders in the cardiac apparatus. Administration of exogenous steroids has been shown to have profound effects ranging from volume reduction to changes in heart mass. The objective of this study is evaluate the effects of chronic use supraphysiological doses of Nandrolone Decanoate in sedentary Wistar rats in the cardiovascular system, with a focus on the heart.

Material and Methods: Were used for this study twenty male Wistar rats, with 3 months of life, weighing between 300g and 500 g, divided into two groups: sedentary control rats, using peanut oil (SHAM) (n = 10) and, treated rats with Nandrolone Decanoate and sedentary (DECA) (n = 10). After the adaptation period, the treated group received intramuscularly Nandrolone Decanoate (Deca Durabolin 50 mg.mL⁻¹ Organon) at a dose of 10 mg.kg⁻¹ of body weight, once a week during seven weeks. Animals of the control group received, also intramuscularly, injection of vehicle (peanut oil with 10% benzoic alcohol) for the same period and dosage to cause the same stress experienced by the animals of the treated groups. The rats were maintained in bioterium of the Valença Medical School (CESVA), with controlled temperature (25 ± 1 °C), with an artificial light-dark cycle (lights on from 7:00 am to 7:00 p.m.), each experiment group divided into four standard rodent boxes and standard diet, feed and water ad libitum. The body mass of the rats was measured, for seven weeks, using a precision balance and the value was expressed in grams. The animals were killed with an anesthetic dose of sodium thiopental injected intraperitoneally and later the heart was dissected and weighed in the balance analytical to evaluate its mass and volume by the methods of Sherle's. All results were expressed as mean and SD. Statistical analyzes were performed using T Student and statistical significance was considered when p<0,05.

Results: After analysis of the samples some relevant results were found. There was a reduction of 10.47% of the body mass of the DECA group in relation to the SHAM group (348 ± 2.58 - 382 ± 6.62, respectively). Cardiac volume, through the analysis of the Sherle method, obtained a reduction in the DECA group in relation to the SHAM group, of 12.50% (1.231 ± 0.02512 - 1.407 ± 0.06578, respectively). Regarding the cardiac mass, there was no significant reduction between the analyzed groups.

Discussion: Decreased cardiac volume may have occurred due to possible thickening of the myocardial wall, thereby decreasing the lumen of the cardiac chambers. Our study aims to analyze posteriorly ventricular thickness and lumen in order to corroborate the findings found in the Sherle's method. Changes in cardiac volume may be associated with a possible remodeling caused by the effect of the supraphysiological dose of Nandrolone Decanoate.

Conclusion: Nandrolone Decanoate alters cardiac morphology, decreasing its volume and mass.

CREATINE SUPPLEMENTATION AND RESISTANCE TRAINING IN THE ELDERLY: A SYSTEMATIC REVIEW

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Introduction and Purpose: Creatine is a substance related to energy metabolism, involved in high intensity and short duration activities, with established efficacy in sports training. Its function has been studied in several pathological contexts. Among them, there is the loss of strength and muscular function related to aging, which can lead to sarcopenia and fragility. This study presents a systematic review of the effect of creatine against placebo on strength, improvement of functional tests and body composition in elderly subjects, combined with a resistance training program.

Material and Methods: A systematic search was performed in the MedLine, Embase, Central and Lilacs databases. Randomized, placebo-controlled clinical trials, with patients over 50 years of age and undergoing resistance training for a period of at least 8 weeks were included. Studies with patients in pathological conditions, without a control group, studies where creatine was given along with other possibly ergogenic substances, without resistance training, and studies that did not evaluate at least one outcome of interest of this review were excluded. The initial search on the databases returned 4431 publications. Of these, 10 papers were selected for inclusion in the review.

Results: The total sample consisted of 294 patients (151 men, 116 women, 27 not determined), with ages ranging from 50 to 84 years. The intervention time ranged from 12 weeks to 12 months. Resistance training protocols were variable. All studies used creatine monohydrate at doses of 3 to 6 g per day, or 0.07-0.1 g/kg/day. Three studies used a creatine loading protocol. For body composition assessment, most studies used dual energy x-ray densitometry (DEXA). For force evaluation, tests of one maximal repetition (1RM) were performed before and after the training protocol. Only three studies evaluated functional tests. Five studies showed greater strength gain for the creatine group, two studies showed improvement in functional tests and six studies found greater increase in lean body mass.

Discussion: Of all the strategies used to control the decline in strength and muscle function related to senility, exercise is recognized as the most effective measure, especially strength training. Because it is a common morbidity condition in the elderly population, it is important to propose new strategies that amplify therapeutic efficacy. Although there is evidence suggesting good results with the use of creatine without associated resistance training, the combination of these two measures has been shown to be more effective. The positive effects of creatine in strength observed in this review are consistent with the recent literature. Functional tests are used as predictors of the risk of falls and determinants of musculoskeletal frailty. Good results were observed in the improvement of these tests for the groups using creatine. However, it is noteworthy that few studies include functional tests in their evaluation, and evidence on the use of creatine to improve these parameters is still scarce, although promising. The greater gain of lean mass observed in the groups using creatine is commonly attributed to an indirect action of improved training performance. However, physiological mechanisms directly attributed to creatine have been observed, such as increased expression of growth factors, phosphorylation of anabolic signaling proteins and differentiation of myogenic satellite cells.

Conclusion: Creatine seems to be a good adjuvant strategy in preventing the loss of muscle function associated with aging, when combined with resistance training. More studies with better evidence level are necessary.

A BIBLIOGRAPHIC REVIEW ON INJURY IN THE ACHILLES TENDON IN THE SPORTS PRACTICES AND THEIR RESPECTIVE TREATMENTS.

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Introduction and Purpose: Achilles tendon ruptures are common in patients of age 30 to 55 years and account for 35% of all tendon injuries, including more than 75% of occurrences during participation in sports activities. Treatment of Achilles tendon rupture (ATR) can be done conservatively or surgically, but the debate over the choice of treatment continues. In addition, several growth factors are involved in the activation and concurrence of processes during various stages of tendon healing. For a follow-up examination, HFCDU (High Doppler Color Doppler Ultrasonography) may reduce the clinical error and to evaluate the recovery of the Achilles tendon after the treatment, serving as an effective, accessible, non-invasive and easy examination method to perform. Due to the enormous importance of the Achilles tendon, such as the practice of exercises or daily life, the present study aims to obtain a bibliographic review to analyze Achilles tendon injuries in sports practices and to gather possible methods of treatment and rehabilitation for them. The objective of the study in question is to perform a literature review to analyze Achilles tendon injuries and to gather the most indicated treatments.

Material and Methods: The present study consisted of a review of the specialized literature and was carried between May and June 2018. Selected scientific articles were used through the SciELO and SBRATE database, from the LILACS source.

Results: The results showed that the surgical treatment results in a lower percentage of re-rupture (0-6%), early mobilization and a faster return to sports practice. However, the reported risk of post-surgery complications varies from 0 to 21%. Non-surgical treatment is associated with a risk of recurrence ranging from 13 to 30%.

Discussion: Given all the literature on conservative treatment and surgical treatment, it is interesting to note that the incidence of re-ruptures in surgical treatment is similar to the incidence of re-rupture in conservative treatment. It seems that there is still no universally accepted treatment as the best option for calcaneal tendon injuries. Both surgical treatment and conservative treatment have their advocates as well as their critics. Not considering the possibility of early mobility, after the surgical repair, the time and type of immobilization are practically the same in both types of treatment, leaving doubts when discussing with the patient with calcaneus tendon injury, about possible forms of treatment. If the immobilization and the period of time necessary to use it are equal in both treatments.

Conclusion: The Achilles tendon rupture is a recurrent tendon injury in sports practice. The acceleration and deceleration mechanism is the most common cause for this injury. The conservative treatment is indicated in cases of lesions with rapid diagnoses, patients with surgical risks and small rupture. However, it presents a high risk of re-rupture. On the other hand, the surgical treatment is indicated in cases of late diagnoses, high level athletes and big rupture. It also presents a risk of re-rupture, but in smaller proportions.

ANTIHYPERALGESIC EFFECT PROMOTED BY CONTINUOUS AND INTERVAL AEROBIC EXERCISE IN MICE SUBMITTED TO A COMPLEX REGIONAL I-TYPE PAIN SYNDROME MODEL.

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Introduction and Purpose: Aerobic physical exercise is an alternative to adjuvant treatment of chronic pain. The objective of this study was to evaluate the effects of continuous aerobic exercise (EAC) and interval aerobic exercise (EAI) on mechanical hyperalgesia in mice submitted to the chronic post-ischemic pain model (DPIC).

Material and Methods: Male Swiss mice submitted to ischemia and reperfusion (IR) were used. After the seventh day of IR, exercise sessions were started. Each group performed one session per week and mechanical hyperalgesia was evaluated on days 7, 14 and 21 after induction. Naloxone at doses (1 mg / kg i.p., 10 mg / kg i.p.) and morphine (5 mg / kg s.c.) were administered. In the evaluation of mechanical hyperalgesia the Von Frey filament (0.6 g) was used.

Results: The velocity of 16 m / min and the time of 30 minutes presented the best antihyperalgesic effect after the session. When comparing the antihyperalgesic effect between EAC and EAI, EAI at speeds of 16 m / min and 19 m / min for 30 minutes obtained the most lasting analgesic effect for 5 hours while EAC at 16 m / min for 30 minutes per one hour.

Discussion: The main findings of this study are related to the parameters of aerobic physical exercise of treadmill running type and its influence on mechanical hyperalgesia in a model of pain after chronic ischemia. The animal model used in the study reproduced the behavior of pain after chronic ischemia for up to 21 days. Running on a treadmill enabled the reduction of mechanical hyperalgesia, which is dependent on speed, intensity and aerobic exercise mode. The participation of systemic opioid receptors in the antihyperalgesic effect was only verified in the continuous running exercise at 16 m/min. When comparing four speeds with the same total continuous run time on treadmill for 30 min, the group that ran at 16 m/min showed a better mechanical antihyperalgesic response on the seventh, the fourteenth and the twenty-first day of evaluation by up to 1 hour after the race. The finding demonstrates that there is a difference in the anti-hyperalgesic effect generated by continuous aerobic exercise at different speeds, which corroborates that of Naugle et al. He conducted a study with healthy youngsters who rated heat pain after exercise. It used three different intensities: high, moderate and rest. It was concluded that the performance of the exercise in high intensity had better results against experimental pain. By using 3 different running times with the same speed, it was possible to verify that during 30 minutes of exercise it generated hypoalgesia for a longer time and with a greater intensity of 15 min and 60 min. Concluding therefore that time is a determining factor in the effect. As Hoffman described in his study, hypoalgesia induced by 30 min of exercise was more significant than that induced by 10 minutes of treadmill. Hoffman describes that the effect is not only dependent on the central action opioid system, it questions the possible involvement of the descending inhibitory pathways. In addition to suggesting that the distraction generated by exercise modulates the perception of pain. Exercise-induced hypoalgesia is already established in the literature in animal and human studies. Among them, the study by Shen et al showed that swimming regularly performed had an analgesic effect on neuropathic pain induced by sciatic nerve constriction in mice. The animals presented hypoalgesia in the ipsilateral paw after training. Bobinski has proven the same effect when using low-intensity treadmill exercise. The hypothesis supported in the study was analgesia induced by the increase of serotonin in the marrow.

Conclusion: This study indicates that treadmill EFA reduces the mechanical hyperalgesia generated by DPIC in mice. The EAI generates greater analgesic effect after the run in relation to the EAC. Opioid receptors are involved only in EAC. We suggest new studies on the mechanisms involved in analgesia induced by EAI

A BIBLIOGRAPHIC REVIEW ON CORRELATION BETWEEN EATING DISORDERS AND PROFESSIONAL SPORTS

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Introduction and Purpose: Today's society prizes specific physical patterns in search of an ideal look. In high performance sport, to achieve this goal, specific attitudes can be incorporated and may challenge human physiological capacity. This phenomenon, with the aim of achieving a suitable physical standard for the modality, can lead to the development of eating disorders (EDs), such as bulimia and anorexia, which lead athletes to a reduction of body mass, through rigorous diets, strict practices schedules and the use of drugs. The aim of the study was to identify the eating disorders and the risk factors for their development in athletes, evaluating the influence of physical exercise in the development of EDs in this group.

Material and Methods: 20 selected articles were used through the SciELO and SBRATE database, from the Lilacs source.

Results: VIEIRA et al. (2006) evaluated 101 judo athletes, concluding that 30.7% presented Eating Disorders (EDs). Out of the total, 41.9% were males judokas and 58.1% were females. FORTES et al. (2012) analyzed 64 athletes and verified that the shorter the social background, the greater the score achieved at EAT-26 and the greater the body discontent. BOSI and VIEIRA (2003) have found that 16.7% of the athletes and 21.8% of the non-athletes have obtained results that indicate the presence of a risky nutritional behavior. With the sample of 19 athletes from junior synchronized swimming, 8 senior and 32 non-athletes, PERINI et al. (2008) have established that in these groups there are cases of a slight feeling of dissatisfaction with the body image. SUNDGOT-BORGEN and TORSTVEIT (2014) found that the prevalence of EDs among female athletes competing in aesthetic sports was 1,5x higher than that observed in endurance sports.

Discussion: Eating disorders are characterized by a persistent change in eating habits and dietary behavior. The EDs are present in many sports modalities, especially among those the female gender is the majority. The incidence rate of EDs is not likewise among all the sports modalities. Evidence suggests that leanness-dependent and weight-dependent modalities, such as artistic gymnastics and ornamental jumps, are at greater risk for eating disorders than those sports, in which this ideal is not fundamental. Studies show that athletes in team sports, e.g. basketball and volleyball, presented a lower incidence of EDs. Another major factor is the use of uniforms associated with the number of people analyzing the game, since the higher the number of critics and referees, the more the athletes strive to achieve the maximum of their performance. In addition, the uniform promotes a comparison between the athletes, encouraging them to be in their best shape. Furthermore, there is an important pressure of the media and marketing, imposing standards of beauty. Athletes present behavioral, physical and psychological symptoms that cause changes in eating habits and affect several aspects of health. The knowledge of the risk factors for EDs allows preventive intervention. The follow-up and treatment of EDs in athletes should be multidisciplinary and involves a doctor, a psychologist and a nutritionist.

Conclusion: EDs mainly affect athletes due to the high degree of competitiveness existing in sports, which results in the search for a better performance, being more expressive among individual sports, especially those that praise physical appearance. Furthermore, elements such as the sports modality, gender, age, as well as pressure coming from coaches and jurors strongly collaborate to the development of eating disorders. In this context, it is extremely important to identify these factors in order to act in the prevention of EDs, as well as to treat it when presented. Therefore, the results of the present study can be taken to the field and used in future works.

NEUROLOGICAL INJURIES ASSOCIATED WITH HIGH-INTENSITY SPORTS AND THE USE OF ENERGY DRINKS

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Introduction and Purpose: Lesions arising from the practice of sport are distinct and their risk is determined by intrinsic (age, gender, height, physical fitness level) and extrinsic aspects (frequency, intensity and type of sport). The most common injuries are those affecting the musculoskeletal system. Ischemic strokes (IS) stand out among the afflictions of the nervous system and, in this context, they have arterial dissection as their main cause. Objective: The study seeks to report the case of a patient with an IS diagnosis secondary to a vertebral artery dissection (VAD) and to correlate the factors that may have contributed to the evolution of the condition.

Material and Methods: The work consists of a descriptive study of the case report type, using retrospective information obtained from the medical records and examinations of the patient. Along with the case description we developed a narrative review of the medical literature, the PubMed and Scielo database, using the terms Cerebral Vascular Stroke, Vertebral Artery Dissection, Energy Drinks, Athletic Traumas.

Results: Patient A.L.S.A., male, 36 years old, regular Jiu-Jitsu practitioner, started dizziness and headache two hours after a workout. The same made regular use of thermogenics and energy drinks as "pre-workout". He sought prompt care, where he was treated with symptomatic and released. Hours later, there was progression of the picture to loss of balance followed by a seizure, when he returned to the hospital and was admitted to the Intensive Care Unit. He underwent na angiotomography of the skull that showed no changes. However, the patient underwent orotracheal intubation by lowering the level of consciousness. After 10 days of hospitalization, the patient underwent na angiography of the cerebral vessels, in which dissection of the right vertebral artery and contralateral vessel hypoplasia were identified. The practice of high-intensity sports and the consumption of energy drinks for the optimization of performance were identified as important factors for the occurrence of the clinical case under study. A predisposing arteriopathy (arterial hypoplasia) was also associated with these factors.

Discussion: The diagnosis and the clinical history of the subject of this study allow for the inference that important factors may have contributed to the occurrence of the episode. Among them, the practice of high-intensity sports, the consumption of energy drinks and a predisposing arteriopathy should be emphasized. The practice of high-intensity sports coupled with the consumption of energy drinks leads to an intense cardiovascular response, which possibly contributed to the occurrence of the dissection by significantly increasing the blood flow of the vertebral artery and the blood pressure, increasing stress on the vascular network. In addition, the possible hypotension after the end of the physical activity is a factor that may have intensified the ischemic process resulting from the VAD. The arterial hypoplasia limiting the potential for compensatory blood circulation, in association with the previously mentioned factors, predisposed the patient for the ischemic event. The practice of Jiu-Jitsu, in particular, may also have been a contributing factor due to the situations of cervical instability caused by the blows of this fighting sport.

Conclusion: Neurological lesions are characterized by leaving important sequelae in patients, who must learn to live with their new limitations. The factors associated with the neurological lesions arising from the practice of physical exercise must be quickly identified in order to prevent and recognize them early, thereby optimizing the medical interventions to be performed and minimizing damage to the patient.

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CLINICAL, RADIOLOGICAL AND FUNCTIONAL CHARACTERISTICS OF SKELETALLY IMMATURE ATHLETES WITH ACL GRAFT FAILURE

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Introduction and Purpose: To evaluate clinical, radiological, and functional characteristics associated with re-rupture of ACL in skeletally immature athletes submitted to ACL revision surgery.

Material and Methods: This is a retrospective longitudinal study with 18 skeletally immature athletes undergoing revision ACL reconstruction after graft failure. Patients provided data that included age, gender, laterality, Tanner stage, current physical activity, trauma mechanism, associated injuries, surgical technique, and rehabilitation time. Tegner and Lysholm scores are applied, and radiographs and MRI used to evaluate the graft, tibial slope, and intercondylar notch.

Results: Isometric ACL reconstruction was the most prevalent surgical method used in primary surgeries (88.9%) compared to secondary surgeries (77.8%). The average age of patients at graft rupture was 19.4 years. The time from primary procedure to revision ACL surgery ranged from 2 months to 9 years. Most graft failures occurred after rehabilitation program, when the patient had already returned to sports practice following medical advice. In primary surgery, 22.2% of cases had associated injuries compared to secondary surgery (38.9%). The mean Lysholm knee score was 57.6 after the primary injury and 87.7 after the rehabilitation of the revision surgery. The mean value found for the intercondylar notch width in the anteroposterior radiograph of the knee was 0.23 (range from 0.18 to 0.27). After surgery, the mean angle of the tibial slope obtained using lateral radiographs was 11o.

Discussion: Skeletally immature patients generally exhibit increased risk of ACL reconstruction failure when compared to the skeletally mature. Some hypotheses have been presented in the literature and include the size of the graft, the fatigue behavior of the graft over time, the surgical technique used to avoid physeal damage and growth arrest to the detriment of more anatomical reconstructions recommended for adult patients. Increased participation and demands on children in sports increases the risk of graft failure. This can be one of the reasons why an increased incidence of ACL injuries among skeletally immature patients has been reported in literature. Additionally, emphasis should be given to the psycho-behavioral factors of this population. Frequently, the skeletally patients have not experienced any frustration related to the previous treatment and are not able to measure the damage caused by a new injury. Consequently, these patients may be exposed to situations that can often cause re-rupture of ACL reconstruction compared to adults. In our study, soccer players were those with the highest re-incidence of graft failure. However, it is not possible to specify that this particular sport is an increasing risk factor for this type of injury, since it became the most played sport across the world at these days. It is noteworthy that the second most common cause of ACL reconstruction failure is not directly related to sports practice. In the present study, Tegner activity score was used to evaluate how patients return to sports in primary and secondary surgeries. According to the literature, the return to sports in skeletally immature patients does not differ from that of adults. Based on the results obtained, it was observed the patients presented lower scores after the rehabilitation of primary reconstruction. This can be considered an indicator of patients more susceptible to ACL reconstruction failure, but with no significance difference.

Conclusion: 68.8% of ACL revision surgery occurred before 20 years old, ranged between 2 months and 9 years after primary ACL reconstruction. These injuries most commonly occurred after sports practice. No association was found between the tibial slope values and the notch width index.

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AMATEUR ATHLETES AND BODY FAT: ULTRASOUND, BIOIMPEDANCE AND SKINFOLD ANALYSIS

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Introduction and Purpose: Running is a low-cost, accessible and widely-practiced physical activity in Brazil. The body composition of a runner is of great influence on his performance and shows why it is essential to validate effective techniques to measure this composition. The bioelectrical impedance analysis (BIA) and skinfold test (ST) are already widely employed to this end, but they have flaws that suggest the need for a low cost, accessible, highly-reproducible and reliable model that can be used more widely and routinely. Despite the versatility of US devices, it is not a method widely used as a tool to measure body composition. This study sought to compare ultrasound (US) as a subcutaneous adipose tissue and total body fat measuring method in comparison with the BIA and ST tests in amateur runners.

Material and Methods: This was an observational and cross-sectional study with data collected between January and April 2018 from a sample made up of 30 amateur regular practitioners of running, 16 men and 14 women [age 32,9 (28-44); weight 65,2 (48-84); body mass index 23,4 (18,6-28,9)]. Tetrapolar bioimpedance measurements were carried out with an Inbody 270 (Ottoboni) device, skinfold measurements were taken with the scientific adipometer Cescorf, and the ultrasound tests were performed with the BX-2000 device (BodyMetrix™). The position and dispersion methods were calculated through descriptive statistical analysis and the obtained data was compared with the Wilcoxon test. A statistical significance level of $p < 0.05$ was considered.

Results: A positive correlation was observed for all anatomic points measured when US and ST were compared. There was a statistically significant correlation between US 15,7% (7,8% - 22,4%) and ST 16,6% (7,9% -23,4%) ($p:0,322$), ST 16,6% (7,9% -23,4%) and BIA 17,9% (10,4% - 24,6%) (0,258) regarding the percentage of body total fat, but the comparison between the methods US 15,7% (7,8% - 22,4%) and BIA 15,7% (7,8% - 22,4%) revealed a strong trend toward a difference between the obtained results ($p:0,051$).

Discussion: US proves to be a method that is capable of assessing subcutaneous fat quickly and accurately, with broad applicability and reliability. When compared to the other techniques and the findings in the literature, a strong positive correlation is obtained between US and ST, mainly in the thigh region. There was an overestimation of the BIA values in relation to US, on the other hand, which suggests the possible need for a larger study sample to obtain satisfactory statistics. Even though the correlation between methods of measurement of subcutaneous fat is a new and scarcely-explored area of study, the importance of the use of US should be emphasized if it is used with caution for monitoring in Sports and Preventive medicine.

Conclusion: US is a suitable method for the assessment of the body composition of runners. Further studies are suggested for comparisons with the gold standard in order to establish if US can be superior to BIA and ST when used for the same objectives.

THE KNOWLEDGE FROM THE BRAZILIAN MEDICAL STUDENT ABOUT SPORT MEDICINE AS A SPECIALITY

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Introduction and Purpose: The residency in sport medicine have the purpose of graduating doctors to treat athletes so they can have the best sports income with the appropriate training and preventing injuries, as well as helping people with chronic diseases related to a sedentary lifestyle and those who want to have a better life quality through a secure physical education. The residency is a 3 years program strait after medical school. Objectives: Analyze the Brazilian Medical Students knowledge about Sport Medicine as a speciality.

Material and Methods: Data obtained from an electronic questionnaire answered on July/2018.

Results: The research was made with a total of 220 Brazilian medical students of both sex, prevailing females with 142(64.5%) to males with 78(35.5%), and universities through all the 5 Brazilian regions on the proportions of: Southeast 185 (84.1%), South 27 (12.3%), Central-West 3 (1.4%), Northeast 3 (1.4%) and North 2 (0.9%). The students evaluated through questioning were from the 1st to the 12th semester, predominating students from the 6th semester: 58(26.4%); followed by 5th and 4th semesters each with 25(11.4%); 3rd semester: 24(10.9%); 10th semester: 19(8.6%); 7th semester: 18(8.2%); 11th semester: 12(5.5%); 8th semester: 11(5%); 2nd semester: 10(4.5%), 1st semester: 9(4.1%); 9th semester: 6(2.7%); and 12th semester: 3(1.4%). The students that answered the questionnaire, 129(58.6%) were from 21 to 25 years old; until 20 years: 38(17.3%); from 26 to 30 years: 29(13.2%) and over 31 years old: 24(10.9%). The students who were asked about "what contact with sport medicine they had": 114(51.8%) answered "they never had contact"; 30(13.6%) "had contact through Academic Leagues"; 27(12.3%) through conferences, courses and other events related to sport medicine; 25(11.4%) through individual studies; 20(9.1%) through classes in university; 4(1.8%) through the development of scientific research (articles); and no student referred having had contact with sport medicine through working in clubs or sports entities. 203(92.3%) students don't plan on doing residency or post graduation in sport medicine, and 165(75%) have never thought working in this speciality. When questioned about "what is the length of the program", 16(7.3%) people answered 1 year, 159(72.3%) people answered 2 years, and 45(20.5%) people answered 3 years. The students were also asked "if it is required to course family medicine or orthopedics before entering sport medicine residency program" and 144(65.5%) students answered "no".

Discussion: The questionnaire revealed a great deal of ignorance from the medical students about the speciality, not only because of the 92.3% of the interviewed didn't consider coursing the speciality and the 75% that never thought on the possibility, but also because 51.8% never had any contact with sport medicine throughout ones graduation, as well as 79.6% not know the length of the course, and 34.5% not knowing the right way to enter the residency program.

Conclusion: The propagation of sport medicine knowing among academics allows the increase of the speciality and results in greater access of the population to specialized professionals, contributing to better treatments. However, the questionnaire reveals a great ignorance of the interviewees about the speciality, raising an alert about the subject.

THE IMPACT OF COMBINED CORE AND BALANCE TRAINING FOLLOWED BY MYOFASCIAL TRIGGER POINT THERAPY ON LUMBOPELVIC PAIN INTENSITY AND POSTURAL STABILITY OF YOUNG SOCCER PLAYERS

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Introduction and Purpose: Lumbopelvic (lumbar spine, sacroiliac and/or pelvic, hip) pain (LPP) is often identified and confirmed by diagrammatic representations of self-reported pain location alone or in combination with clinical tests. The prevalence of pain among children and adolescents ranges 14 to 24% as back pain. Most LPP is reported in and around the lumbar area, where the majority of the upper body weight is supported by that body region. Soccer is a sport requiring a plethora of technical skills as well as static, semidynamic and dynamic balance. Being able to hit the ball and different technical movements in soccer require posture on one foot. In addition, the stability of the support foot is important to be able to perform the hitting motion as correctly as possible. It is unknown if a lumbopelvic-hip core stabilization and balance program followed by ischemic compression (IC) will improve symptoms and function in soccer players with LPP. The purpose of this study is to examine the effect of eight weekly combined core and balance training with the inclusion of the overactive and under-active muscle in a progressive levels with IC on LPP intensity and dominant-leg assessment of postural stability in male soccer players.

Material and Methods: Twenty four adolescent soccer players (mean age, 14,5 ± 0,25 years) participated in this study. Pre- and post-test models were used and based on the pre-test results, the participants were divided into control (n=12) and experiment (n=12) groups. The Shapiro Wilks test was used to determine the distributions of the variable and it was determined that the distributions were not normal. Nonparametric Wilcoxon Two-Sample test was used to determine the significance of the difference between the pre and post tests of each group. Nonparametric Mann Whitney U test was used to determine the difference of average between the groups. Level of significance was determined as (p < 0.05). Balance Measurements were applied with Biodex Balance SD device. Postural Stability was used for measuring single-leg sway parameters. The athletes were asked to keep their center of gravity at the center of the target on the screen for 30 seconds with minimum sway. IC was performed by compressing trigger points with Visual analogue scale.

Results: While control group was shown no differences on dominant-leg sway parameters after a 8-week training period, experimental group was shown differences in pre and post tests (p<0.05). There was significant differences on dominant-leg sway parameters after a 8-week training period between the groups (p<0.05). While control group was shown no differences on LPP intensity after a 8-week training period, experimental group was shown differences in pre and post tests. (p<0.05). There was significant differences on LPP intensity after a 8-week training period between the groups (p<0.05).

Discussion: While the term "myofascial" has steadily gained currency over the last couple of decades, replacing muscle in some texts, minds and brand names, it is still widely misunderstood. Myofascial tissues provide stabilizing support and that control movement in the body with generating integrated webs and networks of passive and active tensional forces. Core and balance exercises have gained interest in recent years and have become an integral part of training programs.

Conclusion: The human resting myofascial tone has a passive role in helping to maintain balanced postures and provides a stabilizing component to help maintain balanced postures. However, any pain of the athletes is often neglected and they continue the trainings with a pain and muscle stiffness also without sufficient flexibility. Strengthening lumbar muscles and increasing lumbar flexibility are important objectives of LPP treatment and should be emphasized. So, in the light of research findings, it is possible to say that, the workouts performed with combined core and balance training followed by IC improved the dominant-leg assessment and LPP intensity parameters.

THE IMPACT OF HIGH-INTENSITY INTERVAL TRAINING IN TYPE 1 DIABETES

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Introduction and Purpose: Type 1 Diabetes Mellitus (T1DM) is an autoimmune disease that is prevalent in the younger. Nowadays fitness lifestyle is a trend. Although, T1DM may be exposed to hypoglycemic episodes (HE) when practicing exercise by themselves without professional guidance, as some kinds of exercise may offer a less risk for hypoglycemic episodes, like high-intensity interval training (HIIT). However, there is evidence that plasma lactate levels are acutely increased after HIIT, and it suppresses symptoms and counter-regulation while preserving cognitive function. The objective is to Verify the safety of HIIT in glucose control and stability in T1DM.

Material and Methods: Literature systematic review of the influence of HIIT in hypoglycemic episodes in T1D, between 2013 – 2018, using four articles, being two randomized crossover trial. Basis in SCIELO, PUBMED, LILACS and COCHRANE databases.

Results: It was not found HE during or after HIIT and continuous exercise (CON), in a Study with seven T1DM males who were using ultra-long-acting insulin. CON led to a higher Blood Glucose decrease compared to HIIT. These findings demonstrate that HIIT and CON can be safely trained by T1DM. In another study, a randomized controlled trial with patients with T1DM verified that HIIT attenuated hypoglycemia-induced cognitive dysfunction, cortisol and growth hormone responses were suppressed. However, catecholamine responses to hypoglycemia were preserved.

Discussion: A randomized crossover study about closed-loop glucose control with twelve patients T1DM, suggests that HIIT and Moderate-Intensity Exercise is safe to be undertaken. However, the rise in ketones in post-exercise is observed with HIIE, may be a challenge for these control systems. According to a meta-analysis using 33 studies, sprint-type exercise applied in brief bouts of high-intensity can minimize a hypoglycaemic episode risk, yet only regular aerobic training will reduce T1DM's glycated haemoglobin level.

Conclusion: HIIT is a recent modality of exercise, some studies have shown its efficiency in glucose control in T1DM. But, there is a necessity for more studies revealing potential risks, like attenuated cognitive responses for hypoglycemia, self-awareness, and post-exercise ketone levels.

UNIVERSITY EXTENSION PROJECT IN GYM'S AT SALVADOR (BA): PERCEPTION OF PARTICIPANTS IN AN ACADEMIC LEAGUE FROM BAHIA

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Introduction and Purpose: The university, facing its basic objectives of professional training, generation and dissemination of knowledge, covers dense and complex processes, given the diversified nature, intrinsic to academic work. In this context, there is the university extension, a practice of construction and dissemination of knowledge that interferes significantly inside and outside the university. Anchored in this process, the academic league, as part of the university, carries out university extension projects, aiming to promote from the dialogue to the update on various themes, in any field of knowledge, to the community. The objective of the present work is to describe the experience of medicine students, members of an Academic League in a university extension project in two gyms of Salvador (BA) between the months of July 2017 and March 2018.

Material and Methods: The methodology used to accomplish the project was through the study of the themes based on the scientific literature and subsequent dialogued expositions mediated by two or three ligands per session, in the gyms, in the period from July 2017 to March 2018, with monthly frequency, totaling eight sessions. The expositions of the contents were made in a clear and objective approach, having as central themes the benefits of physical activity in the maintenance of health or its effects in various diseases.

Results: In total, 13 league members mediated the discussions and 15 professionals (physical educators and physiotherapists), men and women, participated of the sessions. The meeting was open for anybody, health professional or not, that wanted to participate. The sessions were taught by the dialogue exhibition about the theme. With the association among a participative strategy and many didatics resources. Each session were exposed different themes and in the end any person could express their opinion. The participating professionals had more inquiries relating with contents updates. This updates was a focus on the management of the people that had some pathology, like cardiovascular disease and metabolic syndromes when they practiced physical exercises.

Discussion: The participation in group with professional allowed to get, to share experience and technical-scientific knowledge. Thereat, it was identify a new connection among professionals from another areas. Like this, is was possible promote a higher gain in knowledge production. This experience made possible to comprise the importance of multiprofessional teams. A precept of SUS (Unic Health System) explain that the multiprofessional teams are important to integral care of the person. The continuous education was one of the support addressed in the project thereby it was directed of updates constants among the reading and exhibition in the sessions and news from academia. Finally, the participation in this project also made possible observe that university extension was a substantial moment to develop qualitative and quantitative researches.

Conclusion: This university extension model was an opportunity for the discussion mediators could develop their capacity of sharing knowledge. Like this, they could build this capacity based on the experience with other professionals in several relations of horizontality. This project can be the point start of a new era in the build of knowledge based in a participative model for individuals and academic leagues on the university extension context. News studies are necessary to understand the effects of this activities on the vocation training of future health professionals and updating professionals of this area.

ACUTE EFFECT OF 60-METER SPRINTS IN THE NEUROMUSCULAR PERFORMANCE OF POLICEMEN

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Introduction and Purpose: Sprint Interval Training (SIT) is a subdivision of high-intensity interval training and it is recognized as an effective method for improving physical fitness. However, there is little information regarding the influence of the volume of this training method on acute neuromuscular fatigue when overloads are associated with exercise. This study aimed to analyze the acute effect of SIT volume on the isometric rate of force development (RFD) and muscular activation of military policemen (MP) with the overload of military clothing and equipment.

Material and Methods: Participated in the study 10 male MPs, age: 34.6 ± 5.8 years. The isometric force-time curve (RFD) for 200 ms and the respective muscle activation were recorded before and after (immediately and 24h) two SIT volumes: low volume (LV - 5 sprints of 60 m) and high volume (HV - 10 sprints of 60 m) with the MPs equipped with their military outfit. The order of the protocols was randomized and was determined by the counterbalanced crossover method. Only one SIT volume was adopted in each experimental session and the recovery interval was 1:10 for both volumes of SIT.

Results: ANOVA two way for repeated measurements showed no interaction between volumes at different moments ($p > 0.05$) for muscle activation; however, ANOVA showed that neuromuscular performance was reduced immediately after SIT protocols with a $p < 0.05$: RFD0-200 (before LV: 4855.7 ± 1340.4 N.s-1, before HV: 4420.7 ± 1127.5 N.s-1, immediately after LV: 3952.4 ± 1080.2 N.s-1; immediately after HV: 3870.8 ± 1049.8 N.s-1; and 24h LV: 5191.9 ± 1030.9 N.s -1; 24h HV: 4604.9 ± 1512.6 N.s-1).

Discussion: The reduction in RFD after sprinting is the main result of the present study. That reduction has occurred at moments for the RFDpeak, RFD0-50 and RFD0-200. The behavior was similar at the two volumes and 24 hours after stimuli the neuromuscular recovery has established efficiently. The significant drop in RFD values is in line with the results of another study¹¹, which also identified a reduction in strength production capacity after 10 maximum of 6-second run shots with 30-second intervals on the cycle ergometer. Muscle strength parameters such as Maximum Voluntary Contraction (MVC), RFD and muscle activation were evaluated before, immediately after and five minutes after the stimulus. It is important to note that similar behavior occurred with the 10 sprints, as in the present study, where five or 10 sprints presented similar results.

Conclusion: Both SIT volumes promoted significant reductions in neuromuscular performance acutely, being recovered 24 hours after the effort. The increase in SIT volume does not seem to influence the neuromuscular recovery process.

A PILOT STUDY ON THE RELATIONSHIP OF BAUMGARTNER SCORE AND HEART RATE AT THE ANAEROBIC THRESHOLD II IN OVERWEIGHT ADULT MEN

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Introduction and Purpose: There is an expressive amount of scientific studies on obesity, mainly in regard to etiology and the association with physiological factors, physical activity, pathological, among others. In Brazil, 18% of the male population are overweight. Some indices are used to classify the anthropometric condition (e.g. BMI) as well as others indicators, which demonstrates a better accuracy such as the Baumgartner score [LB: appendicular lean mass (kg) / height (m²)]. In addition, physical capacity is also linked to population health. Brazil has 46% of sedentary people who do not perform the minimum amount of physical activity recommended by the World Health Organization (WHO). This scenario in conjunction with obesity can negatively impact hemodynamic conditions such as heart rate (HR) and tolerance to the indicated physical exercise by the anaerobic II threshold (LAN II). In this sense, a possible association between LB and FC in LAN II in obese men may add more information about the physical condition in this population. However, the literature still presents gaps in providing data on this subject. Objective: The study aims to verify the correlation between the index of Baumgartner and heart rate at the anaerobic II threshold in overweight adult males.

Material and Methods: Male patients registered on the database of the Sports Medicine Centre who underwent cardiopulmonary testing until voluntary exhaustion on a gas analyzer (Quark CPET Cardio-Pulmonary Exercise Testing, Cosmed Metabolic Company, Rome, Italy). The protocol started with an initial speed of 4km per hour and slope of 1%. The speed has been increased by 1Km per hour every 1minute. A portable device was used to collect heart rate (HR Probe Polar®, Warminster, USA). The volunteers were classified as "overweight" from the Baumgartner score, considering the value $< 7.26 \text{ kg} / \text{height}^2$. The Spearman test was used as the correlation statistical test, with a significance level of $p \leq 0.05$. To evaluate the correlations (r), the following stratification was adopted: $0.50 < r < 0.75$ or $-0.75 < r < -0.50$: moderate correlation. All procedures were performed using the SPSS statistical package (version 20.0 IBM®, New York, USA).

Results: The sample was formed by 18 adult male patients with age of $42.8 (\pm 12.1)$ years, body mass of $81.1 \text{ kg} (\pm 8.5)$, the height of $1.80\text{m} (\pm 0.1\text{m})$ and BMI of $25.8 \text{ kg} / \text{m}^2 \pm (2.5 \text{ kg} / \text{m}^2)$ and 38% of fat body mass. The correlation between the two variables, Baumgartner index and heart rate at the anaerobic II threshold was moderate ($r = 0.57$) and significant ($p = 0.01$).

Discussion: The main outcome of this study was a moderate and significant correlation between the Baumgartner score and heart rate at the anaerobic II threshold in the overweight male adult. A brief literary review (PUBMED) demonstrated that there is a low amount of articles (296) on this subject. However analysing the anaerobic II threshold, exercise tolerance and heart rate in overweight men studies report that the anaerobic II threshold is commonly used for the evaluation of integrated physiological parameters: cardiopulmonary and muscular during aerobic exercise. Although the study indicated a moderate correlation between Baumgartner index and exercise tolerance, some evidence reports only the relationship between exercise tolerance and heart rate in obese men.

Conclusion: The study concludes that there is a good and significant correlation between the Baumgartner index and the physical effort tolerance in overweight adult males. For further studies, a depth literature review on this subject should be leaded in order to have a greater comprehension of the theme as well as studies with a longitudinal design.

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OCCURRENCE OF DOPING AT THE FÉDÉRATION INTERNATIONALE DE NATATION (FINA)

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Introduction and Purpose: In high performance sports, winning is one of the most important things. For that, many athletes end up using drugs and prohibited methods in sport. The adverse effects and consequences of performance-enhancing drugs abuse are extremely relevant for athlete's health. Doping cases in aquatic sports are published through the official site of the Fédération Internationale de Natation (FINA) at the Antidoping section. However, the provided statistics do not point, specifically, about the identified drugs in the tests. This study sought to characterize the doping occurrence profile among FINA's athletes.

Material and Methods: It is a cross-sectional observational study with documental analysis, of analytical character including results regarding published antidoping tests at <http://www.fina.org/> in the period of May of 2013 to April of 2017. Cases in which violations to the Code of this International Federation did not involve illicit substances in sport, and those which possessed incomplete data concerning the tests, were excluded. The used variables were divided in three types: related to the individual, the ones that characterize positive drugs in the antidoping exam and those related to Antidoping Code violations. The statistical analysis was performed using Microsoft Excell®, 2013 version.

Results: During the period of study, 54 cases were included. Among the 26 nationalities involved in doping cases, Russia (13%) and China (11%) stood out. Swimming (64.8%) was the sport with the highest occurrence, approximately 2/3 of the total. Men appeared in 65.7% of the cases. The classes of substances most commonly used were Anabolic Androgenic Steroids (38.8%) and Diuretics and Masking Agents (12.9%). But, most frequently encountered substances were hydrochlorothiazide (9.2%) and the metabolite carboxy-tetrahydrocannabinol (THC) (7.4%). Only in marathon swimming positive results for recombinant human erythropoietin were observed.

Discussion: In a historical perspective, the Soviet Union, where Russia was included during the Cold War, made clear the importance of taking athletes to their own limits as a way to demonstrate power to other nations. Similarly, the same reason took China to enter the doping race between the 80's and 90's, and, maybe, that is one of the reasons why this "doping culture" still remains nowadays in these places. Swimming is the most practiced aquatic sport, so, major occurrences of doping in this field were expected. Also, in agreement with previous studies, the prevalence of men involved in drug abuse has been widely reported. Anabolic Androgenic Steroids are used to provide strength and increase muscle mass while Diuretics and Masking Agents, as hydrochlorothiazide, are generally taken to eliminate faster other prohibited drugs from athlete's body. In the other hand, is not very clear the reason of taking marijuana, which provides the metabolite carboxy-THC, as a doping agent, considering its depressive effect. Probably, this is related to manage athlete's anxiety. Moreover, the utilization of recombinant human erythropoietin in marathon swimming is compatible with the effect of increasing oxygen delivery to the tissues, what is very required in endurance sports.

Conclusion: The indiscriminate use of substances to increase performance can cause several deleterious changes, mainly related to neural, cardiovascular, hepatic and renal systems. When known the profile of the occurrence of this phenomenon, it is possible to create not only prevention strategies, but also intervention methods, and to alert all those involved in the fight against doping, including doping control authorities, coaches, doctors and athletes. Despite the small number of cases, this investigation tried to reveal the profile of drug utilization among these athletes.

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THE EPIDEMIOLOGY OF BASKETBALL INJURIES AMONG ELITE PLAYERS IN THE LAST 20 YEARS: LITERATURE REVIEW

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Introduction and Purpose: The basketball was invented by James Naismith, a canadian professor in 1831. Almost two centuries later, this sport is practiced and watched throughout the Earth. Some characteristics of the basketball are repetition of movements such as jumps, accelerations and others explosives actions in a short period in the game. Therefore, this characteristics together with contacts between playerS are associated with specific injuries. In this article, the authors reviewed the most prevalent injuries in basketball. Objective: this study aims to realize a literature review regarding the most prevalent injuries among basketball elite players in the last twenty (20) years.

Material and Methods: The study was based in A systematic review of national and international literature about the theme. By means of databases PubMed and SciELO (Brasil) was included on the research the publications with the following criteria: articles published in english or portuguese that would approach injuries in basketball elite players and publications between 1998 and 2018. It was excluded articles that do not attended all the criteria cited before or that had only one key-word.

Results: It was identified 322 articles. After the pre-analyze, 12 (3,7%) publications was selected because they meet the inclusion criteria, so, they was included in the final analysis. There were no duplicate articles in the research in two databases.

Discussion: By the performed analysis of the collected articles it was observed that the most area affected, or higher prevalence, by the injuries was the lowers members, independent the league (the duration of the match may change), publication time. About the most common type of injury, the sprain occupied the first place following the spasm and strain. There is a divergence between studies of who shows in second place. Lastly, fractures and tensions. In relation with the body structures the most segment affected was the ankle following by knee. With less injuries, chest, shoulder/arms/elbows and head, without distinction about the third structure prevalent. Two studies brought that the action of landing, after a jump, it is the most movement in the game with injuries associated. It was observed that the resonance methods is the most used method for the identification of injuries in basketball because the high resolution quality of the tissues and by the orthopedics nature of the injuries. Finally, four article related the prevalent of injury by position, guards appear to be less likely to suffer a injury, forward and certes appears to be the positions with higher number of injuries.

Conclusion: The knowledge about the factors associated with the occurrence of injuries in basketball elite playerS, is important to manage prevention actions. Therefore, the prevalence of injuries in this sport might be reduced, maximizing the gain for the player and the team. At least, most studies should be done in order to relate types of injuries in basketball players between the positions found in the game, such as guards, forwards and centers because of the different functions executed in the game.

GASTROINTESTINAL MANIFESTATIONS IN COMPETITORS OF HALF-MARATHON, REGION OF COQUIMBO, CHILE.

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Introduction and Purpose: In the last decade the number of resistance events has increased in all world. The half marathon being the favorite event among competitors between 21 and 44 years old (Olgueta-Alday 2018). In Chile, there is little information on the prevalence of gastrointestinal manifestations (GM), which are common in endurance athletes. The most common gastrointestinal discomforts are: nausea, vomiting, abdominal pain, abdominal distension, gastroesophageal reflux and diarrhea. The symptomatology is individual, and the patterns associated with these discomforts are not clear. (De Oliveira 2014). Our objective was to identify the prevalence of gastrointestinal manifestations during the half marathon in competitors of the Region of Coquimbo, Chile.

Material and Methods: Cross-sectional study. It was included participants older than 18 years of the half marathon of the Coquimbo Region of Chile in 2016. A questionnaire was applied by trained interviewers and the information was obtained was: age (years), sex (male, female), total body mass (kg), competition time (min), previous experiences (>5 similar competences), nutritional strategies before and during the competition. The descriptive data are presented as a percentage distribution, and the differences between variables were analyzed with linear and multiple regressions. Confidence level was 95% and $\alpha=0.05$. The analyzes were performed with STATA. The study was approved by the ethics committee of the "Universidad Católica del Norte." The researchers declare no conflicts of interest. The funding source of the study is the responsibility of the researchers.

Results: The results obtained from the 48 runners were: Sex: 85% male and 15% women, age: 37.5 ± 10 years, weight: 71.2 ± 11.2 kg, competition time: 102 ± 19 min, experience: 50% with previous experience, pre-competition carbohydrate intake: 49 ± 33 gr, pre-competition liquid intake: 327 ± 289 cc, and during competition: 12 ± 14 gr of carbohydrates and 333 ± 309 cc of liquids respectively. The prevalence of pre-competition GM was 25% (n=12), stomach pain 6.2%, diarrhea 6.2%, gastroesophageal reflux 6.2%, stomach heaviness 6%, nausea 4.1%, others 6.3%. The prevalence during the competition was 27% (n=13), dizziness 8.3%, meteorism 4.17%, gastroesophageal reflux 2.1%, nausea 2.1%, vomiting 2.1%, stomach heaviness 2.1%. In addition, on 2% of this group thirst and hungry was observed. They were not reported gastroesophageal reflux or diarrhea during the competition. In relation to the average time of competition, the runners with GM during the race, the time was of 105 ± 26 minutes and 101 ± 19 minutes in the group without GM (P=0.3). There was no statistically significant relationship with the variables age (P = 0.2), sex (P=0.3), previous experience (P=0.3), weight (P=0.8), pre-competition gastrointestinal problems (P = 0.1), food consumption during competition (P = 0.3), carbohydrate intake (gr) pre-competition (P = 0.9), during competition (P = 0.7), fluid intake (cc) pre (P = 0.3), during (P = 0.2). No relationship between the consistency of food during competition and gastrointestinal manifestations: solids (P = 0.7), gels (P = 0.8), liquid (P = 0.1)

Discussion: The prevalence of GM was 27%, like the prevalence of 30 to 35% reported in the literature in others marathon competitions (De Oliveria 2014), being the most common disturbances dizziness and meteorism. The explanation for these symptoms are multifactorial, the most common causes are splenic hyperfusion, changes in intestinal permeability, mechanical causes, and nutritional factors like the type and schedule of previous meals and during the competition and the state of hydration of the athlete (Jeunkendrup 2017)

Conclusion: Runners who presented gastrointestinal manifestations prior to a half marathon recorded a higher average time of competition. No statistical associations were observed with the variables under studied. Studies with a larger sample size are required to deepen these findings.

NON-ALCOHOLIC FATTY LIVER DISEASE AND ATHLETES

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Introduction and Purpose: Non-Alcoholic Fatty Liver Disease (NAFLD) is a medical condition that might be triggered, especially, by: obesity, metabolic syndrome (MS) and diabetes mellitus type 2; acquiring steatohepatitis is a real possibility as its clinical course unfolds. Athletes have very little relapses cases as a reference. Objective: Learn about the relationship between NAFLD and athletes.

Material and Methods: Systematic literature review, under a qualitative approach. The following are the database queried: Pubmed, Scopus and Web Science. Full articles and hepatic steatosis reference in athletes were the filters applied.

Results: Five out of 53 articles have been added. The study revealed that athletes have a longer life expectancy and lower risk of chronic non-communicable diseases perhaps due to fit and healthy lifestyle. Probably the factor that stands out the most is the amount of time this group invests in physical exercises during their lives.

Discussion: The study addressing the effects of endurance training clearly shows the influence of endurance exercises on the decreased accumulation of free fatty acids in the liver, thus preventing a possible NAFLD. In the study on the use of anabolic androgenic steroids (AAS) by bodybuilding athletes, the autopsy finding of NAFLD in the subjects, who died for cardiac complications of the use of AAS, shows the potential effect of these drugs on the onset of NAFLD, and this possibility should not be subjugated. In the study addressing the effects of irisin in metabolism, it was observed that athletes have a higher level of physical activity than the less active general population, and the higher levels of irisin in this group indirectly leads to the increase of thermogenesis and energy expenditure, thus hindering lipogenesis and therefore the accumulation of fat in the liver, significantly decreasing the risk of NAFLD. The article addressing the factors that may influence the flexibility of ectopic lipids shows that there is a complex interaction between (quantitative and qualitative) diet, availability of fat mass, action of insulin and physical activity in the influence of the distribution of ectopic lipids. NAFLD reflects from the excessive ectopic deposit of lipids in the liver. Athletes certainly have an additional protection factor in the development of NAFLD, due to their higher level of physical activity. In the study which addressed the longer life expectancy and lower risk for chronic diseases in male elite athletes during their lives, it is clearly observed a lower risk of NAFLD in this group when compared with their sedentary controls over life, and the level of physical activity was a determining factor for protection. This review revealed that athletes have a longer life expectancy and lower risk of chronic non-communicable diseases, perhaps due to the physically active and healthy lifestyle. By carrying out this review, we could conclude that NAFLD is not commonly found in athletes. The level of physical activity in this population during their lives is probably the most relevant factor in this group. Thus, only athletes abusing anabolic steroids for ergogenic purposes, such as bodybuilders, have increased risk for developing NAFLD. It was also observed that hepatic steatosis is not a common pathology found in athletes, except for some bodybuilding athletes abusing anabolic steroids for ergogenic purposes. It is worth to keep in mind that an old career, such as elite athlete, and sports-oriented lifestyle, is associated with a better quality of life.

Conclusion: The study revealed that NAFLD is not commonly found in athletes, except in some cases of bodybuilding athletes abusing anabolic steroids.

PREVALENCE OF METABOLIC SYNDROME AND DIABETES MELLITUS TYPE II IN SERVERS OF UNIVERSITY HOSPITAL OF GRANDE DOURADOS (HU-UFGD)

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Introduction and Purpose: Metabolic syndrome (MS) is a pathology with high incidence and prevalence rates, being responsible for a considerable increase in morbidity and mortality rates in the last decades around the world. It is characterized as a set of chronic non-communicable diseases that increases the risk of cardiovascular events. These include central obesity, insulin resistance, dyslipidemia, and arterial hypertension. Thus, the objective of this study was to study the prevalence of metabolic syndrome and type II diabetes mellitus in servers of a public hospital located in the city of Dourados/MS.

Material and Methods: Approved by the Research Ethics Committee under opinion nº 2.282.56, the study has descriptive quantitative cross-sectional nature, with a sample of 172 employees with an average age of 37 years. For convenience, the individuals were interviewed for socioeconomic, anthropometric data collection (weight, height, BMI, waist circumference), physical exercise practice checks, ingestion of alcoholic beverages, smoking and also analyzes of medical records of the Occupational Health and Safety of the hospital to determine the diagnosis of diabetes and hypertension.

Results: The research remained dominant by the feminine gender 58%, with indices of sedentary people happening of 50%. The overall diagnosis of MS was 14% and of diabetes 7%.

Discussion: Differently from other studies in which the prevalence of metabolic syndrome is 30% in our study the prevalence is 14%. The predominance of central obesity in women is similar to other studies. Even with the lower prevalence, health intervention is necessary.

Conclusion: Therefore, the increasing prevalence rates of MS and type II diabetes mellitus in different populations refers to a rapid response action, thus, the most appropriate interventions are: adherence to healthy eating habits, physical exercise and medical follow-up.

RELATIONSHIP BETWEEN INDEX OF BAUMGARTNER AND MAXIMAL HEART RATE IN MEN AND WOMEN

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Introduction and Purpose: Inadequate nutrition and the absence of physical activities have contributed to increasing on sedentary rates around the globe, which implicates in the augment of obesity pathologies index (e.g. diabetes, hypertension) and mortality risk. Added to that, morbidities such as sarcopenia may be diagnostic earlier in people who do not exercise. This fact is important to study since the lean body mass has been currently related to the improvement of metabolic ability (e.g. taxon metabolic basal) or better performance in daily tasks (e.g. sitting, lifting, walking). This loss of lean body mass can be obtained through the Baumgartner index protocol (IB), which demonstrates values of sarcopenia by each person [IB: appendicular lean mass (kg) / height (m)²]. Women tend to show greater IB when compared to men. Although a lean mass is an indicator of better health status, there are other parameters that can be used to identify the health of the organism, such as maximum heart rate (HRmax), which demonstrates the effectiveness of the system in pumping blood to the central areas (e.g. the heart itself) and peripheries (e.g. arteries and arterioles). Given this, the relation between the Baumgartner index and HRmax still clearly known for each gender. Objective: The present study aims to verify the relationship between the Baumgartner index and the HRmax to men and women.

Material and Methods: 18 men (42.8 ± 12.1) and 16 women (40.3 ± 9.1 years) have participated in the study at the Sports Medicine Centre of the Hospital Nove de Julho in Sao Paulo, Brazil. They underwent cardiopulmonary testing until voluntary exhaustion. The protocol started with an initial velocity of 4km per hour and slope of 1%. The speed was increased to 1Km per hour every 1 minute. A portable heart rate (HR Probe Polar®, Warminster, USA) was used to collect the data. The IB protocol was employed to determine the level of sarcopenia. Added to that, the volunteers were classified as "overweight", considering the value <7.26 kg / (height)². In order to evaluate the values of the correlations (r), the following stratifications were used: 0 < r < 0.25 or - 0.25 < r < 0: fundamentals or 0.25 < r < 0.50 or - 0.50 < r < - 0.25: 0.75 or - 0.75 < r < - 0.50: moderate correlation and 0.75 < r < 1.00 or - 1 < r < - 0.75: strong or perfect correlation (perfect if r = -1 or r = 1). For a statistical, the Spearman test was adopted with a significance level of p ≤ 0.05. The normality test of Shapiro Wilk has identified asymmetric data, and the Spearman (r) was performed to identify the relation between IB and HRmax for both genders, adopting p < 0.05 as significant values. All analyses were performed using the SPSS statistical package (version 20.0 IBM®, New York, USA).

Results: The results showed that there was a positive moderation correlation (r = 0.51) with a significant statistical value (p = <0.05) between IB and HRmax to the male group and it was moderate positive (r = 0.61) with a significant statistical value (p = <0.05) between IB and HRmax to female group.

Discussion: The results showed that women have a small cardiac capacity related to (e.g. lean mass and fat mass) changing body composition. In addition, research emphasizes the importance of physical activity in favour of reducing the sarcopenia indices that mainly affect the elderly, increasing lean mass and improving cardiorepiratory capacity.

Conclusion: Given the results above, the conclusion is that there is a moderate relationship between IB and HRmax in adults of both genders. In addition, it is suggested that further studies should be a performance to verify the level of physical activity.

EPIDEMIOLOGICAL STUDY OF INJURIES IN THE BRAZILIAN MEN'S SOCCER TEAM IN THE UNDER-15 AND UNDER-17 IN THE YEAR 2017**Autores:** Matheus, D L R, Pedrinelli, A, Picanço, A, Ramos, G P**Instituições:** Universidade de São Paulo - São Paulo - Sao Paulo - Brasil

Introduction and Purpose: Sports practice is considered to be key to achieving an active and healthy lifestyle. With more than 240 million amateur soccer players and approximately 200,000 professional athletes worldwide, soccer is one of the most popular and practiced sports in the world. It is a sport that involves a lot of physical contact, short, fast and non-continuous movements, such as acceleration, deceleration, changes of direction and jumps. Because of this, it presents in absolute terms a high number of injuries and arouses much interest in sports traumatology. The purpose of this study is to understand the most frequent types of injuries that have occurred in the under-15 and under-17 categories of the Brazilian men's soccer team and to somehow prevent them.

Material and Methods: All types of complaints made by athletes of Brazilian men's soccer team in the under-15 and under-17 categories during the training and competitions in the year 2017 were computed. These complaints were filled out by the doctor in a form developed by the technical committee. For this work, only orthopedic complaints were considered. We used data related to: type of injury, whether by trauma or overuse; whether or not he had contact at the time of injury by another athlete; The severity of the injuries was subdivided according to the estimated recovery period in days. Degree I/insignificant: did not need to move away from activities; grade II/minimum: 1 to 3 days of withdrawal from the activities; grade III/mild: 4 to 7 days ; grade IV/moderate: between 8 and 28 days ; grade V/severe: more than 28 days of withdrawal from activities; degree VI/ career terminator; segment of the affected body an

Results: In addition to the under-15 and under-17 injuries, we had 170 injuries, of which 81 were sub-15 and 89 sub 17. The most frequent type of injury was contusion (94 injuries), followed by muscle injuries (56 injuries), sprains (15 injuries) and tendinopathies (5 injuries). The most affected regions were thigh (35 injuries), followed by foot (28 injuries) and trunk(24 injuries). Of the 170 injuries, we had 97 per contact and 73 without contact from another player at the time of injury. Regarding the cause of the injury, we had 109 for trauma and 61 for overuse. Regarding the severity of the injury, we found 139 injuries grade 1, 24 grade 2, 4 grade 3, 1 grade 4 and 2 injuries grade 5.

Discussion: Sullivan et al. suggests that the more inconsequential behavior of younger athletes leads them to greater number of injuries in upper limb, head and face injuries during sports activities compared to older athletes, being the main explanation for this finding. Also in the lower limbs is notable the greater incidence of bruises on young players. Most are caused by trauma, although it is observed that during a season up to 34% of injuries are due to overload, which is in agreement with our findings. Regarding to the diagnosis, contusions, muscle injuries and sprains are the most frequent injuries found in the literature. We found similar results in our study, since, in addition to showing that injuries of lower limbs occurred as an absolute majority, the most common types were contusions and muscular injuries, respectively.

Conclusion: The analysis of the results obtained in the present study allowed to draw a profile of the prevalence, distribution by body segment and severity of the injuries of under-15 and under-17 soccer players of the Brazilian men's soccer team. Most of the findings of this study are in agreement with the data obtained from other epidemiological studies involving injuries in adult and professional football, although there are still no studies with the incidence of injuries in the age group studied for comparison. There was a higher prevalence of lower limb injuries, the most frequent diagnoses were contusions, with the cause being trauma and the injuries presenting, for the most part, minimum degrees of severity.

EVALUATION OF DIETARY INTAKE OF TAEKWONDO ATHLETES FROM THE CITY OF SETE LAGOAS - MG.**Autores:** Menezes, J A, dos Santos, L C**Instituições:** Centro Universitário de Sete Lagoas- UNIFEMM - Sete Lagoas - Minas Gerais - Brasil

Introduction and Purpose: Taekwondo is an ancient art of Korean origin spread throughout the world. The Taekwondo athlete needs adequate nutrition to meet their nutritional needs, gaining strength and endurance to withstand the pace of training and competition. The dietary intake of athletes of various modalities is well described in the literature, but few studies evaluate the diet of Taekwondo practitioners. The objective was to evaluate the dietary intake of Taekwondo athletes from the city of Sete Lagoas - MG.

Material and Methods: A cross-sectional study was carried out with 42 athletes, 22 adolescents and 20 adults, of both sexes. A food frequency questionnaire (FFQ) and the 24h recall were applied, as well as the evaluation of the meals performed before, during and after the training sessions.

Results: 64.2% of the athletes are males and 35.8% are females with a mean age of 20.0 ± 8.4 years. 50% of athletes consume cereals and processed foods group in the pre-workout meal. During training, only water consumption was reported. After the training, 71.4% of the athletes consume food from the group of meats and eggs; 69% consume sources from the cereals group while 50% opt for vegetables. Carbohydrate intake in grams per day was 300 ± 141 g for men and 338 ± 191 g for women. In adolescents the mean was 206 ± 37.7 g for males and 215 ± 104 g for females. Protein consumption per kg of body weight was 1.08 ± 0.4 g in adult males and 1.28 ± 0.6 g in adult females, among adolescents was 1.97 ± 1 g for males and $1.1 \pm 0, 8$ g in females. The mean lipid intake among men was 30.5% and 34.4% among adults and adolescents respectively, whereas for women it was 29.6% and 30% among adults and adolescents, respectively. The fiber intake was 19.5 ± 9.7 g among women and 26.4 ± 11.3 g among adult men and 30.5 ± 0.8 g for men and 25 ± 18.1 g for women. Insufficient intake of calcium, iron, phosphorus, potassium and vitamins D, C and E and high sodium intake was observed among adult and adolescent athletes. The FFQ showed high consumption of rice, beans and breads, low consumption of fruits, vegetables and dairy products and moderate consumption of foods such as meats and those considered processed and ultraprocessed as stuffed cookie, soda, artificial juice and hamburger. Water intake was inadequate in both sexes and age groups, especially among women.

Discussion: The diet of Taekwondo athletes is inadequate, unbalanced. There is a high consumption of carbohydrates, contributing to increase body fat and hormonal and insufficient imbalance of several vitamins and minerals with antioxidant profile and important in energy metabolism. Protein intake appeared to be low (except in adolescent males) considering the protein requirement in sports of strength. Consumption of ultraprocessed foods high in sugar and sodium was high, while consumption of minimally processed, natural, nutrient-dense foods was reduced. The water intake was insufficient, evidencing inadequate hydration. The food and water context can significantly affect athletes' physical capacity and performance.

Conclusion: The diet of Taekwondo athletes is unbalanced, deficient in protein and micronutrients, high in carbohydrates and sodium and insufficient in hydration. Nutritional interventions are fundamental in this public in search of better nutritional habits and greater results regarding the performance of the athletes.

DESCRIPTIVE ANALYSIS OF CARDIOVASCULAR EVALUATION IN PROFESSIONALS TEENAGERS SOCCER PLAYERS OF A SOCCER TEAM**Autores:** Chavez, R D R, Perez, B M, Ciocler, T, Moreno, C T**Instituições:** Unifesp - São Paulo - Sao Paulo - Brasil

Introduction and Purpose: Soccer is the most popular sport in Brazil and attracts more and more children, who begin competitive training in schools and professional clubs. There is no doubt that the sports initiative is beneficial for health and quality of life in adolescents, however it is mandatory to detect conditions that may have, in physical exercise, a trigger for serious cardiovascular events such as Sudden Death (SD). The present study had its primary objective to describe the most frequent clinical findings in complementary tests performed in the preseason evaluation of adolescents soccer players from the Youth Academy of a soccer team in the city of São Paulo.

Material and Methods: The study involved 158 male athletes aged 13 to 20 years old who had been training for at least 3 years, five times a week from a professional soccer team in the city of São Paulo. The athletes went through a pre-participation sports assessment protocol, which included anamnesis, physical examination and complementary tests such as electrocardiogram (ECG), exercise stress test (ET) and echocardiogram (ECO) as part of a multimodal evaluation protocol. The main alterations were described and characterized as of physiological nature, resulting from adaptations to exercise, or as a result of pathologies, that imply increased cardiovascular risk when associated with sports practice.

Results: The cardiology exam did not show abnormality in the heart in any of the 158 adolescents. Seventy-nine athletes (50%) presented some electrocardiographic alterations. In the group of athletes with physiological alterations, sinus bradycardia was detected in 43.5% of the athletes, repolarization of the left ventricle was altered in 18%, and in 39% the Sokolow Lyon index was suggestive of an increase in the left chambers. In the group of alterations considered non physiological variants T-wave inversion was present in 5.1% of the cases and one athlete showed a baseline with signs of ventricular pre-excitation. In five athletes (3.16%), isolated ventricular extra-systoles were diagnosed during the effort period in the exercise stress test. Four athletes presented hypertensive response during the effort phase. Seventeen (10.75%) of all echocardiographic examinations were described with some abnormality, of which 76.4% were not associated with alterations restricting competitive practice; on the other hand, some of the echocardiographic findings required investigation or systematic follow-up, among them 2% of left ventricular hypertrophy with IVS thickness values above 11 mm and LVPW above 11 mm, in addition to rare alterations such as anomalous origin of the right coronary artery, enlargement of aortic root diameter (39 mm), bicuspid aortic valve, and papillary muscle hypertrophy.

Discussion: It remains a great challenge to determine protocols capable of detecting young athletes at high risk of sudden death. The indication of complementary tests is not always contemplated in the screening guidelines, however, the results found in this study corroborate with the literature the importance of the combined application of ECG, EST and ECO in detecting potential fatal silent cardiac pathologies, and having in mind that the combination of such tests might decrease the number of false positive electrocardiographic results.

Conclusion: More studies are needed to determine the efficacy of a pre participation screening protocol.

EFFICACY AND SAFETY ASSESSMENT OF PHYSICAL ACTIVITY FOR TYPE 2 DIABETES: RESISTANCE VS AEROBIC EXERCISE**Autores:** Higa, J L N, Pereira, A L S**Instituições:** Fundação Técnico Educacional Souza Marques - Rio De Janeiro - Rio De Janeiro - Brasil, Universidade Federal Fluminense - Niteroi - Rio de Janeiro - Brasil

Introduction and Purpose: Type 2 diabetes mellitus (DM2) is a major cause of disability and death due to its complications. In addition, prevalence keeps rising globally despite innovations in drug therapy and clinical diagnosis. Lack of physical activity is a major risk factor for DM2 (LAAKSO 2008), but regular exercise practice can stimulate the glucose uptake through the skeletal muscle glucose transporter protein (SCHULLER & LINKE 2008). Non-pharmacological nature, low costs and decreased metabolic risk factors associated with diabetes complications are beneficial as well. Resistance and aerobic exercises are both recommended as effective treatments for people with DM2 by stimulating energy and glucose metabolism. The objective is to compare resistance and aerobic exercises in terms of effectiveness and safety in people with DM2.

Material and Methods: An electronic search was performed via PubMed on May 25, 2018 with the following terms: ("Diabetes Mellitus"[Mesh] AND "Exercise"[Mesh]), aerobic exercise and resistance training. Limits were applied for English language and publications between 2007-2018. Clinical outcomes were assessed by glycosylated hemoglobin (HbA1C). Inclusion criteria were as follows: 1) Randomized clinical trials (RCT) and systematic review/meta-analysis 2) Patients with DM2 3) Specified duration and frequency of exercise. Exclusion criteria: patients with gestational or type 1 diabetes mellitus. The two authors independently assessed the abstracts, identified studies that met the criteria and screened references of review articles for further eligible studies.

Results: Among 10 different studies, there were six RCT and four meta-analysis/systematic reviews. Seven reported reduction of HbA1c in both resistance and aerobic training groups. When comparing the two different types of exercise, four studies showed similar reductions and two pointed to a greater reduction with resistance in comparison to aerobic. Only YANG, Z. found a greater reduction of HbA1c with aerobic exercise, but it became non-significant with sensitivity analysis ($p=0.14$). It was shown to be common practice not reporting data on adverse events, which could raise concern about bias. SIGAL, R.J. thoroughly reported its adverse events and demonstrated that 38% of exercise group participants have had adverse effects, in contrast to 14% of control group.

Discussion: A Cochrane review of 14 trials found a 0.6% reduction in HbA1c when comparing any type of exercise with no exercise and, according to the American Diabetes Association, the HbA1c levels reflect glycemic control over the previous 2 to 3 month period. A 1% value decrease is associated with a 37% decrease in the risk for microvascular complications and a 21% decrease in the risk of death associated with diabetes (STRATTON et al, 2000). UMPIERRE, D. et al reviewed 47 RCT, and 30 of them did not report data on adverse events. On the other ones, no major adverse effects were reported and the minor ones mostly included unrelated cardiovascular disease events and musculoskeletal injury or discomfort. One study included a high rate of hypoglycemia. There was divergence on what type of exercise had the greater HbA1c reduction. The studies from SIGAL et al. and CHURCH et al. had opposite results, but both showed better results with a combined aerobic and resistance training program, suggesting synergistic effects.

Conclusion: Clinical guidelines advocate both aerobic and resistance exercises, and there is no evidence that they differ from each other in impact on cardiovascular risk markers or safety (YANG, Z. et al, 2014). However, many patients with DM2 are able to follow just one type of exercise due to physical limitations, availability of facilities or diabetes complications; in these cases, given the small number and the mild nature of adverse events reported in the reviewed trials, progressive resistance exercise appears to be an (effective) and relatively safe form of exercise.

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SUBJETIVE EVALUATION OF RESISTANCE TRAINING TERAPEUTIC EFFECTS

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Introduction and Purpose: Many resistance training effects have been stated as important to prevent or treat chronic diseases and increase functionality. Besides promoting muscle mass gain and strength, there are, other effects such as tendons strengthening, improvement of muscle elasticity, improvement joint mobility, increase of bone mass, improvement of hormonal profile and production increase of anti inflammatory interleukins. Particularly in degenerative joint and spine diseases, the resistance training have been very efficient for promoting pain relieve and functionality, leading to best quality of life. To evaluate the subjective perception regarding resistance training effects in upon initial physical complaints.

Material and Methods: Between 04 and 11 June 2018 a questionnaire was applied to 195 individuals, men (74) and women (171), 30 to 90 years old, involved in resistance training at a specialized institution. All participants used traditional resistance exercises at lever machines and weights, from Biodelta; these have the purpose of relieving joint stress and have mechanical adjustments for pathologic conditions. The participants were not in chronic use of anti inflammatory drugs. The questionnaire included name, age, initial physical complaints, training duration, and their subjective perception with the following question: "Do you think you have improved or have worsened regarding your initial physical complaints? The answers were stated as a Likert Scale from 1 to 5, with the following categories: improved a lot (5); partially improved (4); indifferent (3); partially worsened (2) and worsened a lot (1).

Results: The training duration was less than a year in 22.66 % of participants; from 1 to 3 years in 27,2 %; from 3 to 8 years in 28,2 %; more than 8 years in 22,1 %. 12,3 % participants were >80 years old; 26,2 % were in between 70 and 79 years old; 17,9 % were in between 50 and 59 years old and 9,8 % were in between 30 and 49 years old. The more frequent initial physical complaints were shoulder pain, back pain, knee pain and muscular weakness, in between 40 and 50 % of the answers. The second more frequent, physical complaints were neck pain, ankle pain, general fatigue, bad posture, flaccidity and movement impairment in between 30 and 40 % answers. The "improved a lot" responses and the "partially improved" responses summed up: neck pain 70%; shoulder pain 75%; arm pain 55%; hand pain 44%; back pain 84%; ankle pain 73%; knee pain 77%; ankle pain 44%; foot pain 61%; general fatigue 84%; muscular weakness 95%; falls 65%; bad posture 84%; flaccidity 72%; movement impairment 85%.

Discussion: The percentages of symptomatic improvement attributed to resistive exercises are very important from a clinical approach. Besides, resistance training has been demonstrated to have high adherence in general population, particularly among old people who habitually have joint complaints. Resistive exercises can be adjusted in weight, range of motion and amount of effort in order to be suitable to any status of health. Some equipment seems to be best suited for these adaptations.

Conclusion: Resistive exercises showed high efficiency levels for improving the initial physical complaints according to participant's subjective perception.

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CORRELATION OF TISSUE DAMAGE WITH HEMATOLOGICAL CHANGES INDUCED BY MARATHON IN DIFFERENT ENVIRONMENT CONDITIONS

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Introduction and Purpose: Long-distance running induces several physiological changes such as hemolysis and tissue damage as well as myocardial and renal damage. In thermally stressful conditions hydroelectrolytic unbalance may aggravating the hemolysis and tissue damage induced by exercise. The aim of this study was to evaluate the correlation of hematological, renal and myocardial markers after the race in different thermal environments.

Material and Methods: Twenty-six Brazilian male endurance runners joined this study and completed both the São Paulo International Marathon 2014 (~33°C and 53% of relative humidity) and 2015 (~16°C and 82% of relative humidity), hot and temperate environment (HE and TE, respectively). Blood samples (30ml) and urine samples were collected before 24h, immediately after it, 24h and 72h after the marathon simultaneously. Were evaluated hematological parameters: erythrocyte (ERC), hemoglobin (HB), hematocrit (HT), MCHC, MCV, total and unconjugated bilirubin (TB and UB, respectively); cardiac parameters: proBNP, troponin (TN), CKMB; renal parameters: urea, lactate (LAC), glomerular filtration rate (GFR), erythropoietin (EPO), creatinine (CRN), hematuria (HU), leukocyturia (LCU), proteinuria (PU) and urine cylinders (UC); and hydroelectrolytic parameters: osmolarity (OSM), magnesium (Mg), calcium (Ca) with the routine-automated methodology in the Clinical Laboratory of Dante Pazzanese Institute of Cardiology. Statistical analyses with a Spearman correlation were performed to identify the coefficient between the variables using absolute values with significance assumed at p-value <0.05.

Results: In both climates, there was a negative correlation (NegCorr) between the cardiac parameters, proBNP and TN with ERC (p<0.01 and p<0.05, respectively), HB (p<0.05 and p<0.01, respectively) and HT (p<0.05). Moreover, in the HE a NegCorr of CKMB with ERC (p<0.01), HB (p<0.01) and HT (p<0.01); proBNP with MCHC (p<0.01); and TN with Mg (p<0.05) was observed. In addition, EPO levels obtained a positive correlation (PosCorr) with proBNP in both climates (p<0.05). However, in HE, EPO showed a PosCorr only 1 day later when compared to the TE that had a PosCorr immediately after the marathon, suggesting that erythropoiesis in HE is late. In addition just in HE, was observed an NegCorr between renal markers with hematological and hydroelectrolytic parameters: urea with HB, HT, Mg and Ca (p<0.05), TB and UB (p<0.01); GFR with Ca (p<0.05); PU with MCV (p<0.05), HU with Mg (p<0.05); and PosCorr between CRN and UC with UB (p<0.02); and LCU with Ca (p<0.05). The metabolic marker LAC also had a PosCorr with OSM (p<0.05) and NegCorr with Mg in HE. EPO had a NegCorr with PU (p<0.01), Mg and Ca (p<0.05) and PosCorr with GFR (p<0.001) and OSM (p<0.05).

Discussion: Previous studies from our group demonstrated that marathon induces myocardial and renal damage followed by hemolysis, immune activation, fluid, and electrolyte imbalance pronounced by thermal stress may be important factors responsible for hemolysis, renal damage, immune activation, and impaired performance after long-term exercise (Oliveira et al., 2017). The main discovery of the present study demonstrated an association between hematological changes and myocardial injury induced by marathon race in both climates. However, thermal stress appears promoted to hydroelectrolytic unbalance that contributes to renal dysfunction, delaying erythropoiesis response and impairing hematological parameters. The hydroelectrolytic unbalance also was correlated with LAC, suggesting hypoxia that may contribute to renal dysfunction.

Conclusion: The myocardial damage is associated with hematological changes induced by marathon race independently of environmental conditions. However, the thermal stress may increase the risk of renal damage by mechanisms involving hemodynamic stress induced by long-distance exercise impairing performance.

CARDIORESPIRATORY FUNCTION DIFFERENCES BETWEEN ELITE AND SUB-ELITE BRAZILIAN WHEELCHAIR RUGBY PLAYERS WITH SPINAL CORD INJURY

Autores: Vigário, P d S, Vicentini, C E, Mainenti, M R M

Introduction and Purpose: The practice of sports has been one of the strategies successfully used in rehabilitation programs of individuals with a spinal cord injury (SCI). In addition to the physical benefits, it encourages socialization and improves quality of life. The wheelchair rugby (WR) is a sport for individuals with tetraplegia which provides chronic adaptations for both aerobic and anaerobic systems. Certain studies, which include non-disabled athletes from different sports, age and sexes, had shown a positive correlation between the competitive level and the physiological responses. However, this relation in athletes with physical disabilities is less clear. In addition, the functional classification specific to each sport may be an intervening variable in the triad motor physical disability, sports performance and competitive level. The aim of this study was to compare the cardiorespiratory capacity on effort of WR players, according to their competitive level and to correlate the cardiorespiratory capacity to the sport's functional classification.

Material and Methods: Seven players in a regional team of WR, who compete only at the national level, and 18 players of the Brazilian team, who participate in competitions at the international level, took part in this cross-sectional study. All participants underwent cardiopulmonary exercise testing (CPET) on an arm cycle ergometer with metabolic respiratory gases analyses. The initial test load was set at 20W, with successive increments of 2W/min (for athletes with functional classification =< than 2.0 points) or 5W/min (for athletes with functional classification => than 2.5 points). The participants were instructed to maintain the cycling rate between 50 and 60 rpm.

Results: The athletes competing at the international level practiced WR for a longer period of time ($p = 0.01$) and had a greater total volume of training per week, total effort time, final power, VO_2 peak absolute and relative, pulmonary ventilation and VCO_2 peak (all p -values <0.01), with the effect size ranging between -0.45 and -0.70 (moderate to strong). A positive and moderate correlation, with statistical significance, was found between functional classification and the VO_2 peak absolute and relative, pulmonary ventilation and VCO_2 peak and a strong correlation was found for final power in the group of athletes that competed internationally. Among the athletes competing at the national level, the functional classification correlated only with the final power ($\rho = 0.91$, $p < 0.01$).

Discussion: The main findings of this study were that athletes with a higher competitive level had a better cardiorespiratory capacity on effort. These results have practical relevance, since it shows that adjustments in variables related to training may improve the aerobic capacity of players, possibly resulting in a better performance and cardiorespiratory health. With regard to the relationship between the functional classification and the cardiorespiratory capacity on effort, positive and moderate correlations were found only in the group of athletes who competed internationally. However, regardless of the competitive level, the functional classification correlated strongly with the final power. The aspects involved in the evaluation of functional classification of the athletes may help explain these findings.

Conclusion: Players who compete at the international level presented a better cardiorespiratory capacity on effort than those who compete at the national level, which was associated with a greater amount of time practicing WR and a greater volume of training weekly. The functional classification correlated strongly with the final power, regardless of the competitive level. As for the cardiorespiratory variables, the correlation with functional classification was evident among athletes who competed internationally, possibly because this group was homogeneous with respect to the chronic adaptations of the cardiorespiratory system triggered by training.

GENERAL EPIDEMIOLOGY OF SPORTS INJURIES IN BASKETBALL: INTEGRATIVE REVIEW

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Introduction and Purpose: Basketball is a contact sport, with complex movements including jumps, turns and changes in direction, which cause frequent musculoskeletal injuries in all regions of the body. Objective: Integrative systematic review of the epidemiology of musculoskeletal injuries in basketball.

Material and Methods: Integrative review based on the following sources of information: Pub-med/MEDLINE, Embase, LILACS, BBO, IBECs, Nursing Journals, Dental Journals and Core Clinical Journals in the last 10 years with studies addressing the general epidemiology of sports injuries in basketball.

Results: In total, 268 articles were selected, of which 11 were eligible for the integrative re-view. A total of 12,960 injuries were observed, most of which occurred in the lower limbs (63.7%), with 2,832 (21.9%) ankle injuries and 2,305 (17.8%) knee injuries. Injuries in the up-per limbs represented 12 to 14% of total injuries. Children and adolescents received head injuries more often compared to the other age and skill categories. In the adult category, there was an increased prevalence of injuries in the trunk and spine. In the upper limbs, hands, fingers and wrists were affected more frequently than the shoulders, arms and forearms. In the master's category, there was an increase in the incidence of thigh injuries.

Discussion: In this study, more than 12,000 basketball injuries were analysed from the 11 included studies, and the results showed that there were more injuries in the lower limbs (63.7% of the injuries), regardless of gender (male, 65.2% and female, 68.4%) or level: professionals (64.7%), master (74.5%) and children and adolescents (62.5%). These data are in accordance with the literature. In a WNBA and NBA six-season retrospective study, Deitch et al. concluded that lower limbs (65%) were the most common basketball injury site. Of the 5,272 injuries of the professional category included in this study, 3,411 occurred in the lower limbs, representing 64.7% of the total injuries reported. According to the specific anatomic region, the largest proportion of injuries occurred in the ankle (2,832 injuries, 21.9%), followed by the knee (2,305 injuries, 17.8%). Most authors point to the ankle as the most common injury site; however, some authors report that the knee is the most affected region.

Conclusion: The lower limbs were the most affected, with the ankle and knee joints having the highest prevalence of injuries regardless of gender and category. Further randomized studies, increased surveillance and epidemiological data collection are necessary to improve the knowledge of sports injuries in basketball and to validate the effectiveness of preventive interventions.

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NONSUSTAINED VENTRICULAR TACHYCARDIA IN ASYMPTOMATIC ULTRAMARATHONER DUE TO SCARRING FROM MYOCARDITIS: A CASE REPORT

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Introduction and Purpose: Nonsustained ventricular tachycardia in athletes is associated with the risk of sudden death in patients with focal myocardial scarring, and it is of fundamental importance to establish early diagnosis and therapeutic. The purpose of this case is to report an association of potentially lethal cardiac pathologies.

Material and Methods: D.M.S male, 36 years old, ultramarathoner, presents nausea, vomiting associated with liquid diarrhea, myalgia and arthralgia during a mountain ultramarathon. Symptoms ceased after resting and vigorously hydrating. Asymptomatic from a cardiological point of view after 6 months, presented nonsustained ventricular tachycardia during routine exercise testing. Interrupted immediately the patient examination progresses without complaints, hemodynamically stable with recovery of sinus rhythm after test termination. As discussed later, the patient didn't complain of previous tachycardia, palpitations, dyspnea, syncope or presyncope. He had no family history of sudden death, drug use, alcoholism, smoking. The resting electrocardiogram was normal. The echocardiogram revealed basal septal hypokinesia, with preserved ejection fraction. The investigation proceeded with magnetic resonance imaging (MRI), which revealed a slight dilation of the ventricles, with atria of dimensions within the limits of normality. Cardiac chambers presented thickness and normal walls. Preserved atrioventricular and ventriculoarterial relationships. Sequence in T1 and T2 showed no signs of infiltration by adipose tissue in the myocardium. The dynamic study showed preserved systolic performance of the right ventricle and in the lower limit of normality in the left ventricle, absence of significant myocardial contractility or valve changes. The ejection fraction was 54%. During dynamic study, a late enhancement area was visualized in the inferior septum region of non-ischemic origin. The myocardial scarring region makes suspicion of prior myocarditis with evidence of late enhancement. Due to the age of the patient, not having risk factors for atherosclerosis, being an athlete, and also because MRI suggests nonischemic pattern of fibrosis, we chose not to perform coronary angiography. The patient was oriented to stay away from physical activities, which did not happen. We conclude that often several imaging methods are necessary for the evaluation of high performance athletes. From the clinical history and the complementary examinations we found the diagnosis of myocarditis to be probable.

Results: The results of the complementary tests are described above.

Discussion: Myocarditis may result from a number of infectious and non-infectious causes, and viral myocarditis is the most prevalent form. Diagnostic evaluation of myocarditis starts with clinical suspicion combined with noninvasive diagnostic methods. Diagnostic confirmation is only possible through histological analysis obtained by endomyocardial biopsy of the right ventricle. In clinical practice most of the myocarditis diagnoses are made from diagnostic suspicion, since only the minority of the patients with suspected myocarditis are submitted to endomyocardial biopsy to confirm the inflammatory aggression. The investigation of myocarditis in athletes after symptoms is of paramount importance since later areas of myocardial scarring can lead to complex arrhythmias and sudden death.

Conclusion: All high-performance athletes should be evaluated as a means of preventing sudden cardiac death.

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BODY DEHYDRATION OF ATHLETES DURING FIVE DAYS OF ECOLOGICAL HIKING

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Introduction and Purpose: Loss of body mass $\geq 2\%$ during exercise is considered dehydration. Some factors may influence the dehydration process, such as the elevation of the core, reduction of plasma volume and low water consumption before, during and after exercise. The effects of long-term net loss on exercise are related to cardiovascular repercussions: increased activity of the sympathetic nervous system, increased secretion of the vasopressin hormone, increased serum concentration of cardiac toponym and changes in heart rate variability. As inadequate water replenishment during a few hours of moderate to vigorous physical activity leads to cardiovascular and muscular changes, most likely the walk during a whole day (mean of 8.3 hours) for five days, with soil temperatures between 31 -42 ° C can lead to signs of dehydration and chances of cardiovascular events. The objective of this study was to verify the body dehydration of the athletes of the ecological walk during the five days.

Material and Methods: The soil temperature was measured with a thermometer coupled to a digital reader. The distance and time taken to go through each segment was measured by vehicle tachograph. The body mass was measured with a portable digital scale. Stature was measured using the portable stadiometer. Bioimpedance was performed with a single-cavity bioimpedance device. The variations (Δ) of all BIA parameters of each day were calculated by subtracting the values observed in the afternoon from the values collected in the morning. Differences in the variances were verified by the ANOVA test for repeated measures. Of the participants, 20 presented a great loss of body mass ($\geq 2\%$) on the first day, while in the next four days (DIA1-DIA5) the variation was negative indicating that the day ended hydrated, but they started dehydrated.

Results: In this study it was evidenced that there was a loss of more than 2% of body mass of participants who completed the 296 km course.

Discussion: The athletes presented loss of liquid from the first day. Evidence indicates an increase in cardiac troponin concentrations in dehydrated athletes, but that elevation of this protein may be linked with other mechanisms related to exercise adaptation. Maintaining hydration is vital for athletes and this factor is key to performance during long-term exercise. Regarding the bioimpedance parameters, the resistance / stature, on the first day of walking, were higher at the end when compared to the measurements performed in the morning, showing a positive and significant variation. This result suggests that there was an opposition to the flow of electric current in the cell membranes, due to the reduction of intra and extracellular volume, which culminated in loss of body water volume by diuresis and sweat. The cardiovascular system probably attempted to minimize the losses of dehydration by allowing endothelium-dependent vasodilation (nitric oxide production), increasing the capacity to accommodate increased blood volume per minute, while the renal system promoted fluid retention through increased secretion of vasopressin trying to maintain the steady state. Imbalances in body steady state can lead to severe cardiac dysfunctions, which do not have the mechanisms described in the literature. With dehydration occurring during intravascular volume reduction and plasma hyperosmolarity conditions, after exercise, intolerance to orthostatic position and increased sympathetic activity (tachycardia) may occur to protect the body against hypotension.

Conclusion: Participants had body mass loss higher than the recommended limit at the end of the first day. From the second day of hiking, the day started dehydrated and the day ended hydrated.

THE RELATIONSHIP BETWEEN GENDER AND THE INTENSITY OF LOW BACK PAIN IN PATIENTS FROM THE CITY OF VALENÇA / RJ

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Introduction and Purpose: Low back pain is one of the most common public health problems. It can be recognized by pain that persists after the third month, from the first episode of acute pain and by the gradual increase of disability. It is usually the first cause of limitation in adults under 45 years and the second between 45 and 65. It is a prevalent condition in 11.9% of the world population, in Brazil, among chronic diseases, it is second with 13.5%, losing only for Hypertension with 14%. Low back pain has a multifactorial causal factor, may be associated with sociodemographic factors, life or behavior habits, and health status and occupation. It is known that fatigue is one of the main symptoms and it is verified a relation directly proportional to the intensity, and physical activity can be a great ally in the improvement of pain. The objective is to assess the prevalence of low back pain among genders and the intensity of pain.

Material and Methods: It is a descriptive study with a cross-sectional design. We evaluated 70 individuals from the city of Valença / RJ, of both sexes, without age restriction. Data were collected in the first half of 2018 at the basic health units of the region and in the integrated medicine outpatient clinics of the Luiz Gioseffi Jannuzzi School Hospital. Visual analgesic pain scale (VAS) was used to assess the intensity of low back pain. EVA consists of a scale ranging from 0 to 10, where the degree of pain is increasing, with 0 meaning total absence of pain and 10 the maximum pain level that the patient can bear. The mild pain is quantified as 0 to 2, the moderate one of 3 to 7 and the intense one of 8 to 9. The patients were also divided between male and female to be possible the association between sex and the intensity of pain.

Results: Analyzing the VAS and correlating with the sex, it was possible to observe that of the 70 questionnaires 43 (61.5%) were women presenting a prevalence. There were 2 (4.7%) with mild pain, 24 (55.8%) with moderate pain and 17 (39.5%) with severe pain. Males accounted for 27 (38.5%) of the questioning, being 2 (7.5%) mild pain, 13 (48.1%) moderate pain and 12 (44.4%) severe pain.

Discussion: The majority of the studies present a higher prevalence of lumbar pain in females in relation to males as presented in the present study, since females are the ones that seek the most for medical consultation and treatment. Regarding pain intensity, women presented a higher proportion of moderate to severe pain (95.3%) than men (92.5%), which may be influenced by the loss of height that occurs faster and in greater magnitude in women than in men. Other studies related the VAS with physical exercises and strengthening of the lumbar region, presenting improvement of pain in patients submitted to the activities. What could be proposed to the participants of the research in order to improve the presented symptoms. On the other hand, recent studies have shown that other factors would influence the incidence of low back pain such as age, psychosocial factors, occupation, smoking, overweight and painful syndromes. It is important to analyze these variables to highlight the risk factors.

Conclusion: From the study carried out on the intensity of lumbar pain between genders it is possible to verify the higher prevalence of low back pain in the female sex in relation to the male, and it should be included in the result the fact that the women seek greater medical care as opposed to the men. If it is a multifactorial cause it would be necessary to carry out more studies considering all the variables to establish a more reliable result.

SLEEP PATTERNS AND COMPLAINTS OF ATHLETES DURING PREPARATION FOR RIO OLYMPIC GAMES

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Introduction and Purpose: Sleep is considered an important aspect of the post-exercise recovery process by coaches and athletes, and a critical factor for optimal performance. Sleep quality is an important factor which deserves to be taken into account in evaluations of high-performance athletes. Poor sleep quality is common among athletes, particularly before competitions, and can have a significant impact on their performance. Athletes who suffer from unrefreshing sleep do not enjoy the benefits of restorative sleep. The present study aimed to investigate the sleep patterns, complaints and disorders of elite athletes during preparation for the Rio 2016 Olympic Games.

Material and Methods: The study included 146 athletes from the Brazilian Olympic Team (male: n = 86; 59%; female: n = 60; 41%) with a mean age of 24.3 ± 4.6 years. The assessment of the Olympic athletes' sleep took place during the preparation period for the Rio Olympic Games. The athletes underwent a single polysomnography (PSG) evaluation. Sleep specialists evaluated the athletes and asked about their sleep complaints during a clinical consultation. In this evaluation week, the athletes did not take part in any training or competitions.

Results: 53% of the athletes reported a sleep problem during the medical consultation, the most prevalent being insufficient sleep/waking up tired (32%), followed by snoring (21%) and insomnia (19.2%). In relation to the sleep pattern findings, the men had significantly higher sleep latency and wake after sleep onset than the women ($p=0.004$ and $p=0.002$, respectively). The sleep efficiency and sleep stages revealed that men had a lower percentage of sleep efficiency and slow wave sleep than the women ($p=0.001$ and $p=0.05$, respectively). The PSG examination and clinical evaluation, we found insomnia to be the most prevalent sleep disorder among the athletes (19%), followed by bruxism (7%) and sleep apnoea (7%) (apnea/hypopnea index [AHI] > 5 events/hour).

Discussion: The fact that we found sleep complaints in 53% of the athletes is in line with the findings in the literature, which show a similar percentage of sleep complaints such as snoring, insomnia, insufficient sleep and bruxism in the general population. A study of the population of São Paulo, the largest city in Brazil, showed a similar result and also demonstrated that sleep complaints were more prevalent in men than in women. Snoring was the most prevalent complaint in the study, with an increase of 20% over the previous 2 decades. The study also found that 63% of the population sampled reported at least 1 sleep related complaint. Sleep disorders are therefore common, with approximately one-third of adults in the general population complaining of insomnia, but sleep can also be disturbed over short periods as a result of stress and particular stressful events. In the present study, when we considered the PSG records and clinical evaluation together, 36% of all athletes had a diagnosed sleep disorder, which is in fact consistent with the literature.

Conclusion: Most athletes reported some sleep complaints, with men reporting more sleep complaints than women in the clinical evaluation. The PSG showed that 36% of all athletes had a sleep disorder with a greater reduction in sleep quality in men than in women.

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CASE REPORT: CORRELATION BETWEEN LOWER LIMBS FATIGUE, NON-TRANSIENT HYPOMAGNESEMIA AND SELECTIVE INCREASE IN PLASMA ALDOLASE IN ATHLETES AT REST

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Introduction and Purpose: Muscle tissue may be damaged following intense and/or prolonged training as a consequence of both metabolic and mechanical factors. Local damage due to sarcomere injury, rhabdomyolysis as consequence of electrolyte alterations, drugs, hyper or hypothermia, excessive training, alteration of carbohydrate metabolism or increase in metabolic demand, and hypokalemia as a result of excessive sweating are the most common causes of muscle damage. Serum levels of skeletal muscle enzymes or proteins are markers of the functional status of muscle tissue; being the most used: creatine kinase (CK), lactate dehydrogenase (LDH), aldolase, aspartate transferase (AST) and myoglobin. An increase in these enzymes may be an index of cellular necrosis or tissue damage following acute and chronic muscle injuries. Aldolase is a glycolytic enzyme which catalyses the transformation of fructose 1-6-biphosphate in glyceraldehyde 3-phosphate and dihydroxyacetone phosphate in the Embden-Meyerhof glycolysis metabolic pathway; it may be used together with CK to evaluate the status of muscle adaptation to training. In addition to muscle tissue, the erythrocytes are rich in aldolase and this is released in the hemolytic anemias. Magnesium is the fourth most abundant cation of the organism and the second in importance within the cell; participates in more than 300 enzymatic reactions, including: glycolysis, fat oxidation, synthesis of proteins and ATP, second messenger system, membrane stability regulation, and cardiovascular, neuromuscular, immune and hormonal functions. Exercise training increases the body requirement for most nutrients included magnesium. Non-transient hypomagnesemia produces decreased performance, fatigue, weakness, and cramps. This study is a case report of 5 amateur athletes whose reason for consultation was fatigue on their lower limbs, and in all of them non-transitory hypomagnesemia and selective increase of aldolase were found. Symptoms resolved in all patients with oral magnesium supplementation.

Material and Methods: 5 patients (4 men and 1 woman), amateur athletes (2 football, 1 recreational running, 1 marathon, 1 hockey), average age 37,8 (range, 21–58 years), and all of them complained of fatigue on their lower limbs. Their physical exam was normal: no painful points, acceptable flexibility, negative neurological semiology, stable joints. Blood and urine tests were obtained, being non-transitory hypomagnesemia and selective increase of aldolase the unique alterations founded. The treatment was oral magnesium supplementation for 30 days, with subsequent control.

Results: The symptoms resolved and the laboratory became normal in the 100% of the patients with oral magnesium supplementation for 30 days.

Discussion: When muscle tissue is damaged as consequence of intense and/or prolonged exercise, CK, aldolase and, in some cases also LDH, plasma concentration increases. The finding of selective increase of aldolase together with non-transitory hypomagnesemia suggests another physiopathological mechanism. There are no similar cases published in the international scientific literature. Considering the foregoing, it is proposed as a hypothesis that the selective increase of aldolase in athletes, in coincidence with a state of non-transitory hypomagnesemia may be determined by the release of aldolase present in erythrocytes and not due to muscular damage.

Conclusion: There is an apparent correlation between non-transitory hypomagnesemia and selective increase of aldolase in athletes with fatigue of lower limbs. Treatment with oral magnesium supplementation for 30 days is effective both to normalize the laboratory and to resolve the symptoms. More studies should be done to determine the incidence of symptomatic non-transient hypomagnesemia in athletes and its correlation with the selective increase in plasma aldolase. As well as, try to determine the mechanisms responsible for this.

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ANTHROPOMETRIC CHARACTERISTIC OF CHILEAN YOUNG SOCCER PLAYERS

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Introduction and Purpose: The assessment of the anthropometric variables regarding the structure and body composition is a key factor in the athletics program evaluation (Norton and Olds, 1996). In addition, there are new challenges concerning the progress of young soccer player such as to generate quantifiable statics involving sports profiles. According to this, the evaluation of the 94 athletes belonging to the lower divisions of a professional team of the Coquimbo Region, Chile promotes to recognize the population, distribution of the characteristics according to categories, and thus compare the data with national and international reference. The aim of the study was to analyze the anthropometric characteristics of 94 male Chilean young soccer player.

Material and Methods: Ninety four (94) Chilean young male soccer players, among 14 and 18 years old members of an Chilean professional soccer club were evaluate. The young soccer players were organized by playing position (goalkeeper n=9, defenders n=32, midfielders n=30 and forwards n=23). To calculate the anthropometric characteristics (Debona Kerr method) and somatotype (Heath-Carter method) of the soccer players, we used: height (in centimeters), body mass (in kilograms), 6 skin folds (triceps, subscapular, supraspinale, abdominal, thigh and medial calf, in millimeters), limb girths (transverse thorax, medial calf, thigh, arm flexed and calf, in centimeters), and bone breadths (transversethorax, biilcrestideo, biepicondylar humerus and femur, in centimeters). All results were expressed as mean values and SDs (mean±SD). The data were analyzed using the STATA software, and values of $p < 0.05$ were considered statistically significant. This study were approved by the university Catolica del norte Scientific and Ethics Committee.

Results: Average values in all subjects: Age 16,9±1.6 years old, weight 63,1±8.9Kg, height 170±6.4cms, BMI 21.6±2.3Kg/m². Fat mass (FM) 8.9±3.4%, Muscle mass (MM) 43.4±3.7%, Residual mass (RM) 10.7±1.1%, Bone mass (BM) 11.0±1.9%, Skin 5.7±0.5%. Endomorph 3.3±0.9, Mesomorph 4.1±1.2, Ectomorph 2.8±1.0. The body mass and somatotype values among playing position are: Goalkeeper: FM 30,3±3,9%, MM 43,0±3,4%, RM 10,3±0,9%, BM 10,9±2,2%, Skin 5,3±0,3% Endomorph 4,1±1,2, Mesomorph: 4,6 ±1,2. Ectomorph: 2,0 ±0,9. Defenders: FM 28,8±3,3%. MM 43,3±3,8%. RM 10,8±0,7%. BM 11,1±1,8%. Skin 5,8±0,4%. Endomorph 3,0±0,8. Mesomorph: 3,9 ±1,0. Ectomorph: 3,1 ±0,9. Midfielders: FM 29,2±4,1 %. MM 43,5±4,0%. RM 10,6±1,2%. BM 10,7±1,9%. Skin 5,8±0,5%. Endomorph 3,3±0,8. Mesomorph: 4,1±1,1. Ectomorph: 3,0 ±0,7. Forwards: FM 28,4±2,7 %. MM 43,5±3,5%. RM 11,0±1,6%. BM 11,2±2,1%. Skin 5,7±0,5% Endomorph 3,4 ±0,8. Mesomorph: 4,0 ±1,4. Ectomorph: 2,7±1,2.

Discussion: Considering all subjects, we found a somatotype value of 3,3 - 4,1 - 2,8. This values has been reported in scientific literature in Chile and other countries. That have demonstrated the mesomorphy prevalence in somatotype of adults and young soccer players. (Jorquera et al 2012, Perroni et al 2015). We observed the same situation with the muscle mass, (no difference between game position). It is logical that the muscle composition is beneficial to carry out the various activities during the competition. (Gontarev S, et al 2016) The goalkeepers showed highest endomorphy component and fat mass. The same situation was observed by Perroni et al in 2015.

Conclusion: The knowledge of the anthropometric variables of the structure and body composition of the young soccer player could allow a better and faster talent identifications and make decision about to design an effective physicals and nutritional programs for de pgress in this stage of development.

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CORRELATION BETWEEN BODY FAT INDEX AND BODY MASS INDEX IN OVERWEIGHT ADULT MEN: RESULTS OF A CROSS-SECTIONAL PILOT STUDY.

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Introduction and Purpose: Currently, the world population experiences an exponential growth of obesity or overweight, representing 18% in the Brazilian male population. The etiology of excess weight is associated with a complex scenario involving several factors: genetics, physiology, environment, level of schooling and financial, also linked to several chronic diseases. The technological advance provided, among other benefits, the possibility of diagnosing the amount of adipose tissue with high precision, regarding this we can mention the "X-ray absorptiometry in two energies - DEXA" that offers one of the results the patient's adipose mass and used in the index of body fat (IGC: fat mass kg / height m²), however it is a high cost examination. Among several equations that aims to analyze body composition under a general, simple and low cost view, the body mass index (BMI: weight / height²) can be mentioned. These indexes also aim to classify the patient's body profile, stratifying in conditions referring to risk factors. Purpose: Verify the correlation of body fat and body mass indexes in overweight adult men participating in a pilot study.

Material and Methods: A cross-sectional study involving data from a database of male patients and adults of a Sports Medicine Center who underwent DEXA (GE Lunar Prodigy Primo®) with the classification (IGC); 3.0 kg / m² to 6.0 kg / m²: regular. For the BMI, the classification according to the World Health Organization was used: <18.5 kg / m²: low weight; proper weight: ≥ 18.5 kg / m² at < 25.0 kg / m²; overweight: ≥ 25.0 kg / m² at < 30 kg / m²; obesity ≥ 30 kg / m². In the statistical correlation was used the Spearman test with significance level of $p \leq 0.05$. For evaluating the correlation values (r) was adopted the following laminates and their definitions: $0 < r < 0.25$ and $-0.25 < r < 0$: small or null correlation $0.25 < r < 0.50$ or $-0.50 < r < -0.25$: weak correlation, $0.50 < r < 0.75$ or $-0.75 < r < -0.50$: moderate correlation and $0.75 < r < 1.00$ or $-1 < r < -0.75$: strong or solid correlation (perfect if $r = -1$ or $r = 1$). All procedures were performed using the SPSS statistical package, version 20.0 (IBM®, New York, New York, USA).

Results: It has been analyzed 18 adult overweight (BMI) males, average age 42.8 ± 12.1 years, body mass of $81.1 \text{ kg} (\pm 8.5)$, height of $1.80\text{m} (\pm 0.1\text{m})$. The IGC rate was $6.9 \text{ kg} / \text{m}^2 (\pm 2.2 \text{ kg} / \text{m}^2)$ and BMI of $25.8 \text{ kg} / \text{m}^2 \pm (2.5 \text{ kg} / \text{m}^2)$. The correlation between the two methods, body mass index and body fat index was moderate ($r = 0.70$) and significant ($p = 0.00$).

Discussion: Studies report that the BMI used alone does not provide information on the respective contributions of fat free mass and body fat mass. The literature related to the subject also informs the use of IGC and BMI as trackers of the metabolic syndrome, especially IGC. In addition, IGC is also studied as a variable associated with disability and longevity, although the authors suggest longitudinal surveys.

Conclusion: It was concluded that, for the present pilot study, IGC and BMI showed a good and significant correlation in overweight adult males, indicating a more practical body assessment strategy. Our suggestion brings studies that analyze the cost and benefit relationship between the use of BMI and IGC.

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APPLICATION OF FUNCTIONAL PLYOMETRIC TRAINING IN THE IMPULSION GAIN IN VOLLEYBALLISTS ATHLETES - A CASE OF STUDY

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Introduction and Purpose: Volleyball as well as other high performance sports, noticeably growing in the professional and amateur. To improve performance in team sports, they traditionally use conventional weight lifting training exercises. Understanding the vertical jump as a variable of the essential physical conditioning for volleyball players, it is suggested that the functional training can be a new tool for the training of this athletes. The objective of this research was to analyze the behavior of the vertical jump variable after four weeks of plyometric functional training - PFT in amateur volleyball players of male and female teams of the Tubarão City Sports Foundation - SC.

Material and Methods: This study was characterized as a quantitative case study. Participated, from simple random sampling, eight men and seven women, aged 19 and 35, all with experience of 5 to 20 years in the sport, in regional and state championships. Training sessions were carried out twice a week with 15 minutes durability to warm up and 30 minutes of specific PFT. The vertical jump test in blocking and attack, according to Sargent Jump Test protocol proposed by Johnson and Nelson (1974), was performed before and after each training session. Data were tabulated from the Excel 2010 program, and analyzed through the basic statistical measures.

Results: Results for the lock in females showed variation from 1.25 cm to 2.38 cm (mean 1.93 cm), among men, 0.88 to 2.75 (mean 1.83cm). The vertical jump to attack the athletes achieved results between 0.62 cm and 3.25 cm (mean 1.70 cm) and among males, 0.25 cm to 2.50 cm (average of 1, 03 cm). There were reductions in performance in some subjects in individual workouts without significance in the final average. Differences between the average results in both sexes were minimal (0.1 to 0.67 mm in blocking the attack) suggesting similar results with the PFT, although women present better performance in both tests. When analyzed PFT each session were observed specific reduction performance as compared to most positive outcome measures for blocking and attack (3cm the 8cm).

Discussion: The difference in vertical jump between the sexes varied among athletes. There were better results for some female athletes compared to male athletes and vice versa. Overall, women achieved a slightly higher outperformance than men. From the variables analyzed in this research we can not say with certainty the reason for this result, but we suggest that further studies, more in depth, would have to be elaborated to diagnose these differences, which may be related, for example, to the athletes' body composition, transversal session of the muscle groups of the thigh and leg, electromyographic impulse, among other variables. It is important to note that in the blocking ability there was variation in the final test result before and after each session of -3 cm to 8 cm between women and -3 cm to 4 cm in men. This result corroborates that found in the others researchs that applied plyometric training in athletes of volleyball and observed a statistically significant gain.

Conclusion: The results obtained in this case study, using plyometric functional exercises, show a prominent evolution in both vertical block and attack jumps for this sample of men and women. The improvements varied between the athletes and between the training sessions. An important factor to register is that the results can be influenced by individual factors such as the training proposed in the period, fatigue, climate, diet, menstrual cycle and psychological of the athlete. We also suggest that individual fitness, ability to play and position may have contributed to the final result. The application of PFT can be extremely important when conducted with athletes before a competitive match since been shown relevant improvement in jump.

RELATIVE ENERGY DEFICIENCY IN SPORT (RED-S) AMONG BRAZILIAN FEMALE ATHLETES

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Introduction and Purpose: Low-energy availability (LEA) is suspected to be the underlying cause of both Female Athlete Triad and the more recently defined syndrome, RED-S. RED-S may decrease athletic performance due to a number of factors including irritability, impaired immunity and cognitive function (concentration and judgment), increased injury risk, decreased training response and coordination, depression, decreased glycogen stores and muscle strength. Objectives: To determine the prevalence of RED-S among female Brazilian athletes who practice different sports.

Material and Methods: The study analyzed 125 medical records from the Department of Gynecology - UNIFESP-EPM, São Paulo, Brazil, from January 2015 to March 2018. The data were collected for the following variables: Age, sex, body weight, height, daily caloric intake, body fat percentage, exercise energy expenditure and duration. In order to calculate EA, the formula $EA = \frac{(\text{Daily Caloric Intake} - (\text{Exercise energy expenditure} \cdot 2 \cdot (\text{Exercise duration}/60) \cdot 1 - (\text{Body Fat Percentage}/100)) \cdot \text{Body weight}}{1 - (\text{Body Fat Percentage}/100)}$ was used. The athletes were categorized according to the sports modality: 1) Artistic Sports (Artistic gymnastics, Synchronised swimming, diving), 2) Fight Sports (judo, taekwondo, Muay Thai, mixed martial arts), 3) Field or Court Sports (soccer, handball, rugby, five-a-side football). For the purpose of the study those who had $<30\text{Kg/Kg/lean mass/day}$ was considered with RED-S and those with $>30\text{Kg/Kg/lean mass/day}$, without RED-S. Data analyses were performed using a descriptive statistics parameters adopting usual measurements of central and dispersion tendencies. Statistical analysis was achieved utilizing the nonmatched Student t-test to compare the quantitative data and the chi-squared test for qualitative data, with statistical significance considered with p-values less than 5%.

Results: The sample consisted of 125 athletes, the mean age was 24 ± 10 years and mean BMI was $22 \pm 3 \text{ Kg/m}^2$. The prevalence of RED-S was 38%. Regarding age and BMI, comparing the athletes with and without RED-S, there was a statistically significant difference (26 ± 9 vs 23 ± 10 years, $p=0,03$ and 23 ± 3 vs $22 \pm 3 \text{ Kg/m}^2$, $p=0,01$). The syndrome was more prevalent in fight sports (44%), field and court sports (31%) and artistic sports (20%). However, there was no statistical significance between the groups, $p=0,1$.

Discussion: The effects of RED-S on the athlete's performance have not been extensively studied. A 12-week study of 10 elite junior swimmers found a decrease on the performance in those with ovarian suppression secondary to energy deficit, identify the exact cause for the impaired performance was and still is difficult. Other studies support that LEA is associated with negative impacts on multiple performance domains and therefore more research are needed to understand the underlying mechanisms behind this.

Conclusion: Our study demonstrated that RED-S is found in different sports, regardless of weight or age. Further prospective studies are needed in order to guide the management and treatment of RED-S.

AGREEMENT AMONG OBSERVER IN ECG INTERPRETATION OF ATHLETES WITH AND WITHOUT THE INTERNATIONAL CRITERIA USE.

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Introduction and Purpose: The ECG is a fundamental part of pre-participation assessment in athletes. In 2017 its interpretation criteria were reviewed with the creation of the International Criteria (IC). The universalization of this knowledge among could decrease misdiagnosis in athletes' heart and decrease the amount of complementary exams. Our objective was to evaluate the difference in ECG analyses after 1 hour training of an experienced cardiologist according to international criteria.

Material and Methods: A general cardiologist (GC) analyzed 61 ECG of amateur athletes performed in the first hour after the conclusion of the marathon and half-marathon of Rio de Janeiro (MMRJ 2017) according to the IC. The tracings were categorized in two ways: normal (N) or abnormal (A); and the need for complementary exams (MC) due to the presence of potentially pathological alterations. The gold standard was the interpretation of senior sports cardiologist (SEC). The agreement between the findings was made by the Kappa statistic (κ).

Results: After 1 hour training the agreement for the 61 ECG was 0,816 vs. 0,401 for abnormal findings. For imagine exams 0,769 vs. 0,461, which meant 5 complementary exams less. The sensibility for the need of complementary exam was 100% and 70% specificity.

Discussion: Since the Seattle international criteria in 2013 there was a task force in the understanding that the athlete's ECG was different and needed individualized criteria. Even experienced cardiologists, who are not familiar with the normal criteria of athlete's ECG, will be wrong to request further tests when there is no such need. This statement shows the importance of publicizing the updated international criterion of athlete ECG.

Conclusion: Due to the small number of ECG changes there was no power to find statistical differences between pre and post workout findings. However, the significant difference in the concordance values suggests that with a few hours of training a GC can better its diagnostic performance in an athlete's ECG.

IMMEDIATE BIOMECHANICAL EFFECTS AFTER POSE METHOD GAIT RETRAINING IN RUNNERS

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Introduction and Purpose: High vertical loading rates are associated with an increased risk of running-related injuries. Laboratory-based gait retraining has been reported to be an effective strategy to reduce impact loading in runners. Pose[®] Method of running is a popular coach-based gait training program to modify running form and reduce risk of running injury. However, only a few biomechanical studies have been reported on the effects of this program. Hence, this study investigated the immediate biomechanical effects after Pose[®] method gait retraining in distance runners.

Material and Methods: Fourteen recreational runners (5 females and 9 males; age 35.7 ± 8.0 year; body mass 61.7 ± 10.2 kg; body height 1.71 ± 0.10 m; running experience 2.82 ± 2.74 year; weekly mileage 29.8 ± 22.6 km) were recruited from local running clubs. All participants underwent an eight-sessions over four weeks gait retraining program delivered by a certified Pose[®] Method technique specialist. 10 successful trials of self-paced running kinematics and kinetics were collected using motion capturing and force plate during overground running. The vertical loading rates, lower limb kinematics, and footstrike pattern during overground running before and immediate after training were compared using paired sample t-tests.

Results: Changes in the vertical loading rates were not significant after Pose Method gait retraining ($p=0.693-0.782$). However, participants demonstrated greater peak hip flexion (Cohen's $d=0.84$, $p=0.008$) and peak knee flexion (Cohen's $d=1.1$, $p=0.003$) during swing phase and a switch from heelstrike (pre-training footstrike angle= 11.5 ± 13.5) to midfoot strike landing (post-training footstrike angle= 1.3 ± 11.1) after training.

Discussion: The coach-based Pose[®] Method gait retraining appears not to be effective on lowering impact loading in runners immediate after training as compared to previous laboratory-based gait retraining studies. However, participants were able to exhibit some kinematic changes of the hip and knee joints in swing phase and a switch in footstrike pattern after completing a course of Pose[®] Method gait retraining. A longer follow-up period is warranted to observe kinetic changes in the trained runners.

Conclusion: Distance runners completed a course of Pose Method gait retraining only demonstrate kinematics change at the hip and knee joint during swing phase and a switch in footstrike pattern. The vertical loading rates remain similar after training.

REDUCED SIDE-TO-SIDE DIFFERENCE IN KNEE KINEMATICS IN ACL RECONSTRUCTED PATIENTS DURING STAIR DESCENDING

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Introduction and Purpose: Anterior cruciate ligament reconstruction (ACLR) aimed to restore knee's rotational and anteriorly translational stability. Using a stair descending task, previous study showed a significant difference on kinematics between normal subjects, ACLR and ACL-deficient patients [1]. We hypothesized that bilateral difference of knee kinematics reduces after ACLR. The project objective is to investigate the change of knee kinematics within 12th month after ACLR.

Material and Methods: A group of ACL deficient patients were recruited for the current study. The patients performed the stair descending motion task before the operation (Pre-Op). Afterwards, they were invited for follow-up tests at 3rd month, 6th month and 12th month post operation (Post-Op). Subjects were instructed to perform stair descending task on a 2-step staircase. The staircase height is 20cm. Tibiofemoral kinematics were recorded using a portable motion analysis system (Opti-Knee[®], Shanghai InnoMotion Inc., China). Kinematic data of flexion/extension, adduction/abduction and internal/external tibial rotation were obtained at 60Hz. The range-of-motion (ROM) was calculated from the first touchdown to the second touchdown of the targeted side. The bilateral difference was defined as injured minus contralateral side. For every patient, the Post-Op bilateral differences were subtracted by the Pre-Op bilateral difference. The bilateral differences were analysed by one-way ANOVA with Bonferroni correction. The significance level was set at 0.05.

Results: In total, 71 ACL deficient patients were recruited. Since the follow-ups were not compulsory, the drop-outs were recorded. The number of tested patients was 55 at 3rd month, 53 at 6th month and 41 at 12th month Post-Op. Significant differences were found on bilateral difference on the knee flexion/extension and internal-external rotation ROM. The ACLR patients performed larger bilateral difference at 3rd month Post-Op ($7.6^\circ \pm 5.3^\circ$) than 6th month Post-Op ($5.2^\circ \pm 4.6^\circ$) on the knee internal/external rotation ROM, at $p < 0.05$. Moreover, larger flexion/extension ROM was recorded at 3rd month Post-Op ($7.0^\circ \pm 8.0^\circ$) compared to 12th month Post-Op ($4.0^\circ \pm 4.0^\circ$), at $p < 0.05$. The current stair-descending motion task could reveal the kinematics changes on the flexion/extension and internal/external rotation ROM.

Discussion: In order to enhance the sensitivity of the task, modifications such as customizing the staircase height and exercise intensity should be considered.

Conclusion: The knee laxity ranges from normal subjects have functioned as a good reference to the ACLD patients. The side-to-side difference on Flexion-Extension angle showed a significant larger value at the 3rd month Post-Op compared with Pre-Op. It is indeed coherent to the general consensus that the injured knee is generally stiffer within 3rd-4th month after operation. It causes a serious limping in stair descending because a high knee flexion is required. The difference gradually decreased from 3rd-12th month. The side-to-side difference at the 12th month post-operation showed a significant value compared with the 3rd month Post-Op. It can serve as a potential kinematics variable to monitor the restoration of mobility. The progress in reducing the side-to-side difference with time could be observed. For stair-descending, the side-to-side difference of internal-external rotation angle at 6th month post-operation is significantly lower than 3rd month post-operation. It is coherent to our hypothesis that the side-to-side different is decreasing with respect to rehabilitation time. Using the stair-descending motion task, significant or a trend of reduction in side-to-side difference in ROM of tibiofemoral external/internal rotation and in flexion/extension were shown in the ACLR patients within 12th month after ACLR. Stair descending is apparently suitable to measure ACLD patients starting at 3rd months Post-Op.

PREVALENCE OF KNEE INJURIES IN STREET RUNNING ATHLETES IN THE SOUTH REGION OF SANTA CATARINA

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Introduction and Purpose: The running races has been an important means in recent times to bring supporters to a healthy lifestyle. Running became more than the search for good physical conditioning to be a means of staying active, challenging and fraternizing in a group, as well as providing well-being and quality of life, improving physical fitness and reducing the risks of diseases sedentary lifestyle. Likewise this sport has shown increased popularity over the last 20 years, as a form of exercise, injury to riders also became more frequent. The aim of the study was to identify the prevalence of knee injuries in street running athletes in southern Santa Catarina.

Material and Methods: It was characterized as an epidemiological study of descriptive cross-sectional nature. The study population consisted of men and women, street racers participants 27 Ranking Cortuba 2015, by simple random sample, 137 athletes, representing 17.29% of the total population. They were excluded from the participants under the age of 18, and has a physical disability of lower limbs. The instrument used for data collection was a questionnaire adapted from SIMONI (2008). The study was approved by the Research Ethics Committee (CEP) of the University of Southern Santa Catarina (UNISUL).

Results: Among the results found a prevalence of knee injuries 0.09, with no significant difference between the sexes. The sample included more men with an average between 21 and 40 years; BMI average 23,2Km / m²; More often up to 10km distances; Ultimate goal was the leisure; Average length of 3.86 ± 6.75 training; Start of training between 20 and 30 years; The most common adjuvant weight lifting; Men with higher weekly periods than women training; Median three-hour weekly training; Preparation of training as responsible Professor of Physical Education; Training monitoring is not carried out; Small portion is monitored by other professionals. Participation in competitions in the year of nearly eight events. The most frequent injuries were Patelofemoral Syndrome and Hoffa's Syndrome. Overall, the majority of injuries are severe, occur during training sessions. The home or physical therapy is more frequent and the return to practice is symptomatic.

Discussion: The prevalence of of knee injuries is within the one found in other studies however a tendonopathies of the patellar tendon and meniscal injury has a good percentage in different surveys. It is believed that training for 5/10km distances is facilitated by adapting to shorter training periods. It is known that training for half marathon and marathon events requires more commitment from the practitioner, in addition to other accompaniments such as nutrition and physical therapy, which is not part of the amateur runners and thus, is largely reserved for athletes of income . This result corroborates the findings regarding the objectives of participating in race events, since the overwhelming majority of the interviewees, in both sexes, focus on leisure. There also seems to be a trend of over 40 to begin race training. This fact causes us concern since in this age group we found risks of increased cardiovascular events in individuals who were probably sedentar

Conclusion: With similar prevalence to other studies it is suggested that the small number of knee injuries can be linked to positive characteristics of the sample and the preparation of training hours and adequate training periods, aiming leisure, conducting training adjunctive modality and participating events of small distance. Despite the small prevalence, the characteristics of the lesions are worrying. More careful investigations could be performed the prevalence of injuries in other areas of the body in runners, since in the reviewed literature there seems to be significant involvement of all joints of the lower limb. In addition, analyzing the referred pain pattern without diagnosis can significantly increase the number of conditions in the street corridors, which is the major limitation of this of this research.

BIOCHEMICAL AND STEROIDAL PROFILE ASSOCIATED WITH GENETIC POLYMORPHISM IN STRENUOUS PHYSICAL EXERCISE

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Introduction and Purpose: Regular military physical training is part of daily routine, however, when performed in a strenuous way or developed in adverse conditions may lead to muscular lysis, causing rhabdomyolysis by effort (RE). RE is defined as a degeneration of muscle cells, myoglobinuria and increased levels of sarcoplasmic proteins and the main consequence is acute renal failure. Because the prognosis of this syndrome is favorable when it is treated early, it is extremely important an early diagnostic. Some individuals develop RE when they participate in comparable levels of physical effort under identical environmental conditions and others do not. Thus the goal is to correlate biochemical and steroidal profile with genetic polymorphisms in Brazilian Navy special operations course.

Material and Methods: The study was initially composed of 44 student volunteers and ending with 17 students of CESCOMANF from the Brazilian Navy. Data were collected 24 h before each mission and 24 h after. Stratification of creatine kinase (CK), Urea, Creatinine, Albumin, PTF, TGP, TGP, LDH, and electrolytes levels was based on the normality values specified by Orthos Vitros ® 4600. The endogenous steroidal profile was analyzed using liquid-liquid phase extraction followed by GC-MS-MS (Thermo Fisher). The genomic DNA was extracted from mouth swab and blood. The polymorphisms in the angiotensin converting enzyme (ACE) and bradykinin B2 receptor (BDKRB2) genes were analyzed by standard PCR and the polymorphisms in α -actinin 3 (ACTN3) and angiotensinogen (AGT) were performed by using the allelic discrimination method by RealTime PCR.

Results: While some argue that CK values > 15,000 IU / L are predictive of renal impairment, this was not observed in the military group with CK values ranging from 281-51,516 IU / L (about 300 times greater than the normal value). After an intense physical exercise, performed at Restinga da Marambaia, post-exercise CK were > 15,000 IU / l (n=19). Despite the marked increase in CK of these volunteers, none of them presented visible myoglobinuria or impaired renal function. Our results examined data from military students in intensive physical training (n=44 / n=17), and although none developed RE in high temperature, high altitude and climbing environments, CK values went up to 51,516 IU / l. We observed that 73.7% of the students had at least one allele R for the ACTN3 (RR=4, RX=10, XX=5). The endogenous steroidal profile obtained from the analyzed samples showed correlation with genetic polymorphism and high altitude.

Discussion: The data collected in the study shows that during a strenuous physical activity the students submitted to the same physical effort CK values ranged from 721 to 48,308 IU / L, and no alterations were observed in the electrolyte or renal balance. The data reveal that the analyzed group with the XX genotype were not likely to be at increased risk for RE, since the CK values, although increased, were not different from the heterozygous genotypes.

Conclusion: This is the first study to compare genetic, biochemical and steroidal profile in military personnel who engage in strenuous physical activity in different operating environments. It was observed after strenuous exercise with values of CK>48,000 IU/ L there was no change in the electrolyte or renal profile. Despite the high values of CK, RE was not observed during the missions.

“OPEN-AIR GYMS” TO BRING THE POPULATION CLOSER TO OUTDOOR SPORTS ACTIVITY

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Introduction and Purpose: The Municipal Administration in collaboration with the Institute of Sports Medicine of Turin, during “Torino European Capital of Sport 2015” promoted in some city parks the initiative “Open-Air Gyms” that offered citizens an information point and medical sports evaluation of physical fitness.

Material and Methods: The initiative was conducted between May and October 2015 three days a week in the afternoon with the aim of involving those who train at the park after work or school/university. 578 subjects participated at the initiative, 269 females and 309 males between 6 and 85 years. At the information point there was medical and technical staff of Institute of Sport Medicine of Turin and they collected these parameters: weight and height; blood pressure; spirometry; joint mobility (trunk); general assessment of the subject concerns his lifestyle; explosive strength evaluation (throwing of the medical ball); coordination skills and speed (hexagonal obstacle test).

Results: 76% of the females and 71% of the males practice some sport (marching or running) in the city parks in their free time. For the data evaluation was used the range age between 21 and 50 years old, considered as adult age. The average value of body weight in females is 60.5 kg (BMI 22.54), and there are differences between the group of women who play sports and the group of non-practicing: the best results are in the first group: 59 kg (BMI 21.90) compared to non-sports: 63.6 kg (BMI 23.9). For males the mean value of body weight was 77.2 kg (BMI 24.7). The average value of sporting subjects was 76.1 kg (BMI 24.3), while for non-sportsmen the weight was 80.3 kg (BMI 25.6). Also the joint mobility confirmed the trend of the values of body weight with better average values in athletes compared to non-practitioners. Females: trunk mobility average value 4.31cm, between the sports 4.80 cm vs non-sports 3.31 cm. Males: trunk mobility average value - 4.41 cm, between sportsmen -3.25 cm vs non-sports -6.71cm. The coordination skills (exagonal obstacle test) confirmed the previous results: average females values 23.42 s, (sporty females 22.9 s vs non-sports 24.78 s) and average males value 22,37 s (sporty males 22,03 s vs non-sports 23,31 s). In accordance with previous results is also the explosive strenght (throwing of medical ball): 2,67 m no sporty females vs 2,72 m sporty females (average value 2,68 m) and 4,51 m sportsmen vs 4,10 m non-sports (average value 4,40 m).

Discussion: From the results it appears that between non-practicing subjects and those who practice motor activity even mild (walking in the parks) at least 2-3 hours per week, there are substantial differences in weight and body composition, coordination skills and joint mobility in favor of “sporting” subjects.

Conclusion: The presence in the city parks of sports medical personnel and sports technicians is configured as an excellent tool to bring the population of sports and non-sports subjects to improve their state of physical efficiency and to discuss the possibility of starting a program of outdoor activities useful for contributing to the creation or consolidation of healthy lifestyles. We hope to continue the experience by extending it to all the major green areas of the city.

THE INFLUENCE OF SPORTS ON THE FORMATION OF INDIVIDUAL PERSONALITY

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Introduction and Purpose: The formation of the individual as a modifying agent of society begins as soon as it is born. The sport can influence on the formation of the citizen. Some questions can make this citizen understand in sports and make it really active in the social perspective. Considering the relevance of sport as a factor in the interaction of the individual, the present study has the aim of researching about it in the formation of personality. The importance of thinking about sport beyond physical performance must be shown. Deepening this can provide significant points in various other subjective approaches that can lead citizens to have benefits in social coexistence.

Material and Methods: This study is a literature review. Articles were selected by means of searching the databases Scielo and Ebsco, from the Medline source, in addition to textbooks. The research of the articles was carried out between January and June 2018.

Results: Different studies have shown a higher level of aggressiveness in athletes in general. Self-confidence, resilience, discipline, stress levels and emotion stability had different results, including higher, lower or normal according to the researched data.

Discussion: In the analyses of the different traits exhibited by athletes and non-athletes, literature contradicts itself regularly. It follows that this line of study is inconclusive. There is a measurable difference between high-level athletes and non-athletes, even when divided in subgroups, formed by gender or modalities. The one aspect that seems to be the greater consensus is aggressiveness. Athletes are generally more aggressive than non-athletes. It is possible this trait is related to the competitiveness present on the training of medium and high-level sports. Maintain self-confidence and emotional stability is a less common trait for athletes than non-athletes. This however contradicts other conclusions in the literature, in which is a stated that athletes are self-confident, resilient, disciplined, emotionally stable and less stressed. There are three hypotheses that classifies the relation between the sports and personalities, that are: Selection hypothesis, which says that sports is a factor that selects special personalities and these are interested in specific sports modalities or by special forma of sports practice. Socialization hypothesis, wich can be defined as sport being a socializing factor that, in summary, is characterized by sports influence in the personality of the practioner, being the opposite of what is said by the first hypothesis. Interaction hypothesis, wich is basically a mix of the previous ones and is defined as an exchange between the sport and the personality of the individual and this process does not define but accentuates the personality of the individual.

Conclusion: After the discussion, it was possible to conclude that there is a difference in the behavior of athletes and non-athletes, even though there is a great contradiction in the literature. Faced with this, aggressiveness and self-confidence are factors that prove this conclusion. In addition to the fact that athletes are generally more stressed and emotionally unstable compared to others. It is evident that this research is extremely important to classify and differentiate human personalities and relate them to sport.

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ANABOLIC STEROIDS CONSUMPTION REPORT AMONGST MEDICAL STUDENTS IN THE STATE OF SÃO PAULO

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Introduction and Purpose: Anabolic androgenic steroids (AAS) are synthetic derivatives of testosterone that were originally used in the late 1930s for treatment/control of various diseases. However, these substances are being used in non-therapeutic and indiscriminate purposes to improve sports performance. Considering the worldwide prevalence of AAS use estimated at 3.3% for the general population, a group that requires attention to the indiscriminate use of these substances is the one of medical students, once that it is a population with easy access to several substances, and still lacks studies indicating the prevalence of such use. This study therefore seeks a better knowledge about the prevalence and motivation that leads medical students to use these substances, certainly contributing to a better elucidation of the profile of the use of AAS in this population. **OBJECTIVE:** To evaluate the prevalence of AAS use by medical students from universities in the state of São Paulo and to have a panoramic of the user of these substances

Material and Methods: A cross-sectional study was carried out, which consisted of the application of a questionnaire, without identification, assessing the prevalence of AAS use, and also the user profile. The study was attended by 191 students from the medical schools of four universities in the state of São Paulo, from the first to the sixth year of graduation, both sexes.

Results: The results demonstrated that 21 students (11%) reported having already used AAS. Among them, 17 (80.9%) practiced competitive sports in college games. Regarding the main motivations involved in the use of these substances, emphasis was placed on the improvement in sports performance (90.9%), followed by the desire to increase muscle mass (63.6%).

Discussion: The high prevalence of AAS use among college students in the state of São Paulo found in this study (11%) may be associated with the growth of university sports, which has been gaining more and more space within universities, especially in the universities that are part of INTERMED, the largest multi-sport university competition in Latin America. In the incessant search for better results, as the level of competition rises, an increasing number of athletes begin to use AAS as a resource for improving sports performance. The results on the reason that led students to use AAS corroborate this hypothesis, since 80.9% of the users compete for college and 90.9% of them refer a desire to improve their performance as a motivation. Another factor that may have contributed to these indexes is the ease of medical student access to various medications, which also explains the high number of medical prescriptions referred to as a way of obtaining anabolic steroids (54.5%).

Conclusion: The results indicate a high prevalence of AAS use among medical students of medical schools in the state of São Paulo, for the purpose of improving sports performance, obtained mostly through medical prescription, which shows the need for greater attention to the health aspects of this specific group, as well as a greater number of studies on the use of AAS in this population.

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PHYSICAL EXERCISE AND PRACTICE OF SPORTS AS THERAPY IN AUTISM TREATMENT

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Introduction and Purpose: Autism, also represented by Autistic Spectrum Disorders (ASD), has no definitive cause and is characterized by a neurodevelopment disorder, with damage of the social, communicative (verbal and non-verbal), learning and adaptive skills. In addition, it is estimated that 70 million people worldwide have some type of autism, although, currently this disorder is little explored, since there is no knowledge and professional training regarding the implementation of intervention programs, diagnosis, treatment and inclusion. Although there is no cure for it, there is a variety of treatments that can benefit the person with autistics. The treatment is complex and multidisciplinary has been increasingly sought as a way of articulating different methods to ensure a better outcome. It includes therapies, that focus on the improvement of speech and behaviour, medications, that are used to manage secondary conditions related to the disorder and physical activity, which is the main focus of this study.

Material and Methods: This study is a literature review. Articles were selected by means of searching the databases Scielo and Ebsco, from the Medline source. The research of the articles was carried out between January and June 2018.

Results: Exercise has shown an increase in attention, social behavior, social adequacy, socialization capacity, social welfare, assertiveness, self-control, self-esteem and motor skills in patient with autism.

Discussion: The literature evidences the association between the practice of sports by autistic individuals and the increase of attention and social behaviors, social adequacy, socialization capacity, social welfare, assertiveness, self-control and self-esteem. The practice of sports can also promote the development of motor skills, which can help the autistic person on basic daily activities and on the reduction of the stereotyped behavior. There are also plenty of evidences that support using physical activity in the treatment of anxiety, anger, depression and obesity, caused by the side effect of the medications used by autistic people, along with reducing the risk of developing chronic health problems, caused by sedentary lifestyles and other physical health conditions. The therapeutic plan should be individualized and according to the particularities of each case. Individuals who practice team sports have the opportunity to develop and maintain social and friendly relationships between team members and coaches. Those who prefer individual sports can also develop these positive social relationships by forming links with their coaches. Therefore, some sports might not be ideal for certain individuals, like those that require technical accuracy, which may cause frustration, and those that are taught in areas of great flow of people and music on a high volume, which can hinder the insertion of the person on the activity.

Conclusion: Sports practice helps autistics individuals not only in their social life, but also in others individual aspects and in their mental health. It can also promote benefits in their motor skills, reducing the stereotyped behavior, and reducing the risk of developing chronic health problems. However, the therapeutic plan needs to be individualized, according to the patient's needs and capacity.

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EFFECTS OF ENVIRONMENTAL TEMPERATURE IN PHYSIOLOGICAL RESPONSES IN AMATEUR RUNNERS SUBMITTED TO SUBMAXIMAL TEST**Autores:** Silveira, J P**Instituições:** ULBRA/UCS - Porto Alegre - Rio Grande do Sul - Brasil

Introduction and Purpose: The human body is constantly producing heat through endogenous sources and receiving heat from the external environment. Most of the energy produced by the body is lost in the form of heat and a small portion is used to perform work. The amount of heat that tissues generate at rest and during physical activity varies. During physical exercise an adaptation of the thermoregulatory system is performed in order to maintain the internal temperature. Energy transformed by energy metabolism increases from three to twelve times during exercise in relation to rest. This ratio can increase body temperature by 1 °C every 5 minutes if thermoregulation mechanisms are not activated. Physical exercise promotes physiological changes that occur as a form of adaptation to stress caused by both the intensity of exercise and the temperature of the environment. Thus, changes in internal temperature, heart rate, subjective perception of effort and water loss occur in different ways, for the same intensity of effort, at different temperatures, which interferes with physical performance. Thus, the objective of the present study was to evaluate the physiological responses of runners submitted to submaximal test on treadmill and at different temperatures.

Material and Methods: A total of 16 male amateur runners (age = 45.12 ± 8.43 years). After the anaerobic threshold determination, a submaximal test was performed consisting in 40-minute of running, divided into four distinct stages of 10 minutes each, corresponding to 80%, 90%, 100% and 110% of the Threshold Velocity by km/h in cold (17.63 ± 0.36 °C and URA of 54.88 ± 6.62%) and in warm temperatures (31.63 ± 0.55 °C and URA of 54.88 ± 6.62%). Heart rate, Subjective Feeling of Stress, Blood Lactate and water loss were evaluated.

Results: All variables analyzed presented significantly higher values (p<0.05) in warm temperature.

Discussion: Physical exercise promotes physiological changes that occur as a form of adaptation to stress caused by both exercise intensity and ambient temperature. Thus, alterations of internal temperature, heart rate, subjective perception of effort and water loss occur in different forms, for the same intensity of effort, at different temperatures, which interferes in the physical performance. During a strenuous exercise in warm environment, significant loss of water through sweat occurs. A high rate of transpiration reduces blood volume, which limits the volume of blood available to comply the needs of muscles and to prevent elevation of body temperature, thus contributing to potential performance reduction. With both body and ambient temperature increases, the stress inherent to exercise is accentuated by dehydration, which is associated with increased body temperature, impaired physiological responses and physical performance, as well as health risks. During exercise, the loss is approximately 10% when there is a hot environmental condition (30 °C), when compared to mild conditions (14 °C).

Conclusion: There are substantial differences in performing exercises in cold or hot weather conditions. In an aerobic exercise program under warm conditions it is expected that the mean frequency, the subjective sensation of effort, the water loss and the lactate concentration will be greater than in the cold. Therefore, each trainer or practitioner of physical activity should be aware of this at the time of choosing under which conditions to perform the work.

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THE EFFECT OF THE CHRONIC USE OF SUPRAPHYSIOLOGICAL DOSES OF NANDROLONE DECANOATE ON THE KIDNEYS OF SEDENTARY WISTAR RATS.**Autores:** Russo, D R, Leal, A L A, Sá, M L D L L, Lima, F M, Júnior, J L M, Vieira, L S C, Alencar, P K, Babinski, C G, Oliveira, Á L V

Introduction and Purpose: Anabolic androgenic steroids (AAS) are widely used by professional and amateur athletes to improve physical performance, muscle appearance and mass. However, many adverse effects have been associated with the abuse of AAS, including disorders in the urinary tract. Administration of exogenous steroids has been shown to have profound effects, such as increased both renal mass and renal volume. The objective of this study is evaluate the effects of chronic use supraphysiological doses of Nandrolone Decanoate in sedentary Wistar rats in the urinary system, with a focus on the kidneys.

Material and Methods: Were used for this study twenty male Wistar rats, with 3 months of life, weighing between 300g and 500 g, divided into two groups: sedentary control rats, using peanut oil (SHAM) (n = 10) and, treated rats with Nandrolone Decanoate and sedentary (DECA) (n = 10). After the adaptation period, the treated group received intramuscularly Nandrolone Decanoate (Deca Durabolin 50 mg.mL⁻¹ Organon) at a dose of 10 mg.kg⁻¹ of body weight, once a week during seven weeks. Animals of the control group received, also intramuscularly, injection of vehicle (peanut oil with 10% benzoic alcohol) for the same period and dosage to cause the same stress experienced by the animals of the treated groups. The rats were maintained in bioterium of the Valença Medical School (CESVA), with controlled temperature (25 ± 1 °C), with an artificial light-dark cycle (lights on from 7:00 am to 7:00 p.m.), each experiment group divided into four standard rodent boxes and standard diet, feed and water ad libitum. The body mass of the rats was measured, for seven weeks, using a precision balance and the value was expressed in grams. The animals were killed with an anesthetic dose of sodium thiopental injected intraperitoneally and later the kidneys were dissected and weighed in the balance analytical to evaluate their masses and volumes by the methods of Sherle's. All results were expressed as mean and SD. Statistical analyzes were performed using T Student and statistical significance was considered when p<0,05.

Results: After analysis of the samples some relevant results were found. There was a reduction of 10.47% of the body mass of the DECA group in relation to the SHAM group (348 ± 2.58 - 382 ± 6.62, respectively). Renal volume, through the analysis of the Sherle method, showed an increase in the DECA group compared to the SHAM group of 13.70% (1.240 ± 0.04989 and 1.410 ± 0.0100, respectively) Regarding the renal mass, there was also an increase in the DECA group of 15.38% in relation to the SHAM group (1.300 ± 0.5375 and 1.500 ± 0.03333, respectively).

Discussion: Modification of renal morphology is characterized in several pathologies, the increase of its volume and mass may be indications of possible alterations in these organs. The group treated with Nandrolone Decanoate had a significant increase in these variables. In this project, we will still analyze the glomerular density and several markers of renal function in order to compare the volume change with its functional characteristics.

Conclusion: Nandrolone Decanoate alters the renal morphology of sedentary Wistar rats, including their volume and mass.

EFFECTS OF MASSAGE ON POST-EXERCISE RECOVERY OF HEART RATE VARIABILITY INDICES ANALYZED IN THE TIME DOMAIN

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Introduction and Purpose: Physical exercise changes the body's homeostasis, and recovery techniques seek to anticipate post-exercise recovery. One of the ways to demonstrate a recovery of the organism is the resumption after the exercise of cardiac autonomic modulation through heart rate variability (HRV). Among the recuperative techniques, massage is the most widely used technique in sports. To analyze the effects of massage on the post-exercise recovery of HRV indices analyzed in the time domain.

Material and Methods: A randomized crossover clinical trial with 36 male volunteers with mean age of 22.88 ± 3.10 years were submitted to two stages of evaluation. In the first stage, the volunteer performed only the stress protocol (SP) and in the second stage was performed the same protocol of stress immediately following the massage technique protocol (MP). For both stages, the behavior of the HRV indices was assessed at baseline and two hours after the end of each stage by means of a cardiofrequency meter (Polar Electro Oy, Kempele, Finland - model V800). The stress protocol was composed of 10 sets of 10 jumping squats with 1 minute rest between the sets followed by the Wingate anaerobic test and the massage protocol by superficial and deep slides in the anterior thighs and posterior trunk for 12 minutes. Time domain HRV indices (SDNN and rMSSD) were analyzed at baseline [M1 (5 minutes final rest before stages)] and in the following moments of the recovery: M2 (5 minutes at the start), M3 (5th to 10th minute), M4 (10th to 15th minute), M5 (20th to 25th minute), M6 (30th to 35th minute), M7 (40th to 45 min), M8 (50th to 55th minute), M9 (60th to 65th minute), M10 (70th to 75th minute), M11 (90th to 95th minute) and M12 (115th to 120th minute). The descriptive statistical method was used and the Friedman test with Dunn post-test was used for the analysis of the moments and the Mann-Whitney test was used for the analysis between the steps. The level of significance was $p < 0.05$.

Results: In the analysis between the moments it was observed that the SDNN index, representative of the global modulation, in the SP stage was recovered at the basal levels in M9 and in the MP stage the recovery occurred in M6 ($p > 0.05$). For the rMSSD index, which reflects vagal modulation, the SP stage was recovered in M10 and the MP stage was recovered in M9. In the analysis between the stages, for the SDNN index there was a statistically significant difference in all evaluated moments ($p < 0.05$) except for M1 (basal) and for the rMSSD index only moments M1, M7 and M9 did not present significant difference between the stages, and for both indices it was observed that the MP stage presented higher values at all moments of recovery when compared to SP, indicating a better HRV.

Discussion: The anticipation of the post-exercise recovery observed in the SM stage may be related to the mechanism underlying to parasympathetic effect of the massage. It is believed that it is possible that some cutaneous mechanoreceptors measure the response when stimulated by therapeutic maneuvers triggering a predominantly parasympathetic response. Therefore, the massage protocol performed immediately after the end of stress may have been able to reach these skin receptors and promote satisfactory autonomic responses, providing an improvement in HRV.

Conclusion: It was observed that the massage immediately after the stress anticipated the post-exercise recovery of HRV indices analyzed in the time domain.

PROFILE OF RECREATIONAL RUNNERS: INTEREST LEVEL, MOTIVATIONAL FACTORS AND PREVALENCE OF INJURIES RELATED TO MINIMALIST FOOTWEAR

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Introduction and Purpose: Running is a very popular exercise. Literature has suggested that the injury rates in runners ranges between 3% and 85%. Because of these high rates associated to running-related injuries, a new movement supporting theoretical benefits of minimalist running shoes on reducing impact and, consequently, the injury risk has emerged. On the other hand, previous studies have shown that an abrupt transition to minimalist shoes could increase injury risk. Considering the small samples observed in previous studies and the lack of consensus on a definition of running-related injuries, the purpose of this study was to describe the characteristics, the main motivational factors and the prevalence of running-related injuries in runners who have tried running in minimalist shoes.

Material and Methods: An electronic survey adapted from a previously published study (Cohler and Casey, 2015) was developed and sent by social media to runners of Sao Paulo, Brazil. The survey examined demographics, average weekly mileage, use of minimalist running shoes, and history of running injuries. The running-related injury definition adopted was proposed by a previous work (Yamato, Saragiotto and Lopes, 2015). Aiming to avoid recall bias, specific questions about retrospective data of running-related injuries, such as the body parts involved, were restricted to the last 6 months in relation to the survey's answer date. Percentages, descriptive statistics and frequency analysis were used to present data.

Results: Two thousand four hundred and seventy-nine people completed the survey (1329 male; 1150 female). Only 25% of participants ($n = 611$; 58% male and 42% female) have ever tried running in minimalist shoes, and the main motivational factor was an eventual performance improvement (42%; $n = 259$). Of these runners, 69% ($n = 420$) have suffered a running-related injury; 50% of the injuries occurred on last 6 months ($n = 212$), and 89 runners reported that the injuries occurred while they were running in minimalist shoes. The main body parts involved in the injuries developed while runners had been running in minimalist shoes were the lower leg or calf (24%; $n = 29$) and the foot (23%; $n = 28$). Conversely, the knee (25%) was the main body part involved in injuries of the 123 runners who did not develop it while running in minimalist shoes. Regarding those 1868 people (972 male; 896 female) who have never tried running with minimalist shoes, 63% have suffered an injury and 56% of the injuries ($n = 663$) occurred on last 6 months. The main body parts involved in these running related-injuries were the knee (30%, $n = 299$) and the lower leg or calf (23%; $n = 235$).

Discussion: Corroborating with previous evidences, this study showed that injury prevalence in runners is very high (65%; $n = 1601$). An interesting result observed was that the knee was the main body part affected in runners who have suffered injuries while running in conventional shoes. This result was expected, because the knee is the most common body part related to running injuries in literature. In contrast, the most common body parts involved in injuries while runners were wearing minimalist shoes were lower leg or calf, and the foot. When cushioning is removed from the shoes, the runners who are inexperienced in this condition tends to change from a rearfoot strike pattern to a midfoot or forefoot strike pattern, imposing excessive loads on foot bones and on the Achilles tendon. This condition could lead to an overuse injury, as stress fracture or tendinopathy, supporting the injuries reported.

Conclusion: Based on this study, we can conclude that running in minimalist shoes can change the injury course and the body parts involved. Therefore, coaches and practitioners should attentive to this type of footwear when the focus are on preventing running injuries.

ROTATOR CUFF INJURIES IN PITCHERS

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Introduction and Purpose: The shoulder is a frequent site of injury in competitive sports. The pitch has high intensity and frequency, predisposing lesions. Scovazzo et al exhibited in their study that the incidence of problems in this region occurs in 67% of pitching sports athletes because the energy involved is beyond the physiologic limit of this structure. The rotator cuff lesion represents a common cause of shoulder pain, consequent edemas and local hemorrhage, given that it is the stability structure during the realization of repetitive movement of these athletes. The objective of this study is to present the prevalence of rotator cuff lesions, evaluating their relation with the involved sports, the lesion mechanism and treatment.

Material and Methods: The article consists of a systematic review of academic articles published both in Portuguese and English language between the years 2001 and 2018. All database used is fully available online.

Results: According to NIRSCHL et al, 90-95% of rotator cuff abnormalities are secondary to trauma, tension overloading, or overuse. In 2001, EBNISMAN B. et al realized a study with 119 athletes and found a statistically significant association between contact sport and lesion mechanism ($p=0,0240$). The proportion of traumatic lesions cases in athletes that practice contact sports (56,1%) was higher than in non-contact sports athletes (33,9%). They also found a significant association between pitching sports and lesion mechanism ($p=0,0074$). The repetitive interaction between the rotator cuff inner surface and the posterosuperior glenoid was described as the responsible factor for intra-articular lesions secondary to internal impingement, mostly in young, throwing athletes (ANDRADE, R.P. et al., 2004). The main symptom referred by athletes with such injury is pain. Furthermore, when it comes to diagnostic methods, the use of additional screening tests, including radiography, ultrasonography and MRI, is highly recommended. Recently, due to the advent of the arthro-resonance, the diagnostic precision of shoulder lesions in athletes has increased dramatically. The treatment can be divided in to conservative or surgical. Conservative treatment is based on analgic and anti-inflammatory measures, with combination of modalities (corticosteroid injection, nonsteroidal anti-inflammatory drugs, phonophoresis and kinesiotherapy). The surgery techniques can be divided into groups: open repair, mini-open repair and arthroscopy.

Discussion: According to the literature, pain can be used as a parameter to establish the difference between partial lesions and total tendon rupture, since the former tends to present more intense pain than the latter. The gold-standard to rotator-cuff lesions diagnosis would be intraoperative during arthroscopy. However, the arthro-resonance, as shown by the most recent studies, has been pointed out as the best radiologic test when it comes to investigation, since it presents a sensitivity of 86% and a specificity of 96%. The conservative treatment avoids surgery and its inherent complications, but there is the possibility of symptom recurrence, lesions aggravation and chronic degenerative changes. Surgery might relieve pain and prevent chronic changes. One of the indications to operate is tendon tear in active patients and professional athletes. It has been observed in the vast majority of studies that the conservative treatment is the most recommended.

Conclusion: Based on this piece, we can conclude that rotator-cuff lesions are more common in pitchers. In addition to that, the best diagnostic method for this injury, excluding surgery, is through arthro-resonance. According to most studies observed, the conservative treatment has been prioritized, and only if shown ineffective surgical treatment is recommended.

NEUROMUSCULAR PERFORMANCE OF KNEE EXTENSOR MUSCLES IN RESPONSE TO ACUTE FATIGUE AND CRYOTHERAPY

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Introduction and Purpose: Neuromuscular performance measured by surface electromyography (EMG) signal amplitude has been few analyzed in response to acute fatigue protocols and subsequent cold water immersion (CWI) in studies about post-effort recovery methods. The present investigation was developed to analyze neuromuscular performance, from measures of root mean square (RMS), in knee extensor muscles after protocol for fatigue induction and cryotherapy by CWI.

Material and Methods: Casuistry was constituted by 25 university students. Experimental design included one control group (CG) and four CWI groups (CWI); CWI groups performed different combinations of temperatures (5 or 10°C) and immersion times (5 or 10 minutes). Firstly, all participants underwent a maximal isometric voluntary contraction (MIVC) test to determine the maximal isometric force (MIF) of knee extensors of dominant leg. Afterwards, muscle fatigue was induced by performing a 40 and 80% of MIF muscle contraction until exhaustion, followed by rest (CG) or CWI. Neuromuscular performance was analyzed at three moments: immediately after, 15 min, and 30 min after exhaustion. Relationships between RMS values and moments of evaluation were studied by linear regression models in order to identify the fatigue level. The comparison among the regression models (based on slope inclination measures) was performed by using One-Way ANOVA and Tukey's or Dunn's test. The level of significance was considered to be $p<0.05$.

Results: RMS slopes were predominantly positives, which confirmed muscle fatigue occurrence after exhaustion tests in both effort levels, for all groups and muscles. At the protocol of 40% effort, fatigue levels were higher in vastus lateralis (VL) and vastus medialis (VM) muscles than in rectus femoris (RF) muscle. Within groups, slope values were higher in exhaustion when compared to moments 15 and 30 minutes of post-effort recovery. Concerning the 80% effort, experimental groups showed similar neuromuscular performance response profile, regardless CWI protocol.

Discussion: In the present study, increased EMG signal amplitude in response to exhaustion protocol confirmed the occurrence of muscle fatigue in all analyzed muscles. Also, superior slopes observed in VL and VM show more accentuated fatigue level in these muscles; this condition may be explained from muscles sharing strategies controlled by central driving, such as inputs from motoneurons to VL and VM, and mechanical advantages due architecture muscle and cross-sectional area. At higher effort levels (80% of MIF), all muscles were equally fatigued due to higher level of efforts and demands. On the other hand, comparable fatigue levels in different moments show that the CWI did not affect neuromuscular performance, despite of experimental protocols of cold immersion. It is possible that reduction in temperature did not reach deeper muscle portions or had impaired action potentials transmission. Moreover, it is not discarded that possible occlusion and reduction of vessel diameter impaired blood supply and metabolites removal, which requires a longer time to recovery.

Conclusion: In conclusion, different knee extensor muscles present diverse neuromuscular performance in response to fatigue induction, and these responses are not modified by cold water immersion protocols. Grant support: FUNDECT

PREVALENCE OF INJURIES OF SOCCER PLAYERS DURING A REGIONAL SEASON OF PROFESSIONAL FOOTBALL

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Introduction and Purpose: Although the positive health effects of physical activity are well documented, participation in sports is associated with a greater risk of injury, and in professional football the risk is substantial. The objective of our study is to investigate the prevalence of injuries of soccer players involved in the regional soccer championship of the state of Rio Grande do Sul - Brazil in the season 2018.

Material and Methods: This study includes athletes from eight teams, totaling 236 players. The prevalence of injuries was assessed using a questionnaire adapted from the UEFA Champions League Study, which was duly completed by the medical department of the participating clubs. To analyze the data, a descriptive analysis was performed using the statistical software SPSS version 20.0.

Results: At the end of the season 60 injuries and 52 injured players were recorded among 236, that is, a prevalence of 20.0% of injuries. There was a prevalence of injuries during games of 58.3%, training of 40.0% and others of 1.7%. The main types of lesions were concussion (3.4%), fracture (1.7%), other bone injuries (1.7%), dislocation/sublux (5.1%), sprain/ligament (15.3%), lesion of meniscus/cartilage (3.4%), muscle rupture/strain (42.4%), synovitis / effusion (1.7%), overuse unspecified (5.1%), haematoma/contusion/bruise (8.5%), other injuries (11.9%). The more frequent mechanisms during the season were running / sprinting (37.9%), kicking (13.8%) and jumping/landing (10.3%). The most frequent body parts were in the lower limbs: hip/groin (11.7%), thigh (40.0%), knee (13.3%), leg (8.3%) and ankle (10.0%). Of the thigh injuries, 40.9% were in the anterior thigh and 59.1% in the posterior thigh, being the main muscle rupture/strain (75.0%).

Discussion: This study assessed the prevalence of injuries of soccer players involved in the regional soccer championship of the state of Rio Grande do Sul - Brazil in the season 2018. Our results demonstrated a high prevalence of injuries during the 2018 season, being one fifth of the sample affected by some type of injury, taking the players from their professional activities during the season, impacting the performance of teams. The players were injured, especially during the matches. However, we cannot neglect the high frequency of injuries during training. This result leads us to think about the importance of adopting preventive measures for the reduction of injuries, also during training. The more frequent types of injuries were sprain/ligament and muscle rupture/strain and the body parts more affected by injuries were the hip, knee, leg, ankle and thigh. In this study, thigh injuries were the more prevalent, and the hamstring muscles were the most injured, mainly due to muscle ruptures and strain.

Conclusion: The frequency of injuries in soccer players involved in the regional soccer championship of the state of Rio Grande do Sul - Brazil in the season 2018 was high, especially lesions in lower limbs, highlighting sprain/ligament and muscle rupture/strain. Observing the frequency and the factors associated with the injuries can help in the more assertive choice of preventive measures for the reduction of injuries of the football professionals.

PHYSIOLOGICAL, ANTHROPOMETRIC AND DAILY HABITS DIFFERENCE BETWEEN HIGH AND LOW LEVEL AMATEUR TRIATHLETES

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Introduction and Purpose: Triathlon is a relative new sport and has gradually been gaining popularity. The inclusion in 2000 Sydney Olympic Games and the multiplication of national and international competitions has contributed to the huge increase in triathlon practitioners both professionals and amateurs. There are few studies available on the profile of these athletes, mainly on amateur athletes, who are the fastest growing in the world. Moreover, we also have no knowledge between the physiological or training habits difference between the athletes according the results in the race. The purposes of the present study are to characterize and compare the differences of anthropometric and physiological profile in addition to medical history, training and daily life habits of two levels of triathlon amateur competitors groups that participate in the Olympic distance triathlon race.

Material and Methods: Amateur triathletes (39 men and 6 women), who competed in the same triathlon Olympic distance race, participated in this cross-sectional observational study. Participants were evaluated for anthropometric characteristics (body mass, height, and body composition through (DXA)), aerobic physical fitness (maximum oxygen consumption (VO₂máx), anaerobic threshold and respiratory compensation point, maximum aerobic velocity (MAV) and running economy (RE)). Questionnaires on medical history, training routine, sports experience and circadian preference were applied. The triathletes were divided in two groups: Group 1 – race time lower than 2:50:00hs, and Group 0 – race time higher than 2:50:01hs.

Results: Group 1 and 0 presented no difference between height (p=0.74), total body weight (p=0.49) and fat free mass (p=0.09). On the other hand, group 1 presented significantly low fat mass (%) (p<0.0001). The partial race time on each segment (swimming, cycling and running) were significantly lower in Group 1. VO₂máx was 61.8±6.4 and 55.5±6.4mL/kg/min (p<0.001), for Group 1 and 0, respectively. Anaerobic threshold and respiratory compensation point velocity were also significantly higher in Group 1 (13.0±1.7km/h and 11.4±1.1km/h, p<0.001, respectively), but there are no RE difference between groups. Group 1 has been practicing triathlon for longer time than Group 0 (3.4±1.6 years and 2.1±1.4 years, respectively (p=0.007). Other significant difference between groups was that Group 0 presented more chronic disease than group 1 (p=0.003). There were no significant difference between groups according to drinking and smoking habits, regularly visit a physician, preparticipation medical screening, musculoskeletal injuries, nutritional evaluation, sleep time and training time per week or per day.

Discussion: Triathlon training volume is very high, and the sport modality is quite new. Therefore, learning amateur triathletes' anthropometric, physiological and clinical aspects could be very helpful to contribute to understanding the modality. With this aim, we evaluated 45 triathletes, who are used to training and competing in the Olympic triathlon distance. Low fat mass (%) and triathlon training experience in group 1 may contribute for the significant higher VO₂máx, anaerobic threshold and respiratory compensation point velocity.

Conclusion: We can conclude that what differentiates amateur triathletes with better race times is the fat mass, the level of aerobic conditioning and the time of triathlon practice, in addition to the existence of chronic diseases. It is important to emphasize that there is no difference between the number of hours of training per week and the health care habits between groups.

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EFFECTS OF AN EXERCISE-BASED CARDIAC REHABILITATION PROGRAM FUNDED BY A HEALTH INSURANCE

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Introduction and Purpose: Substantial data established that a sedentary lifestyle is the main modifiable risk factor for coronary artery disease (CAD) and increased physical activity provides protection in primary and secondary prevention of CAD. The expected benefits in the programs of cardiac rehabilitation with exercise training are: improves exercise capacity and lipid profile, reduced obesity rates and improvements in the overall quality of life. The objective of this study was to evaluate the impact of exercise on hemodynamic and performance variables in patients submitted to the Exercise-Based Cardiac Rehabilitation Program funded by a health insurance in the Integrated Center for Exercise Medicine of Mãe de Deus Hospital in Porto Alegre.

Material and Methods: 38 patients were accompanied in this study, for an average period of 10 months, with a frequency of three times a week in the Exercise-Based Cardiac Rehabilitation Program. We analyzed the following variables: metabolic equivalent task (METs), double-product (DP), blood pressure (BP) before the exercises (in 2 ergometric tests), body fat percentage, waist circumference, muscle resistance and flexibility.

Results: The group of patients exposed to the cardiac rehabilitation program increased the average maximum metabolic equivalent in 0,80 (CI 95%: 0,31 to 1,29; p value = 0,002), no changes observed in double product (p value = 0,93) rest systolic blood pressure (p value = 0,743) and rest diastolic blood pressure (p value = 0,30). We observed a decrease in fat percentage the average in -1,61% (CI 95%: -0,58 to -2,65; p value = 0,003) and a decrease in waist circumference the average is -1,54 cm (CI 95%: - 0,18 to -2,90; p value = 0,27). For muscle resistance were observed an increase in average the repetitions in 4,98 (CI 95%: 3,88 to 6,06; p value < 0,001) and improve of flexibility in average 3,76 cm (CI 95%: 2,51 to 5,01; p value < 0,001).

Discussion: In the present study improvement in METs in participants of an Exercise-Based Cardiac Rehabilitation Program was observed a difference of means of 0.8 METs. Previous studies show that the risk of death from cardiac causes is inversely proportional to the measured cardio respiratory fitness on a treadmill test. The increase of 1 MET cardiorespiratory capacity decreased from 15 to 25% chance of a cardiovascular event and 10% mortality. Another important factor is the change in the body composition observed in the sample with a significant reduction of fat percentage and waist circumference. Evidence indicates that there is a strong association between high levels of body fat and waist circumference and higher incidence of chronic-degenerative diseases, including the cardiovascular diseases. Also, an improvement in the muscular strength and flexibility of the individuals was observed. We know that the gain in strength and flexibility proportionate a better performance of activities of daily living, making individuals more independent.

Conclusion: There was an improvement in functional capacity measured by METs of the patients submitted to the cardiac rehabilitation program, with no changes in the double product, systolic and diastolic pressures at rest. There were improvements in body composition and neuromuscular variables, consisting of reduced waist circumference, fat percentage, improved muscle strength and flexibility. The results show improvements in health and performance indicators in an Exercise-Based Cardiac Rehabilitation Program funded by a health insurance.

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INFRARED THERMOGRAPHY STUDY AS A COMPLEMENTARY METHOD OF SCREENING AND PREVENTION OF MUSCLE INJURIES

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Introduction and Purpose: Muscle injury is one of the major problems and is reported to represent 20% to 37% of all time-loss injuries at men's professional soccer level (Andersen et al, 2004). Soccer is a complex contact sport that involves relatively high risks and rates of injury in professional players during practices and matches. Athletes are exposed to physical stress of training and competition and overload reactions cause a change in blood flow that affects skin temperature (Merla, 2010 and Ferreira, 2008). Infrared Medical Thermography is not a method that shows anatomical abnormalities, but it is able to show physiological changes related to the control of skin temperature (Merla, 2010) (Ring, 2012). Objective: To evaluate thermography application as a complementary method in preventing muscle injury in professional soccer players.

Material and Methods: Twenty-eight professional soccer players that composed Corinthians' Soccer Team between 2015 and 2016. A longitudinal prospective study conducted during 2 seasons of Brazilian soccer. During the first year (2015 season) of research, muscle injuries were documented and classified in grade of severity (minimal, mild, moderate and severe) by an ultrasound exam by the same team physicians. During the following season (2016), infrared medical thermography was applied twice a week (48 hours after game) and if a positive result was detected, a prevention protocol was initiated. Muscle injuries in 2016 was documented and classified in grade of severity by an ultrasound exam by the same team physicians.

Results: In 2015, a total number of muscle injuries was 11. In 2016, a total number of muscle injuries was 4 (p=0.04). It represents an incidence/player of 78% in 2015 and 28% in 2016, corresponding to a decrease of 63.6% in 2016. It is known, however, that the cast of two seasons in a soccer club is not the same, but 7 players composed the first team in both seasons. Considering this sample, there was a reduction from 8 (in 2015) to 3 (in 2016) lesions, corresponding to a decreased of 62.5% in the incidence of lesions using thermographic monitoring (p=0.06).

Discussion: Understanding the commercial value of an athlete in game conditions, it is important to consider the cost to Corinthians of an athlete in medical department. Considering that, mean salary of cast is US\$60.000,00/month, cost of players absence as a result of muscle injuries was, in 2015, US\$380.000,00. While in 2016, it was US\$ 120.000,00.

Conclusion: The results demonstrated the importance of the use of thermography as a guide for the preventive protocol applied to soccer players with overloaded muscles, in order to prevent muscular injuries. Knowing that the main risk factor for a muscle injury is a previous one, the use of thermography becomes important to decrease the incidence of muscular re-injury. And also, prevention of injuries also guarantees greater performance of the team, as it leaves athletes in good health condition and at disposal of the coach.

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THE CHALLENGE OF THE MULTIDISCIPLINARY MEDICINE SPECIALIST - SPORTS MEDICINE DOCTOR IN THE SPORTS WORLD

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Introduction and Purpose: The World Health Organization has declared physical activity as one of the priorities in improving people's health. Physical inactivity is a fast growing world-wide epidemic - the most common cause of adiposity, cardiovascular diseases, diabetes, cancer and other diseases. Sports medicine as a multidisciplinary clinical, academic and scientific specialty of medicine has become very topical. Sports medicine doctor should have possibility to provide the medical care of athlete, make a pre-competition examination, prevent and treat diseases and injuries of athlete's. Sports medicine doctors' experience, capabilities and knowledge could be significant tools to increase public health. Countries spend finances for people mobility - the sports environment has increased fast. But in this process significant role of the Sports medicine doctor is decreased. The Sports environment strategic planning is established without including reasonable personnel planning of Sports medicine doctors. The purpose of research was to analyze the Sports medicine doctor accessibility.

Material and Methods: The Sports medicine systems in Baltic states and Sports medicine institutions statistical reports were analysed with the methods of mathematical statistics.

Results: The regulation and organization of Sports medicine field were various in different countries. It depended on such Regulations: the Sports Medicine doctor competency, the Athletes medical care, and the Health services during the sports competitions and sports events. There were differences in athlete' pre-competition examination services what provided Sports medicine doctor. It is a problem in countries with small count of citizens. Sports medicine doctors are less than 1% of all specialties doctors: one sports medicine doctor for more than 20 sports organizations and for 6000 athletes who took a participation in organized physical activity. There was no possibility to provide adequate and professional sports medical care for athletes and citizens. State-funded Pre-competition examination is provided only for about 20% athletes aged 10-17 years old.

Discussion: Many Sports organizations operate without the supervision of a sports medicine doctor and medical care for athletes. It results very often in no effective physical activity with huge economic impact to the public-health, to social and political issues. It is essential that in the Strategy of the Sports industry are connected with the Startegy of Sports medicine field. The development Sports medicine strategy would provide the valuable increase of the quality in sports industry and sports medicine doctor's practice, enhance the number of the Sports medicine doctors, establish the Sports medicine doctor supervision in all Sports organizations with influence to health risk factors, also during the Sports competitions, develop the unified information system and the guidelines in Sports medicine field.

Conclusion: The development of the sports medicine field is a long-term process and it should be connected with Sports field strategy. The lack of long-term Sports medicine strategy without the cooperation between Sports and Sports medicine industries make serious problems in future and decline the control of the cardiovascular risk factors, such as arteriosclerosis, arterial hypertension, diabetes, giving up smoking and depression.

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RELATIVE AGE EFFECT AND SPORTS PERFORMANCE IN ELITE ATHLETES OF STRENGTH AND ENDURANCE SPORTS

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Introduction and Purpose: The importance of maturation in sports performance is evident in ages in which individuals have different pubertal timing, making stronger and more resistant to those who mature before their peers. In sports in which category selection structures are defined by month of birth, there are differences in age and maturity within the year of selection (for example, from January 1 to December 31). Those born at the beginning of the year are relatively older for up to 12 months than those born at the end of the year. Research in sports has identified a series of significant effects associated with such differences, called the "Relative Age Effect". Objective: To evaluate the Relative Age Effect and performance of elite athletes of Strength and Resistance sports and differences in sports disciplines and by gender in the High Performance Center in Santiago, Chile.

Material and Methods: A retrospective descriptive study conducted at the High Performance Center of Santiago (CAR). A review of the files of athletes evaluated in the CAR was carried out from 2001 to March 2017. All data were included where the date of birth of the athlete was recorded, of sports disciplines of Athletics, Weightlifting, Canoeing, Rowing, Cycling, Skate Race, Triathlon, Swimming, Andinism and Sky, excluding paralympic athletes. The athletes were divided according to their month of birth in 4 quartiles, Quartile 1 (January, February, March), Quartile 2 (April, May, June), Quartile 3 (July, August, September), Quartile 4 (October, November, December), the statistical analysis was performed through Chi square to see differences between the groups and the athletes were grouped by sport discipline and sex.

Results: We analyzed 333 athletes from the disciplines of Strength and Resistance, 62% were men. With an average age of entry to the Center of 20 years. It was observed that 28% of them were born in the first quarter of the year (the months of January, February, March), while only 18.7% did so in the last months of October, November and December, with a Chi square = 7,58 p = 0,056. There were no differences between men and women. The sports that presented major difference of births in the 4th quartile were Rowing, Athletics, Cycling, Canoeing and Weightlifting, being significant only in Athletics (p = 0.008). When analyzing the athletes with the best sports results, an important relative age effect is observed (p = 0.013), with 28% of the athletes who were born during the first three months of the year and 15% the last 3 months.

Discussion: This results shows a slight increase in those born in the first months of the year, but with a significant decrease in those born in the last 3 months, leaving the doubt if there are considering the younger athletes during the selection of sports talents and if they are having the same opportunities to compete as their peers who were born a few months earlier.

Conclusion: Although a relative age effect was not significant in all athletes with a high performance of strength and endurance, there was a significant effect on athletics, and a trend of lower birth in the sports of Rowing, Cycling, Canoeing and Weightlifting. These results should be considered for future searches of selection and sports talent.

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NON-PHARMACOLOGICAL TREATMENT OF SARCOPENIA: A SYSTEMATIC REVIEW

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Introduction and Purpose: The aging process generates a collective of physiological changes that result in shortage of functional capacity in an individual when not correctly counterbalanced. Sarcopenia is defined by loss of both muscular mass and strength associated with aging and has been of great interest in the last decades. The treatment of sarcopenia is currently a high interest field. There are clinical trials in progress testing various pharmacologic agents, such as testosterone, selective Androgen Receptor Modulator (MK-0773) and myostatin human monoclonal antibody (Bimagrumab). However, there is still no consensus for pharmacological therapy. Therefore, life habits modification focused on physical training and nutritional treatment remains the therapeutic option for sarcopenia. The target of the present research is to review and systematize the data that supports non-pharmacological treatment of the pathology.

Material and Methods: Randomized Clinical Trials (RCT) of sarcopenia patients was searched in MEDLINE, EMBASE and LILACS databases using the terms "sarcopenia" and/or "sarcopenic", using the restrictor "clinical trials", without restriction of languages or date, with non-pharmacological treatment of sarcopenia. A search with the restrictor "reviews" was also made to further search for clinical trials in its references.

Results: A total of 484 papers were found in the initial search. After exclusion of duplicates (85), there were 399 papers. The titles and abstracts were than read and 32 were selected for full reading. Fourteen papers were excluded for not being randomized trials; three for not presenting treatment data; two for including individuals not suffering from sarcopenia; one for age mean being lower than 60 years old; one for not specify the diagnostic criteria; one for not being able to find the full text (paper unavailable for purchase and the authors couldn't be reached). Only seventeen papers were included in this review, covering nutritional therapeutic(4), physical training(3), electrostimulation(3) and combined therapies(7).

Discussion: The small number of studies encompassing treatment of sarcopenic individuals combined to the small number of individuals each study and inconsistency methodology hinders a strong analysis of the subject. That alone prevents us an unequivocal position in the impact of non-pharmacological interventions of sarcopenia. However, the available evidences indicate electrostimulation, nutritional intervention and physical training all present a positive impact. The present evidence also suggests that combined therapies show better results than isolated approaches. However, the impact of these interventions does not reach excellent levels and not all the variables find consistent results between the studies. Studies with greater samples and stronger methodology are required to further support the findings and conclusion of the present review.

Conclusion: The present data suggests that all therapies (i. e. nutritional therapy, physical training and electrostimulation) have positive impact in the treatment of the pathology, and the combined therapies seems to increase even further the benefits in comparison to isolated approaches.

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ANALYSIS OF KIDNEY FUNCTION AND CREATININE CLEARANCE OF YOUNG PLAYERS SOCCERS IN DIETARY SUPPLEMENTATION

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Introduction and Purpose: The supplemental protein consumption and effects on maximal strength enhancement are varied. However, studies with consumption up to 2g/kg/day show in soccer players or other sports athletes using supplementation with a patented milk protein supplement may provide a 14.5% increase in maximal squat strength and 42% increase in strength was noted in bench press exercises. In a recent review that gathered 22 separate clinical trials to yield 680 subjects in their statistical analysis and found that protein supplementation with resistance resulted in a 13.5 kg increase in lower-body strength when compared to changes seen when placebo was provided. Even though, dietary supplementation, be it protein or free amino acids, produces an increase in the synthesis of urea by the liver. Elevation of this urea is excreted by the kidneys and can lead to renal deterioration by supplementation to take up abusively and a perpetuation condition can to progress to kidney failure. The decreased renal function can be detected by laboratory quantification of urea and creatinine in the blood or the quantification of creatinine in urine 24 hours. Therefore, this study will evaluate if the benefits of supplemental protein consumption may cause a deleterious effects on the kidney health in young players soccers.

Material and Methods: The selection was through interpretation anthropometric, and laboratory values of urea (reference range 20-40 mg / dl) and creatinine (reference range 0.6 to 1.3 mg / dl), were collected in December 2017 and analyzed from the charts of 70 athletes from the Centre of Excellence by a club in Rio de Janeiro. 35 athletes belonging to the case group, who used protein supplementation, previously prescribed for at least 6 months, and the control group, which not ingest protein or amino acids, in addition to the supervised diet offered by the club. All male and in the age group between 14 and 20 years of age. Thereby, creatinine clearance was estimated from the Cockcroft-Gault formula, available in the online software of the Brazilian Society of Nephrology (SBN).

Results: The case group, those who used an average of 2g/kg/day (1.5g/kg/day - 2.5g/kg/day) of free aminoacids or protein, presented the following averages for urea (32mg / dl), creatinine (0.92mg/dl) and creatinine clearance (of 139ml/min (99ml/min-180ml/min). The control group, which did not use protein supplementation alone, through diet, presented the following averages for urea (28mg/dl), creatinine (0.85mg/dl) and creatinine clearance of 146.5ml/min (120 ml/min-173 ml/min).

Discussion: Studies have shown variations in all rates (urea, creatinine, uric acid), in addition to creatinine clearance, mainly in populations unmonitored clinically and that used dietary supplementation indiscriminately. This corroborates the literature in the statement about the drop in creatinine clearance and increased renal replacement therapy in patients using supplementation. However, in the present study, no significant difference was observed in rates and metabolites indicative of renal function and could be justified by the use of protein supplementation in the athletes monitored and analyzed. The results were illuminating for the understanding of the relationship between the balanced and supervised intake of supplements and an educated diet.

Conclusion: In conclusion, it is understood that any achievement of protein supplementation/improvement of the daily diet with protein increment must be accompanied by nutritionists and medical specialists so that renal function is preserved and the gain of strength and reduction of injuries can be achieved.

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MANAGEMENT OF INCREASED CORE TEMPERATURE IN EXERCISING ATHLETES

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Introduction and Purpose: Exercising and training in hot and humid environments may cause the core temperature of athletes to increase. Hyperthermic symptoms may well include the following: lowered cardiac output, stroke volume, central blood volume, cutaneous and muscle perfusion. These symptoms combined with the added fluid loss at higher environmental temperatures, increases the injury and illness risk of athletes exercising in the heat. However, athletes from several sporting disciplines train and compete in hot environments that impair performance and pose a potential risk to the health of the athlete concerned. Common cooling methods used to mitigate core temperature increase include water immersion, ice packs, crushed ice ingestion and cold air exposure which are time consuming, logistically demanding and effective for a very limited time period. This study investigated a carbon based (C-based system) compound/cooling system which was designed for therapeutic hypothermia or temperature reduction after acute ischemic events. The aim of the study was to investigate the effect of using this method, directly after athletes exercised for a maximum period of 2 hours in a hot/humid environment, or until their core temperature reached 39.0°C. It was hypothesized that this method can significantly decrease the time to return to the normal baseline core temperatures of the athletes.

Material and Methods: When measuring heat on the sports field, the Wet Bulb Globe Temperature (WBGT) is the gold standard. The WBGT is a measure of heat stress, taking into account temperature, humidity, wind speed, sun angle and cloud cover. Fifteen unacclimatized healthy male athletes were asked to perform an exercise protocol in a climatic chamber (dry-bulb temperature = 39.0°C and a natural ventilated wet bulb temperature of 28.0°C). A workload of 80 Watts was achieved by means of a block stepping exercise on and off a 30.5 cm stepping block (24 steps.min⁻¹). On exiting the chamber, athletes were placed in a supine position and the C-based cooling pads were fitted on the torso and thighs of each participant until his core temperature returned to the pre-exposure core temperature value. A telemetric system was used for continuous core temperature monitoring. The system included a pre-calibrated, rectally inserted, temperature sensor (radio pill) and data recorder. The protocol was repeated twice; once with the aid of the C-based system/cooling pads and once without.

Results: The non-parametric Wilcoxon's signed rank test was used to determine if there was a difference in cooling time, with and without the external cooling aid. A significant difference ($p=0.0023$) was found indicating that the cooling aid accelerated reestablishment of the athlete's normal core temperature. A cooling rate of 0.035°C/min was achieved which is superior to the cooling rates with local ice pack application.

Discussion: As known, the normal human core temperature is 37°C and temperatures higher than 40.5°C may induce cellular destruction. During this study, participants were allowed to exercise until their core temperatures have risen to 39°C. The use of a C-based cooling system resulted in a significant shorter period to normalise the elevated core temperatures when compared to non-cooling periods. The cooling rate was superior to reported ice pack cooling rates because the C-based system maintained a low temperature for a longer period. This in turn is attributed to the increased heat capacity of the C-based system.

Conclusion: This technology may provide an alternative to facilitate the rapid cooling of athletes with a high core temperature, compared to logistically demanding techniques such as ice baths and cold air exposure. Rapid cooling allows new applications like interval cooling in team sports such as rugby and soccer where cooling time is limited and can help to manage the athlete's core temperature pro-actively.

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COL14A1 RS4870723 AND ANTERIOR CRUCIATE LIGAMENT RUPTURE IN PHYSICALLY ACTIVE PEOPLE FROM FOUR DIFFERENT COUNTRIES

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Introduction and Purpose: The COL14A1 gene has been mapped to chromosome 8q23 and encodes the alpha chain of type XIV collagen, a member of the FACIT (fibril-associated collagens with interrupted triple helices) collagen family. Type XIV collagen may be involved in fibrillogenesis and some studies suggest that it may modulate the cellular response of tissue to mechanical stress. Collagen XIV is one of the main structural components of Anterior Cruciate Ligament (ACL) collagen along with collagen types I, III-VI, XII and various proteoglycans and glycoproteins. Therefore, we hypothesized that specific polymorphisms within the COL14A1 gene could be associated with ACL rupture in physically active population, because it is possible that greater tissue damage following exercise leads to ligament injuries such as ACL rupture. The aim of this study was therefore to test the association between the COL14A1 rs4870723 and ACL rupture in physically active people.

Material and Methods: A case-control genetic association study was conducted on 1017 physically active participants (Levels 5-10 of the Tegner Activity Level Scale) of which 579 controls (n=149 females and n=430 males) and 438 individuals with surgically-diagnosed ACL ruptures (n=106 females and n=332 males). The subjects were from Japan (n=267 controls [n=78 females and n=189 males] and n=78 cases [n=35 females and n=43 males]), Poland (n=143 controls and n=182 cases; all males), Russia (n=100 controls [n=41 females and n=59 males] and n=121 cases [n=51 females and 70 males]), and Italy (n=69 controls [n=30 females and n=39 males]; n=57 cases [n=20 females and n=37 males]). All the participants reported non-contact mechanism of injury. Genomic DNA was extracted from either buccal epithelium or saliva using a standard protocol. COL14A1 rs4870723 genotype distributions were compared between cases and controls in each population and in the whole sample under A-dominant (AA+AC versus CC), A-recessive (AA versus AC+CC), and A-additive (AA versus AC versus CC) models. Hardy-Weinberg and odds ratio (OR) analyses with a confidence intervals (CI) of 95% were also performed.

Results: The genotypes distribution related to the COL14A1 rs4870723 polymorphism were in Hardy-Weinberg equilibrium. Considering each cohort separately, no significant differences has been found in COL14A1 rs4870723 genotypes distributions between cases and controls (all $p>0.05$), even if the association had a same direction of effect in three of the four considered countries. Conversely, multinomial logistic regression analyses showed that in the pooled model (Japanese, Polish, Russian and Italian populations), genotype frequency of AA+AC was significantly higher in ACL rupture group than in controls (OR: 1.39, 95% CI: 1.02-1.89, $P=0.03$).

Discussion: In the present study we found, for the first time, the association between COL14A1 rs4870723 polymorphism and ACL rupture in a large cohort of physically active individuals. The carriers of the A allele (AC+AA genotypes) were higher in ACL group respect to the controls in three different ethnicities. These results suggest a protective effect of the C allele in developing ACL rupture among physically active individuals.

Conclusion: Our findings suggest that the COL14A1 rs4870723 polymorphism is one of the genetic variants that could influence the susceptibility to developing ACL injury among physically active people. Further studies are needed to confirm these findings in other cohorts from different countries.

FIRST STEP AS THE DEVELOPMENT OF AN INJURY PREVENTION PROGRAM – AN INJURY SURVEILLANCE STUDY

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Introduction and Purpose: In Hong Kong, student-athletes play at a more competitive level than recreational sport lovers while having unorganized training programs, insufficient medical support and little education on sports injury prevention. In 2006 and in 2011, Caroline Finch proposed that research studies in injury surveillance, behavioral and social science considerations should be taken account into the development of intervention protocols and their delivery strategies. aims to translate the findings of injury surveillance to the development of injury prevention programs. In this study, we have conducted an injury surveillance and behaviour studies as the first step of the framework.

Material and Methods: Over the 2-year period from 2016 to 2018, within the academic semester periods, we included a total of 17 sports teams in a local university and tracked the medical attention records in the sports injury clinic in the university. The definitions of injury type, cause of injuries and body region were generally based on the instructions from the International Olympic Committee standardized assessment of sports injuries in 2008. We also employed a validated questionnaire, which was developed and validated by Chan and Hagger in 2012, to investigate the athlete's adherence to safety measures regarding sports injury prevention.

Results: Total 119 student-athletes attended the sports injury clinic. Total 144 sports injuries were identified. Most injuries were on lower extremity (59.0%); for further body region division, injuries occurred more frequently on knee (30.6%), shoulder/clavicle (13.9%) and ankle (11.8%). In terms of injury types, joint or ligament sprain (17.4%), lesion of meniscus or cartilage (18.8%) and tendinosis/tendinopathy (18.1%) were dominant among all categories. Under definite diagnosis, patellofemoral joint injury (6.8%) and ankle sprain (8.8%) were the most common injuries. Regarding injury mechanisms, recurrence of previous injury (41.0%) and overuse (25.7%) contributed to most sport injuries. For follow-up management, 37.5% injuries did not need referral or can be managed by team clinical sports trainer while 43.1% injuries needed further management in hospital settings. Among all sport teams, basketball (21.0%), football (21.0%) and volleyball (16.0%) had the highest number of reported sport injuries. Among all sport teams, there was no significant correlation between number of injuries and adherence to sport injury prevention, neither in the score of frequency or effort.

Discussion: Our findings were consistent with other major large scale injury surveillance studies, for example, most sport injuries occurred in the lower extremity. The overwhelming number of injury recurrence stressed the potential direction of our injury prevention program: a pre-season screening for sports injuries and early injury management will definitely be beneficial to the student-athletes with recurrent injuries. Adherence to current injury prevention/safety measures made no reduction in sports injuries, which may imply re-education of injury prevention is needed.

Conclusion: Most reported sport injuries occurred over the lower extremity. Among all injury types, soft tissue injuries such as ligament sprain and cartilage lesion were dominant. In injury mechanism, recurrence of previous injury and overuse accounted for the cause of majority of sports injuries. Recurrence of previous injury was the most common cause for all sport injuries. There was no correlation between adherence and number of sport injuries in all sport teams.

YOUNG SWIMMERS OF DIFFERENT AGES AND SEXES HAVE DIFFERENT PERFORMANCE DETERMINANTS

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Introduction and Purpose: Swimming is a very popular sport with great youth participation. It is known that swimming performance is influenced by several factors, such as anthropometric and physiological aspects. However, it is unclear whether the level of association of these variables with swimming performance depends on the age or sex of the swimmer. The aim of the present study was to describe the level of association of anthropometric and neuromuscular properties of upper limbs and performance in 100 meters of free swimming and to compare the association of variables between different age groups from 11 to 23 years and sexes.

Material and Methods: Sixty swimmers participated in the study (13.80 ± 2.61 years, 1.62 ± 0.10 m, 52.36 ± 12.01 kg), 44 males and 16 females were divided into three groups: (A) 11 or 12 years old, (B) 13 or 14 years old and (C) 15 to 23 years old. They were submitted to anthropometric evaluations to determine total body mass (kg), height (cm), wingspan (cm), fat mass (%) and fat free mass (kg) through Dual-energy X-ray absorptiometry. Isokinetic peak torque (Nm) (60°/s) and mean power (240°/s) of external and internal shoulder rotators muscles were assessed. The relations of these variables with the performance were analyzed by scatter plots and Pearson's linear correlation coefficients, with a significance level of 5%.

Results: Performance over 100 meters was significantly associated with total body mass for male group A ($r = -0.58, P = 0.02$) and female group A ($r = 0.84, P = 0.04$) and male group B ($r = -0.78, P < 0.01$), height for male group A ($r = -0.51, P = 0.05$) and male group B ($r = -0.57, P = 0.02$), wingspan for male group A ($r = -0.54, P = 0.03$) and male group B ($r = -0.72, P < 0.01$), fat mass for female group A ($r = 0.84, P = 0.04$) and female group B ($r = 0.85, P = 0.04$), fat free mass for male group A ($r = -0.60, P = 0.01$) and male group B ($r = -0.83, P < 0.01$). Considering the neuromuscular properties of upper limbs association with performance, significant values were shown for peak torque (PT) of external rotators for male group A ($r = -0.77, P < 0.01$) and male group B ($r = -0.73, P < 0.01$), PT of internal rotators for male group A ($r = -0.62, P = 0.01$) and male group B ($r = -0.77, P < 0.01$) and for mean power (MP) of external rotators for male group A ($r = -0.69, P < 0.01$) and male group B ($r = -0.80, P < 0.01$) and MP of internal rotators only for male group B ($r = -0.81, P < 0.01$).

Discussion: As can be seen anthropometric variables (height, wingspan, fat free mass) presented a significant relationship with performance in the male sample, but not in female. Moreover, significant relationships were observed in groups A or B, but not in C group. Similarly, external and internal muscles peak torque and power were associated with performance in male groups A and B, but not C and neither in females group. Considering that differences in sexual maturity are expected between different sex and age groups, it is reasonable to assume that biological changes associated with peak hormone production and physical and motor development may occur and impact performance, particularly at ages closer to the pubertal period. In addition, swimming is a very technical sport, so it is possible that the level of association of these variables of physical fitness and performance is different in athletes of different age groups, since we expect an improvement of the technique over time and a consequent diminution of the importance of maturation status.

Conclusion: Variables associated with swimming performance in 100 meters of free swimming are different for male and female swimmers and it is also different in different age groups. Anthropometric and strength measurement are more associated with performance in males and in younger ages. The understanding of these variables can contribute to the development of proper training programs for each age group, thereby maximizing results.

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UNEXPLAINED UNDERPERFORMANCE SYNDROME IN ENDURANCE AND RESISTANCE ATHLETES: DETERMINANTS AND EARLY DIAGNOSTICS**Autores:** Jegier, A , Szewczyk, A , Rębowska , E , Leszczyńska, J**Instituições:** Department of Sports Medicine, Department of Preventive Medicine Medical University of Lodz, Poland

Introduction and Purpose: Improved physical fitness and performance in sports are the desirable results of training. They are determined by the balance between training load and recovery. Disturbance to such balance may lead to Unexplained Underperformance Syndrome (UUPS). Due to a lack of universal diagnostic tests, UUPS is mostly diagnosed retrospectively. Better understanding of the determinants of UUPS will allow to identify its risk factors and design preventive measures. Aim The aim of the study was to identify the prevalence and determinants of UUPS in athletes with reference to endurance and resistance types of training.

Material and Methods: The study included 142 clinically healthy males at age 18-35, divided into three groups: 1) ENDURANCE (END0 (n=59): athletes with predominantly endurance training for min. 2 years, 2) RESISTANCE (RES) (n=52): athletes with predominantly resistance training for min. 2 years, 3) CONTROL (n=31)- control group of healthy males with average or low physical activity. All the athletes were in the training cycle of a minimum of 8 weeks. The study subjects underwent medical examination including sport history. Their aerobic capacity was evaluated by treadmill ergospirometry (CPET) with maximal oxygen uptake (VO₂max) and anaerobic threshold determination while anaerobic capacity was evaluated by Wingate test. Blood levels of cortisol, creatine kinase (CK), total and free testosterone and IGF-1 were measured. Complete blood count, lipid profile and fasting glucose level were determined. Inflammations, haematological and carbo-lipid disorders were excluded from the study. Additionally, basic anthropometric measurements were taken. Exhaustion and motivation levels were evaluated by means of Profile of Mood State Questionnaire (POMS). The results were then compared to the normative values presented by Terry PC et al. The obtained material was statistically analysed using Statistica v. 13 software.

Results: By comparing POMS results with normative values, analysing chosen biochemical and physical capacity parameters and excluding coexisting diseases, injuries and other distorting factors, a group of n=11 (22,9%) athletes with UUPS symptoms were identified in END subgroup, and n=15 (40,5%) in RES subgroup. These were mostly individuals with their training period between 71 (RES) and 76 (END) months. Statistically significant differences (p<0,05) between the UUPS group and the other athletes were found in the following sub-scales of POMS questionnaire: tension/anxiety, depression, fatigue, vigour/activity. Lower levels of IGF-1 were observed in the athletes with UUPS symptoms, particularly in RES group, but the values were not statistically significant. Aerobic capacity parameters (VO₂max), minute ventilation in END group and anaerobic capacity parameters in RES group were lower in UUPS group than in the other subjects. Sleep duration, workouts quantity and duration did not have an impact on UUPS prevalence.

Discussion: In available literature there is no consensus over the use of the terminology: UUPS vs. Non-functional Overreaching (NFOR) and Overtraining Syndrome (OTS). From clinical standpoint, UUPS was selected as the term appropriate for this study. Some authors reported that this syndrome occurred more frequently in endurance athletes. In this study the prevalence of UUPS was found to be higher in resistance athletes (41%) than in endurance athletes (23%). The highest prevalence of UUPS was observed between 71 and 76 month of training period.

Conclusion: The prevalence of UUPS depends on the type of training and total training period. It occurs more frequently in resistance vs. endurance athletes and in the athletes whose training period exceeded 3 years. Regardless of the training type Profile of Mood State-POMS evaluation is an effective and simple tool for monitoring Unexplained Underperformance Syndrome.

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PCI VS CABG: IMPACT OF COMPREHENSIVE CARDIAC REHABILITATION ON THE CONCENTRATION OF SELECTED LIPOPROTEINS IN MEN WITH CORONARY ARTERY DISEASE**Autores:** Jegier, A , Gołuchowska, A , Szmigielska, K**Instituições:** Department of Sports Medicine, Department of Preventive Medicine, Medical University of Lodz, Poland

Introduction and Purpose: From the point of view of extended laboratory diagnostics, in the monitoring of lipid-lowering therapy should be determined the serum concentrations of apo B, apo A-I, apo E and very low density lipoprotein (VLDL) which could be useful indicators of cardiovascular risk assessment. The aim of this study was to evaluate the influence of comprehensive cardiac rehabilitation (CCR) on concentrations of the selected lipoproteins: apolipoprotein (apo) A-I, B and E and VLDL in men with coronary artery disease (CAD) in relation to the conventional lipid profile and the previous revascularization method: percutaneous coronary interventions (PCI) or coronary artery bypass grafting (CABG).

Material and Methods: The study population consisted of 93 male CAD patients (59,01±7,24 years) consecutively admitted to an outpatient CCR after PCI (n=66) or CABG (n=27). To the final analysis of the results were included only those patients who completed the full CCR program, including 24 physical training sessions (8 weeks) and who had no changes in pharmacotherapy during CCR program. All patients were examined twice: at baseline (examination 1) and after 8 weeks of the CCR program (examination 2). In each subject, the components of a conventional lipid profile such as the serum concentration of total cholesterol (TC), low density lipoprotein cholesterol (LDL-C), high density lipoprotein cholesterol (HDL-C) and triglycerides (TG) was extended by determining the concentrations of apo: A-I, B and E and the concentration of VLDL. The concentration of apo: A-I, B and E and VLDL and LDL were biochemically determined using the enzyme immunoassay method using ELISA (Enzyme-linked Immunosorbent Assay) Kit For Cathelicidin Antimicrobial Peptide (CAMP) from Uscn Life Science Inc. An important element of the CCR apart from physical training was the education, concerning the lifestyle modification including physical activity, appropriate diet, psychological support in stress management and effective methods to combating the addictions including nicotine. The obtained results were subjected to a statistical analysis using the Statistica for Windows 13.0 software.

Results: As a result of a 8-weeks ambulatory CCR in CAD patients no changes in HDL-C, LDL-C, TG and VLDL values were observed (p>0,05), regardless revascularization method (PCI vs. CABG). Reduction in apo A-I concentration was observed in the group of all patients (p=0,028) and in PCI subgroup (p=0,0254). There were no statistically significant changes (p>0,05) in the apo B and apo E serum concentrations in the group of all participants as well as in subgroups of PCI patients and CABG patients. The statistically significant increase in the apoB/apoA-I index was observed only in PCI patients subgroup (p=0,033).

Discussion: The 8-week CCR program had a varied impact on the changes in the concentrations of selected lipoproteins depending on the type of the earlier revascularization method. The apo A-I concentration and the value of the apoB/apoA-I ratio in men after PCI were adversely affected while no changes in the conventional lipid profile and in the range of apo B and apo E were observed.

Conclusion: The CCR program requires intensification of lipid-reducing therapy and education on lifestyle modification. The decrease of apo A-I concentration and apo B/apo A-I ratio may be earlier diagnostic factors of cardiovascular disease than the change in the components of the conventional lipid profile.