

3. POSTER PRESENTATIONS

Roles of skeletal muscles impairment and brain oxygenation in limiting oxidative metabolism during exercise after bed rest

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“Central” and “peripheral” limitations to oxidative metabolism during exercise were evaluated on 10 young males following a 35-day horizontal bed rest (BR). Incremental (IE), moderate- and heavy-intensity constant-load exercises (CLE) were carried out on a cycloergometer before and after (1-2 days after subjects rose from bed) BR. Pulmonary gas exchange, heart rate (HR) and cardiac output (Q) (by impedance cardiography), skeletal muscle (*vastus lateralis*) and brain (frontal cortex) oxygenation (by near-infrared spectroscopy) were determined. After BR, “peak” (values at exhaustion during IE) workload (W_{peak}), peak O₂ uptake (VO_{2peak}), peak stroke volume, Q_{peak} and peak skeletal muscle O₂ extraction were decreased (-18%, -18%, -22%, -19%, -33%, respectively), whereas HR_{peak} was unaffected. The gas exchange threshold was ~60% of VO_{2peak} both before and after BR. The efficiency of cycling (ratio between external mechanical power output and oxidative energy output) was unaffected by BR. At the highest workloads brain oxygenation data suggest an increased O₂ extraction, unaffected by BR. VO₂ kinetics during CLE (same % of W_{peak} before and after BR) were slower (time constant of the “fundamental” component 31.1±2.0 s before vs. 40.0±2.2 s after BR). The amplitude of the “slow component” was unaffected (at the same % of W_{peak}) by BR, thus it would be greater after BR at the same absolute W. Skeletal muscles contribute to the impairment of oxidative metabolism during exercise after BR. The reduced capacity of peak cardiovascular O₂ delivery did not determine a “competition” for the available O₂ between skeletal muscles and brain.

Effect of a selected endurance training program on blood CD4, CD8, and IgA active females

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OBJECTIVE This study examined the effect of exercise on the percent blood lymphocytes T (T helper and suppressor) and immunoglobulin A. Studies have demonstrated that strenuous physical exercise in humans is accompanied by changing in circulating levels of lymphocytes. The purpose of this study was to examine the effect of eight weeks endurance training program on blood CD8, CD4 and IgA active females.

METHODS Method twenty recreational active women participated in the study. Subjects were assigned in one of two experimental group (n=10) (age: 21.6±1.71years, height: 161.45±2.71cm, weight: 57.25±6.99 kg, and VO_{2max} 34.18±2.1ml.kg⁻¹.min⁻¹) and control group (n=10), (age: 24.25±4.30years, height: 159.81±4.86cm, weight: 54.69±3.82kg, and VO_{2max}: 36.1±3.79 ml.kg⁻¹.min⁻¹) groups. Blood sampling were obtained before and after an exhaustive bout of exercise sessions. Lymphocyte subsets were determined by flow cytometry using monoclonal antibodies for T-helper (CD4+), and T-suppressor (CD8+) lymphocytes. Training group participated in an 8-week incremental endurance training program. After training, blood sample were obtained before and after an exhaustive bout of exercise. Data was analyzed using ANOVA test.

RESULTS There were increased in the percentage T-helper lymphocytes levels in 2 groups, decreased T - suppressor levels and increased IgA in 2 groups. There were no significant changes in IgA concentration but CD4 and CD4 / CD8 increased and CD8 decreased significantly (P<0.05).

DISCUSSION & CONCLUSION It was concluded that endurance training may induces changes in lymphocyte subsets but not in suppression of immune function after exercise. Elevated levels of immunoglobulins, especially IgA can be measured in the plasma of athletes after exhaustive long term exercise. We conclude that endurance training may result in significant alteration in IgA and T lymphocyte number, but their actual significant for immunity is seen controversially.

KEY WORDS immune system, exercise, active female

The effect of 8 weeks endurance exercise on cytokines

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OBJECTIVE Several studies have demonstrated that strenuous physical exercise in humans is accompanied by an increase in circulating levels of inflammatory cytokines. Exercise is the strongest stress to which the body is ever exposed he body response to this stress through a set of physiological changes in its metabolic hormonal and immunological systems. In this study responses of the immune system to endurance exercise have been investigated.

METHODS 18 healthy active females, university students participated in this study. Subjects were divided in 2 groups, experimental group (age: 21. 60 ± 0.54 years, weight: 57.25 ± 2.21 kg, height: 161.45 ± 0.86 cm, body mass: 21.99 ± 0.8 kg) and control group (age: 24.25 ± 1.52 years, weight: 54.69 ± 1.34 kg, height: 156.87 ± 1.71 cm, body mass: 21.40 ± 0.4 kg). After physical examinations of the 2 groups, heart rates and VO₂max with the use of Bruce test were determined. The first group was subjected to endurance exercise at a heart rate 60- 75, for 8 weeks, 3 days a week, 30 min. a day. The second group did not have exercise. Pre –exercise and post 8 weeks exercise, venous blood samples were taken from each group. Plasma levels of several cytokines namely interleukins (IL) IL1 and IL 6 and TNFα were determined by ELISA. Statistical analyses, t-test and ANOVA used for measurement IL1, IL6 and TNFα response.

RESULTS Means showed the level of IL1 not changed in experimental group but decreased in control group, the level of IL6 not changed in experimental and control groups, the level of TNFα decreased in 2 groups. T test and ANOVA showed the IL1, IL6 and TNFα response were not significantly. The percentage of lymphocytes expressing intracellular IL1, IL6 and TNFα were not higher in the experimental group than in control group, and it was similar to the value estimated in the 2 groups.

DISCUSSION & CONCLUSION In conclusion the response of the cytokines (IL1 and IL 6 and TNFα) to exercise depends on exercise intensity and duration. Recent studies show that several cytokines can be detected in plasma during and after strenuous exercise but in this study cytokines did not change, because the selected endurance training was not very strenuous and did not affect on increasing or suppressing of interleukins and TNFα function or proliferation.

KEY WORDS exercise, IL1, IL6, TNFα

Human growth hormon effects on the immune system: an in vitro study

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OBJECTIVE Several evidences underline the increased abuse of recombinant human growth hormone (rhGH) among athletes meanly because of its anabolic properties. RhGH exerts a pleiotrophic activity at cellular level which stimulates the proliferation of different cell types through the direct or in direct IGF-1 action. Previous studies demonstrated that, on lymphocytes, rhGH binding to its receptor induces an over-expression of proteins involved in cell proliferation (e.g. Cyclin E, c-myc) and the inhibition of the expression of genes involved in the apoptotic processes (e.g. Bcl-2, Bcl-XL). The aim of the present study was to evaluate the effect of rhGH, alone or in combination with corticosteroid, on cultured lymphocytes in order to analyse the efficiency of the immune system (activation, apoptosis, alloreactivity) following rhGH exposure.

METHODS PBMC were obtained by density gradient centrifugation of heparinized venous blood collected both from healthy and allergic donors. RhGH, was used at the following concentrations: 100 ng/ml, 200 ng/ml, 300 ng/ml, 400 ng/ml e 600 ng/ml. Apoptosis was induced with Methylprednisolone (MP) 1,5 µM/l or incubating the cells in the presence of 1% fetal calf serum (FCS). Mixed lymphocyte cultures were carried out in order to analyze the alloreactivity. Flow cytometry was performed with the use of FACS Calibur cytometer Becton Dickinson.

RESULTS Following 24 hors of incubation, lymphocyte spontaneous apoptosis was significantly increased (6.39±0.24 vs 12.55±0.28). On the contrary, MP induced apoptosis was unaffected by rhGH treatment (14.95±1.87 vs 15.78±0.22). After 3 hours of incubation, rhGH treatment increased the co-expression of the activation antigens CD38/HLA-DR on CD3/CD8 positive cells only (8.41±0.57 vs 12.77±0.68). After 24 hours of incubation, rhGH treatment was able to modify the CD38/HLA-DR co-expression on CD3/CD4 positive cells too (8.80 ± 0.36 vs 19.84±2.30). RhGH treatment was unable to modify the percentage of Th2 cells on samples obtained both from healthy and allergic subjects (1.03± 0.09 vs 1.14 ± 0.14 and 1.69± 0.16 vs 1.9± 0.21 respectively). RhGH treatment was unable to modify the number and the size of cell clusters when mixed lymphocytes cultures are concerned.

DISCUSSION & CONCLUSION RhGH in vitro treatment exerts the following effects on lymphocytes: - increases the spontaneous apoptosis - does not modify the induced apoptosis - increases the co-expression of the activation antigens CD38/HLA-DR which lasts for at least 48 hours - does not increase the alloreactivity - does not modify the composition of the CD4+ sub-populations Th1 and Th2

KEY WORDS Growth hormon, lymphocyte, immune system, flow cytometry

A previous note regarding the influence of strength training on antioxidant defence system in stressed rats

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OBJECTIVE It is widely accepted emotional stress is associated to an increased oxidative damage. Fortunately several studies have reported aerobic exercise improved oxidative stress both in experimental and human research what may be explained at least in part by increasing antioxidant defence system. However to date little information is available regarding the influence of a strength training protocol on oxidant-antioxidant balance. Accordingly the present study was designed to ascertain the effect of resistance training on plasmatic total antioxidant status in young stressed wistar rats.

METHODS To get this goal we used 50 male- Wistar rats, 1 month old and 125-135 g weight. Rats were adapted to the experimental condition of 12:12-h light-dark cycles. They all were emotionally stressed by immobilization for 8 weeks, 5 sessions/week, 1hour/session according to the protocol reported by Trneckova. They all were randomly divided into experimental and control groups. Animals from experimental group (n=25) were also exercised following a model performed by Tamaka in a rodent squat apparatus and performed four sets of 12 repetitions at 60-75% (increasing 5% each two weeks) of their one repetition maximum (RM) with a 120 second rest period between sets, 5 days/week for 8 weeks. Control group included age, sex and emotional stress matched rats (n=25) that did not perform any training program. Circulating levels of adrenocorticotropin (ACTH) were assessed by radioimmunoassay. Plasmatic Total antioxidant status was performed by a spectrophotometric method using commercial kits. It should be pointed out our protocol was reviewed and approved by an Institutional Ethic Committee.

RESULTS Immobilization stress increased plasmatic ACTH levels in experimental (250.3 +/- 8.3 vs. 757.2 +/- 12.6 pg/ml; p=0.032) and control group (248.7 +/- 8.6 vs. 986.8 +/- 14.1 pg/ml; p=0.019). At the end of the experience, plasmatic total antioxidant status in experimental rats (stressed plus exercised) was 0.72 +/- 0.03 [0.69 – 0.76] nmol/l. In control group specimens (stressed but non-exercised) plasmatic total antioxidant status was 0.57 +/- 0.06 [0.51 – 0.63] nmol/l. As was hypothesized, when mean values from both groups are compared we appreciated this difference was statistically significant (0.72 +/- 0.03 vs. 0.57 +/- 0.06; p=0.0217)

DISCUSSION & CONCLUSION We concluded an 8-week strength training protocol improved antioxidant defence system expressed as plasmatic total antioxidant status, in young stressed rats. Further studies are required since resistance training could be important in alleviating the pathological consequences of oxidative damage induced by emotional stress.

KEY WORDS Oxidative stress; emotional stress; exercise

The comparison of serum total antioxidant capacity, superoxide dismutase activity and lipid profile of Zourkhaneh athletes, Karateca practitioners and sedentary individuals

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OBJECTIVE It is believed that prolong and intensive exercise trainings may induce tissue damages due to production of free radicals and other reactive oxygen species. Zourkhaneh (Ancient) sport is a traditional or an ancient sport in Iran and many people interested to carry out its movements or trainings in the sport location named Zourkhaneh. Despite great prevalence of Zourkhaneh and Karate sports in Iran, their effects on the oxidant-antioxidant balance of practitioners are still unclear.

METHODS The purpose of this study is to comparison of total antioxidant capacity (TAC), superoxide dismutase enzyme (SOD) activity, lipid profile and physical fitness characteristics of male Zourkhaneh athletes (n=14), Karateca practitioners (n=17) and sedentary individuals (n=20). For this reason, dependent variables were determined by standardized methods and precise instruments. It is applied the Kruskal-Wallis and Mann-Whitney U test for comparing groups and statistical significance was considered if p<0.05.

RESULTS Results showed that TAC and legs anaerobic peak power of Zourkhaneh athletes and SOD activity of Karateca athletes is significantly higher than to sedentary individuals (p < 0.05). Besides, there were no significantly differences between lipid profiles of groups. On the other hand, it is established that VO₂max, legs anaerobic peak power and fatigue index of Karateca athletes are significantly higher and its body mass index(BMI) and body fat percent are significantly lower than to other groups(p<0.05).

DISCUSSION & CONCLUSION Generally, special trainings of karate caused karateca practitioners obtain beneficial

antioxidant system, VO_2 max and body composition, but it seems that the Zourkhaneh athletes should some extent modify their training methods to achieve more usefulness.

KEY WORDS Antioxidant systems, anti-risk factors, exercise trainings.

Identificación de funcional and biochemical biomarkers to detect early overtraining

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OBJECTIVE During exercise, metabolic, mechanical, and psychological loading result in a wide range of alterations in different organs. The level of fatigue is also important, since extreme fatigue could cause significant alterations, even irreversible ones, and overtraining could occur. An adequate strategy to detect early overtraining (overreaching) could be to consider different markers and their monitoring in standard situations when compared to processes of intensified training. The objective of this study was the identification of functional and biochemical markers, useful for the diagnosis of overreaching.

METHODS Nine young active male carried out a progressive and intensive aerobic intervention training of 12 weeks with 4 data collection: basal (T1), loading (T2), maximal load (T3), and recovery (T4). Ergometric test (treadmill), functional parameters (maximal heart rate, maximal oxygen uptake, blood lactate, and Borg Scale), track field test (3000 m), biochemical analyses (tumor necrosis factor- α , interleukine-6, myeloperoxidase, aspartate aminotransferase, alanine aminotransferase, and lactate dehydrogenase), and leukocyte subpopulations count were measured during the training. ANOVA repeated measures and Bonferroni test for post hoc comparisons were used.

RESULTS Subjects showed lower blood lactate levels on the maximal load period (T3) when compared to baseline ($p < 0.05$), and higher perceived exertion when compared to recovery (T4) values ($p < 0.05$). There were no significant differences in other biochemical parameters and leukocytes subpopulation count during the training.

DISCUSSION & CONCLUSION It is concluded that blood lactate and perceived exertion are reliable markers to detect overreaching and should be taken into account to avoid further overtraining. The biochemical markers studied and leukocytes subpopulations count did not predict overreaching. Granted by "Acción estratégica sobre el deporte", Spain.

KEY WORDS exercise training - fatigue - overreaching - functional markers - biomarkers

N-terminal pro b-type natriuretic peptide and homocysteine concentrations in athletes

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OBJECTIVE Physical activity is generally perceived as a key element for both primary and secondary prevention of cardiovascular diseases. On the contrary, several evidences suggest that intense exercise may increase the athletes' thrombotic tendency. To date, available data on exercise-related increased thrombotic tendency are still conflicting and the clinical significance of those metabolic alteration, found in apparently healthy and asymptomatic athletes, are still obscure.

METHODS The aim of the present study was to correlate sport activity to both NT-proBNP and homocysteine concentrations in order to clarify if hyperhomocysteinemia may be considered as a cardiovascular risk factor in athletes and NT-proBNP levels are affected by homocysteine concentrations during physical activities. The study population was composed by 78 competitive, non-professional athletes (57 M and 21 F, aged 27.5, 38 years, mean \pm SD) practising different sports disciplines and 70 healthy age matched subjects (40M, 30F), recruited from blood donors served as controls. Besides the general clinical and analytical determinations, the assessed variables included homocysteine, folate, vitamin B12, total and HDL cholesterol, LDH, CPK, NT-proBNP and IL-6.

RESULTS The percentages of athletes with normal and elevated homocysteine levels resulted 46% and 54%, respectively. Mean NT-proBNP levels were significantly higher in athletes than in controls (1176.66 \pm 442.15 pg/mL versus 450.34 \pm 180.39 pg/mL, $p = 0.000$). No correlation was found between homocysteine and NT-proBNP values.

DISCUSSION & CONCLUSION In conclusion, both Hcy and NT-proBNP "sport-related increases" are unlikely to represent cardiovascular risk factors and/or indicators of adverse cardiac changes in athletes. In this view, hyperhomocysteinemia and high NT-proBNP levels in healthy young athletes could be interpreted as a marker of metabolic and morphologic adaptation to training rather than a pure risk factor for cardio-vascular diseases.

KEY WORDS Natriuretic peptide, Homocysteine, Athletes, Risk factor

The effect of competition on salivary steroids and mood in elite female handball players

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OBJECTIVE Many researches have done about the responses of hormones and behavior in sport competition (McCaul, Gladue & Joppa, 1992; Trainor, Bird & Catherine, 2003; Bernhardt, Dabbs & Fielden, 1998). Salivary steroids and mood changes following competition are controversial; some investigation did not mention any change in the level of these hormones and mood following competition (Aubets, Seggura, 1995; Calvo et. al., 1997; Droditch & Droditch, 1992; Edwards, Wetzel & Wyner, 2006). Therefore, the present study aims to investigate the effects of a real life stress situation as an official competition on salivary DHEA-S, cortisol and mood in elite female handball players.

Methods This research is applied from the point of practical view and is based on casual-comparative designs. The statistical population consists of elite female handball players in Homa Club in Tehran. Fifteen female handball players (age: M=23.2, SD= 4.72; height: M=168.13 cm, SD=5.67 and BMI: M=59.6, SD=8.77) was selected as a sample. None of the subjects had any history of endocrine disorders and none was on medication or hormone therapy. The study took place over a competitive period in November, during which matches were played each week. Match consist of two halves, each of 40 minutes, separated by a 10 minute recovery period, and are contested by two teams of 15 players. Mood Status Profile (POMS) –consisting of 58 items and measuring six subscales including tension, depression, anger, vigor, fatigue and confusion (McNair, Lorr & Droppleman, 1971)- was utilized for measuring the subject's mood. For Saliva sampling, five ml unstimulated whole saliva was collected from each subject in half hour and five minutes before match, during half time break, immediately, half hour and one hour after end of the match. Matches were played from 4 p.m. to 6.30 p.m. Participants were permitted to consume water during the match. None had trained the day before the saliva collections. Saliva was collected after washing the mouth and drinking 100 ml water. All samples transported on ice to the Biochemistry Laboratory for hormone determination and kept frozen at -20°C until use. The DHEA-S and cortisol value of subjects were tested in duplicate with the aid of Enzyme Linked Immune Sorbant Assay (ELISA) kit from DRG Diagnostics (Sensitivity: 25 pg/ml, Standard range: 0.2 - 12 ng/ml pg/ml and, Sensitivity:1.14 ng/ml Standard range: 2 – 80 ng/ml respectively). The concentrations of and were measured by Elisa method.

RESULTS Repeated measure ANOVA was utilized to compare the changes in hormones concentration. Based on repeated measure ANOVA, DHEA-S levels of these athletes indicated not a significant difference and did not vary throughout the competition ($p>0.05$). But concentration of cortisol significantly changed following competition ($F_{6,14}=6.02, p\leq 0.000$). According to Scheffe's post-hoc comparison tests, concentration of salivary cortisol significantly increased in half time, immediately and half hour after end of match in comparison half hour and five min before match. Neither DHEA-S nor cortisol levels were significantly different before the match (Anticipatory response). After match negative mood factors such as tension, anger and TMD ($P\leq 0.05$ for all).

DISCUSSION & CONCLUSION This experiment provides evidence to suggest that stress related to competition induced high salivary cortisol concentrations than androgen. The evaluation of salivary cortisol appears as a simple, stress free, noninvasive method and sensitive biomarker of competition related stress.

KEY WORDS Saliva, Official competition, DHEA-S, Cortisol

Serum and plasma concentrations of brain derived neurotrophic factor in response to maximal exercise.

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OBJECTIVE Serum concentrations of Brain Derived Neurotrophic Factor (BDNF) increase transiently following exercise in humans. This provides support for the hypothesis that exercise-induced increases in blood BDNF are an important component of the neuroprotective nature of physical activity. Blood BDNF is collected, stored and released by platelets and regulation of blood BDNF concentration by these cells is poorly understood. We wished to investigate the effect of maximal exercise upon serum and plasma concentrations of BDNF to gain insight into its physiological regulation.

METHODS Four men (mean +/- SD: age: 30.2 +/- 5.5 years; body mass: 69.5 +/- 2.4 kg; height: 1.76 +/- 0.09 m; resting heart rate: 56.2 +/- 12.4 b/min) participated and habitual physical activity level was assessed using the Baecke questionnaire, all were physically active. The participants completed a cycle ergometer based maximal exercise test (VO_2 max: 4.22 +/- 0.17 L/min). Blood samples were taken at baseline, immediately following the test and at 30, 60 and

90 minutes post-test, with BDNF concentrations determined by ELISA (Chemicon).

RESULTS Serum levels of BDNF increased following the test and gradually fell post-test (Baseline: 6.97 +/- 4.02 ng/mL; 0 min post test: 15.7 +/- 3.5; 30 min: 13.5 +/- 3.3; 60 min: 12.0 +/- 4.22; 90 min: 11.5 +/- 5.5). Plasma levels of BDNF demonstrated an increase post-test but were considerably lower than serum levels (Baseline: 0.012 +/- 0.008 ng/mL; 0 min post test: 0.038 +/- 0.014; 30 min: 0.030 +/- 0.002; 60 min: 0.039 +/- 0.019; 90 min: 0.025 +/- 0.014).

DISCUSSION & CONCLUSION The results demonstrate that although serum BDNF rises above baseline levels in response to maximal exercise, this increase appears to principally reflect BDNF in platelet granule compartments and not BDNF free in the plasma. Studies reporting increases in blood BDNF post-exercise which rely on serum BDNF measures alone, cannot be assumed to indicate BDNF which is immediately free to cross the blood-brain-barrier. Instead, BDNF released into the bloodstream during exercise is collected by platelets, perhaps to buffer deleterious physiological actions. The fate of BDNF beyond this stage, presumably either degradation within the platelet or regulated uptake by other tissues via slow release from the platelet, remains to be elucidated. This work indicates that plasma concentrations of BDNF in humans are highly regulated following maximal exercise.

KEY WORDS Maximal exercise; Brain Derived Neurotrophic Factor; Serum; Plasma

Endurance exercise increases plasma anandamide levels

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Physical exercise effects on the immune system are controversial. Endocannabinoid anandamide (ANA) serum levels were higher at moderate exercise in humans and animals compared to their sedentary controls. Specific cannabinoid receptors, CB1 and CB2, are located at the central and peripheral organs i.e. immune system. The main scope of this research was to measure serum ANA levels at endurance exercise and to evaluate the immune system response. 24 male rats were categorized randomly into 3 groups labelled as; (a) Control, (b) Exercise and (c) CB1 and CB2 Receptor Antagonist+Exercise groups. All groups except the control group were exercised at 35 m/min for 60 min/day for 5 days per week for 7 weeks after 2 weeks of adaptation. Blood samples were collected immediately after the last bout of exercise. Anandamide serum levels were determined with Affinity Chromatography and HPLC; whereas alterations in immune cells (T cells and subtypes, B cells, NK cells) and T cell activation levels in blood were determined quantitatively by Flow Cytometry. Kruskal-Wallis and Mann-Whitney U tests were conducted to evaluate the hypothesis that endurance type of exercise would increase plasma ANA levels, immune effector cells and their activation. There was a statistically significant difference between the control and exercising groups in terms of ANA and immune effector cells. The ANA serum levels of exercising groups were statistically higher than the control group ($p < .001$). Moreover, results showed higher T lymphocytes but lower B lymphocytes ($p = .004$) and Natural Killer Cells ($p = .002$) in exercising groups compared to control group. There was also a difference in terms of T cell activation between exercising and control groups. It can be concluded that endurance exercise increases ANA and thereby alters immune system response.

Response of athlete's red blood cell, hematocrit and haemoglobin to a short-duration submaximal activity in the morning and evening

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OBJECTIVE Survey the response of athlete's red blood cell, hematocrit and haemoglobin to a short-duration submaximal activity in the morning and evening.

METHODS 13 subjects (age: 23.7±2.3 yr; weight: 69±2.4 kg; height: 176.5±3.2 cm) selected from physical education students at Urmia University. Subjects had did regular physical activity and sport participation (at least 3 yr). Initially, in the morning of 1st day (7:00), after blood sampling (pre-test), subjects performed submaximal Astrand ergometer test –as a short-duration submaximal activity- and blood samples (morning post-test) taken immediately after the test. Then, in the evening of the 2nd day (17:00), the test practiced again by the subjects, and final blood samples (evening post-test) taken. Finally, the blood samples analyzed to determine the values of red blood cell parameters (red blood cell, hematocrit and haemoglobin).

RESULTS Statistical analysis of data detected that submaximal Astrand ergometer test has no significant effect on red blood cell parameters and there is no significant difference between morning and evening results (red blood cell: rest 5.34 ± 0.371 106/ μ l, morning 5.24 ± 0.445 106/ μ l, evening 5.11 ± 0.645 106/ μ l; hematocrit: rest 46.4 ± 1.53 %, morning 45.9 ± 2.11 %, evening 44.7 ± 1.97 %; haemoglobin: rest 15.4 ± 1.57 g/dl, morning 15.1 ± 1.32 g/dl, evening 14.9 ± 1.27 g/dl; $P < 0.05$).

DISCUSSION & CONCLUSION We concluded that 1) submaximal Astrand ergometer test –as a short-duration submaximal activity- can not change values of athlete's red blood cell parameters and, 2) time of day (morning or evening) has no effect on responses of red blood cell parameters to this test.

KEY WORDS blood parameters - submaximal Astrand ergometer test - circadian rhythm - time of day

The effect of altitude on some physiological parameters of sprinters

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OBJECTIVE Altitude training, also known as hypoxic training, involves exercising in, living in or otherwise breathing oxygen reduced air for the purpose of improved athletic performance, pre-acclimatization to altitude and/or physical wellness. The aim of this study was to see the effect of altitude training on sprinters.

METHODS Six elite 400m sprinters from National Track&Field Team participated to this study. Age of subjects was 23.0 ± 1.6 year. The metabolic effect of altitude training was investigated in sprinters. Subjects were tested before and after altitude training as pre-post tests. Ventilation functions (FVC, FEV1FVC and VC) and VO_2 max were tested. Blood parameters (erythrocyte, hemoglobin, hemotocrite, MCH, and MCHC) and some physical characteristics (body weight, resting heart rate, and maximal heart rate) were measured and also the effect of altitude training was investigated on performance. Zagreb protocol was utilized on treadmill for VO_2 max test. Ocean Winspiro spirometer for ventilation functions and Bayer Andrio 2120 analyzer for blood parameters were used. SPSS 16 statistical program was utilized for analyzing the data. Paired sample test was used for within the group difference. Percentiles were used for analyzing of individual differences.

RESULTS There were no differences between pre and post camp tests for VO_2 max, ventilation functions (FVC, FEV1FVC, and VC), blood parameters (erythrocyte, hemoglobin, and hemotocrite) and maximal heart rate. There were significant differences ($p < 0.05$) between pre and post camp tests for body weight, resting heart rate and blood parameters (MCH and MCHC).

DISCUSSION & CONCLUSION It was concluded that there were no effect on VO_2 max and ventilation functions and also there were no significant differences resting heart rate, body weight, and blood parameters (MCH and MCHC) related to 3 week altitude training in sprinters.

KEYWORDS Altitude, VO_2 max, blood parameters, ventilation functions

The effect of induced alkalosis on lactic acid, ammonia and exercise performance in male runner 400 meter

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In order to comprise the effects of metabolic alkalosis on anaerobic performance and some plasma metabolites, 16 young male athletes (age $20/58$, BMI $21/57 \pm$) participated in two 400 m running sessions one hour following bicarbonate or placebo supplementation with counterbalanced order. There were three blood sampling phases (resting condition, 30min after supplementation and 2 min after 400 m running) in both of the sessions and the blood pH, ammonia, lactate and HCO_3^- levels were measured. The results showed the better performance in alkalosis session and blood HCO_3^- levels increased with respect to the resting values, however; it decreased to pre exercise level after running ($P < 0.05$). The HCO_3^- levels also decreased under the resting values after running in placebo session ($P < 0.05$). Significant increases was observed in blood lactate levels in both of the sessions and there was a pH decrease only in placebo session ($P < 0.05$). It can be concluded that alkalosis can be considered as an ergogenic method and can increase blood HCO_3^- content and therefore the training intensity.

An evaluator-independent substitute for anaerobic threshold(AT)

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OBJECTIVE AT is often employed as a measure of exercise tolerance. It, however, is visually determined on the graph and evaluator-dependent. The point where the v-slope (VO_2 vs VCO_2 relation) intersects the line of respiratory exchange ratio (R) of 1 is evaluator-independent. Yet this point may be greatly influenced by tissue CO_2 storage effect(CS) in a non-steady state exercise such as the ramp protocol. We hypothesized that by employing a steady state (SS) exercise protocol and using only SS values R1P will be determined free of CS.

METHODS Eleven healthy subjects, 6 males and 5 females(mean age, 34(SD \pm 6.8) each underwent two symptom-limited maximal exercise, one using 25 watt/min ramp (R-Ex) and the other 3-minute step protocol(S-Ex). The five 3-minute stages were chosen based on R-Ex. The average of the last 1 minute values of VO_2 and VCO_2 at each stage were obtained. CS was mostly over by 2 minute and SS then ensued. These points were plotted as the v-slope. The line crossing the R=1 was mathematically calculated and termed the R1 point (R1P). AT was determined using R-Ex values. The peak VO_2 , AT and R1P were all expressed in ml/min/kg.

RESULTS The peak VO_2 , AT(R-Ex), and R1P(S-Ex) were 34.8, 17.8 and 21.8, respectively. AT was 44.6% and R1P, 21.8% of the peak VO_2 . The HR(b/min) at peak Ex, AT and R1P were 173, 118 and 128, respectively. R1P correlated well with AT ($r=0.88$).

DISCUSSION & CONCLUSION The point where the v-slope intersects the line of respiratory exchange ratio of 1 is entirely determined mathematically, evaluator-independent, and may be substituted for AT.

KEY WORDS anaerobic threshold(AT), R1P(VO_2 at respiratory exchange ratio of 1)

Assessment of heart rate in infants from 6 to 36 months old during aquatic activities

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OBJECTIVE In the last few years the aquatic activities for babies have been growing. The advantages for the baby can not be only established in the relational level, considering that the baby is able to learn and to carry out several aquatic motor skills. The aim of this study was to analyze cardiologic aspects, characterizing the heart rate behaviour in babies from six to thirty-six months old participating in aquatic activities.

METHODS The sample was fourteen babies of both genders, accompanied by their parents. The babies used a heart rate monitor Polar®, model S610i (non invasive method) and a receptor clock was put in the parents' wrist, which was synchronized with the filming during the aquatic activities session. The results are presented in heart rate average and standard deviation for each task defined: immersions, jumps, ventral displacements, dorsal displacements, displacements with support material, autonomous displacements.

RESULTS The results pointed out that the heart rate values were very similar during all the tasks performed by the babies and they were much closed to the value of the heart rate of the beginning of the session.

DISCUSSION & CONCLUSION The obtained results revealed acceptable and sustained standard deviation values to consider this method viable for a heart rate assessment in babies participating in aquatic activities. This method can be useful in several cardiac studies, by observing the heart rate behaviour in a baby and controlling the load that they are submitted to. With this approach, we expect to contribute to the evolution and development of the aquatic activities for babies.

KEY WORDS Heart rate, Aquatic activities, Infants

Effect of circadian rhythm on athlete's ECG (ST segment) response to PWC195 test

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OBJECTIVE Survey on the effect of circadian rhythm on athlete's ECG (ST segment) response to PWC195 test.

METHODS 13 subjects (age: 23.7 ± 2.3 yr; weight: 69 ± 4.2 kg; height: 176.5 ± 2.3 cm) selected from students of physical education. Initially, in the morning (8:00), resting ECGs of the subjects (rest ECG) were recorded. Then, subjects performed PWC195 test and immediately after it. Finally, in the evening of the same day (17:00) subjects performed the test (PWC195) and immediately ECGs (evening ECG) were recorded.

RESULTS In comparison to resting ECGs, the response of the ST segment to PWC195 test in the morning and evening were statistically significant, but there was no significant difference between morning and evening responses (rest: 0.053 ± 0.017 ; morning: 0.023 ± 0.011 ; evening: 0.000 ± 0.004 mv; $P < 0.05$).

DISCUSSION & CONCLUSION We concluded that 1) PWC195 test reduces the voltage of the ST segment but this reduction is not pathologically significant (< 1 mv) and, 2) time of day (morning or evening) has no effect on response of ST segment to it.

KEYWORDS Circadian rhythm – PWC195 – Electrocardiogram – ST Segment

Effect of circadian rhythm on response of some of athlete's serum electrolytes to the submaximal PWC195 test

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OBJECTIVE Time of day affects many physiological characteristics such as aerobic power, and physical practice may influence the serum electrolytes. Accordingly, the purpose of this study was to survey the effect of circadian rhythm on response of some of athlete's serum electrolytes to the submaximal PWC195 test.

METHODS For this purpose, 13 subjects (age: 24.7 ± 2.3 yr; weight: 69 ± 3.7 kg; height: 176.5 ± 2.6 cm) were selected from physical education students at Urmia University. Subjects did regular physical activity and participated to sport (at least 3 yr). Initially, in the morning of 1st day (7:00), after blood sampling (pre-test), subjects performed submaximal PWC195 test - as a short-duration submaximal activity - and blood samples (morning post-test) were taken immediately after the test. Then, in the evening of 2nd day (17:00), the test practised again by the subjects, and final blood samples (evening post-test) were taken. Finally, the blood samples analyzed to determine the concentrations of serum electrolytes (Ca^{++} , K^{+} , Na^{+} and Mg^{++}).

RESULTS Statistical analysis of data revealed that morning and evening submaximal PWC195 tests had no significant effects on serum electrolytes ($P < 0.05$), and there were no significant differences between mean values of morning and evening post-tests ($P < 0.05$).

DISCUSSION & CONCLUSION We concluded that, 1) short-duration submaximal activity did not change concentrations of athlete's serum electrolytes, and 2) time of day (morning or evening) has no effect on responses of serum electrolytes to this type of activity.

KEY WORDS Circadian rhythm, Submaximal Physical Activity, Calcium, Sodium, Potassium

ECG holter monitoring during under-ice dynamic apnea record

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OBJECTIVE Heart rate (HR) reduction, cardiac output lowering and peripheral vasoconstriction are commonly observed in breath-hold diving. These changes are more pronounced in cold and deep waters and in prolonged apneas. The occurrence of extreme bradycardia and arrhythmias is not exceptional. This study reports the ECG changes observed during an under-ice dynamic apnea record.

METHODS An experienced breath-hold diver (male, aged 43) attempted the world record (43 m) of under-ice dynamic apnea. Immersion took place in mid-February into the iced Lake Serrai (Italy). The diver wore a wetsuit with no

flipper. Most of his face but periocular region was uncovered. At 2 m-depth a cable was set to guide the diver to several holes opened into the ice to allow ascent. ECG was recorded continuously by mean of Medilog-AR12 recorder inserted in a water-proof box and HR variability (HRV) analysis was conducted.

RESULTS The diver covered 83.2 m in 1'48'', with no symptoms when resurfaced. During the immersion, a progressive HR reduction occurred, with the upcoming of a junctional escaping rhythm followed by a progressive QRS widening till to a ventricular rhythm and immediate sinus tachycardia at resurfacing (130 bpm). Only one supraventricular ectopy was observed. HRV spectral analysis showed unchanged low-frequency (LF) and marked increase of high-frequency (HF) components with a LF/HF ratio drop.

DISCUSSION & CONCLUSION This report confirms that dynamic apnea in cold, although superficial waters induces ECG changes consisting in progressive HR reduction and occurrence of escaping rhythms. These changes, moreover, are associated to a relative vagal hyperactivity.

KEY WORDS breath-hold; hypoxia; arrhythmias; cold; depth

Effects of bone mineral density on muscle strength gain: Bone myoregulation reflex

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OBJECTIVE A bi-directional interaction between muscle and bone functions may be assumed. However effects of muscle activity on bone structure and function have been investigated till today. Aim of this study was to determine whether bone mineral density (BMD) affected muscle strength gain.

METHODS Twenty three young-adult healthy males were included in this double-blind prospective study. These volunteers were randomized into two groups. In electrical muscle stimulation (EMS) group, EMS of the right wrist flexor muscles was applied for six weeks; in healthy controls, transcutaneous electrical nerve stimulation was applied for six weeks. Before trial, BMD of the right distal radius were measured in all participants.

RESULTS Isokinetic muscle torque measurements was revealed that increase in the wrist extensors strength was 67.2% in EMS group, and was 18.1% in controls ($p=0.001$). Strong correlation between baseline ultradistal radius BMD and muscle strength gain of the wrist extensors were found in EMS group. Regression analysis revealed that ultradistal radius BMD may be an important determinant of the muscle strength gain of the wrist extensors.

DISCUSSION & CONCLUSION Current study suggests that bone can regulate muscle activity, based on its BMD. This result implies that there may exist a mechanism that bone sensing mechanical stimuli can send the signals to central nervous system and neuronally regulate muscle activity (Bone Myoregulation Reflex). It is well known that bone subjected to loading neuronally regulates bone formation. Taken together, bone reflex may also be defined that bone subjected to loading can neuronally regulate bone formation and muscle activity.

KEY WORDS muscle strength, exercise, electrical muscle stimulation, bone mineral density

Does taping affect the upper and lower trapezius electromyographic activity amongst patients with suspected subacromial impingement? A pilot study

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OBJECTIVE One of the most predominant clinical signs in shoulder patients is the loss of muscular control around scapula with trapezius being one of the most commonly affected muscles. Shoulder taping is suggested to improve muscular control; however its effects require further investigation. Thus, the aim of this study was to explore the electromyographic (EMG) activity of the upper and lower trapezius following the application of tape in patients with suspected subacromial impingement.

METHODS 10 subjects (9 females, 1 male, mean age: 33.3 years) with suspected subacromial impingement, and 10 healthy subjects (7 females, 3 males, mean age: 21.3 years) who served as controls, volunteered to participate in this pilot study. Subjects were requested to perform abduction in the scapular plane with and without the application of tape. Furthermore, abduction was performed without a weight and with a 1,5kgs weight on the affected hand. Two taping techniques were utilised, 'relocation of head of humerus' and 'inhibition of upper trapezius muscle'. Bipolar surface electrodes (Ag/AgCl, 4-cm diameter, 25-mm interelectrode distance) were applied over each muscle. Changes in

frequency (F) and root mean square (RMS) of the power spectrum were calculated using the Viking Quest equipment (Nicolet Inc.). Total time of the effort was also analyzed. 5 measurements were provided for each test. Changes within groups were examined by utilising paired t tests for parametric and Wilcoxon signed rank tests for nonparametric data.

RESULTS For the patient group, upper trapezius yielded highly statistically significant results ($p < 0.001$) following the application of the tape in both free abduction and abduction with weight. Lower RMS values were found with the tape (free abduction: 115.3 ± 35.3 , abduction with weight: 177.5 ± 35.3) than without (free abduction: 212.7 ± 30.4 , abduction with weight: 297.3 ± 37.4), indicating a decrease in upper trapezius EMG activity with the taping application. For the lower trapezius, no statistically significant differences were found following the tape in both free ($p = 0.33$) and with weight ($p = 0.1$) abduction. In the control group, no statistically significant differences ($p > 0.05$) were found following the tape in any of the muscles and under any of the testing conditions (abduction \pm weight).

DISCUSSION & CONCLUSION These preliminary findings suggest that taping decreases a potentially overactive upper trapezius muscle in patients with suspected subacromial impingement, however it does not seem to alter lower trapezius muscular activity. Also, taping did not alter upper or lower trapezius EMG activity in our control group. The clinical significance of these findings will be further discussed.

KEY WORDS subacromial impingement, taping, electromyographic evaluation

The computerized analysis of muscle fatigue, using surface electromyography and synthetic indices in athletes

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OBJECTIVE The aim of this study was to evaluate the local muscle fatigue, using surface electromyography (EMGS), a useful simple method, especially because the EMGS unit cannot make a difference between motor units potentials during maximal muscle contraction.

METHODS An experimental, randomized, study was designed with 60 male subjects (average age 24 ± 2.7 years), right-handers, athletes from different sports. The subjects were distributed in two groups: group A ($n = 31$, predominantly aerobes, and group B ($n = 29$), predominantly anaerobes. We have chosen the usage of EMGS correlated with the simultaneous recording of the developed muscle force, by myomechanography (MMG), with the purpose of finding a synthetically relation between the muscle force and the EMGS parameters. In this purpose we have used modern methods of computerized processing of the EMGS recordings, methods which are used frequently only by the high rank researches, and ours new methods (developed in our department, resulting original parameters and indices for better analysis of muscle contraction).

RESULTS From the analysis of obtained results, we selected a number of 46 electrophysiological, mechanographic, cardiovascular parameters and 7 synthetic indices derived from primary parameters, which can be used to develop an algorithm for muscle fatigue investigation.

DISCUSSION & CONCLUSION Comparing various sportive branches, there were significant differences for the majority of parameters and especially for the synthetic indices as exhaustion percent threshold, effort resistance, index mechanical energy - dependence and the parallelism between aerobic and anaerobic athletes. We also showed that muscular fatigue install at higher values of physical effort when the durations of repetitive contraction are shorter (in every cycle of repetitive activity the contraction was 40% and the resting time was 60%).

KEY WORDS athletes, muscle fatigue, surface electromyography

Related factors to climber's success for ascend mount Damavand (5639m)

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OBJECTIVE The aim of this study was to assess factors related to ability of climbers to ascent Mount Damavand (5639m). For this purpose 218 healthy volunteer Iranian climbers (8.3% female) whose aim was to ascent to the summit of Damavand were assessed on the way to the summit at 4200m.

METHODS Questionnaires were obtained and resting arterial oxygen saturation (SPO₂%) were measured between 1 to 2 hours after arriving of participants at 4200m. On return to 4200m trekkers were interviewed regarding their worst acute mountain sickness (AMS) symptoms while above 4200m and their summiting success. AMS was assessed using Lake Louise Scoring System. Climbers who had taken medications for prophylaxis or treatment of AMS were excluded from the study.

RESULTS Successful summiting was significantly correlated to the AMS scores at 4200m before summiting ($r=-0.34$, $p<0.001$), resting SPO₂% at 4200m ($r=0.29$, $p<0.001$), number of nights above 3000m per year ($r=0.19$, $p<0.01$), experience of climbing over 5000m ($r=0.18$, $p<0.01$), pre-exposure as having spent a night above 3000m during the 2 months before the climb to Damavand ($r=0.14$, $p<0.05$). Age, gender, body mass index, smoking, and having spent at an altitude of above 2000m on the night before ascending from 3000 to 4200m had no significant correlation with the summiting.

DISCUSSION & CONCLUSION In conclusion, having a higher resting SPO₂% measured about 1 to 2 hours after arriving at high altitude, having no AMS, good acclimatization before summiting, and a good high altitude climbing experience are the factors which confer advantages to climbers who wish to ascent a 5600m peak.

KEY WORDS Acute Mountain Sickness; High Altitude; Lake Louise Questionnaire; Mountaineering

Related factors to incidence of acute mountain sickness during ascend of mount Damavand

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OBJECTIVE Acute mountain sickness (AMS) is characterized by nonspecific symptoms like headache, loss of appetite or nausea, dizziness, fatigue, insomnia, and peripheral edema that usually occurred within hours after rapid exposure of non-acclimatized individuals to altitudes above 2500m. The aim of this study was to assess factors related to the incidence of AMS among Iranian trekkers during ascent of mount Damavand.

METHODS For this purpose 218 healthy volunteer Iranian trekkers (8.3% female) whose aim was ascent to the summit of Damavand (5639m) were assessed at 4200m. Between 1 to 2 hours after arriving of participants at 4200m, questionnaires were obtained and resting arterial oxygen saturation (SPO₂%) was measured. On return to 4200m trekkers were interviewed, via an investigator blinded to trekker's SPO₂%, regarding their worst AMS symptoms while above 4200m; AMS was assessed using Lake Louise scoring system (self assessment). Trekkers who had taken medications for prophylaxis or treatment of AMS were excluded from the study.

RESULTS The most important finding was the significant correlation between the SPO₂% and the further AMS scores ($r=-0.59$, $p<0.001$). Other significant correlations were found between the AMS scores and average number of nights above 3000m per year ($r=-0.20$, $p<0.01$), experience of climbing over 5000m ($r=-0.20$, $p<0.01$), pre-exposure as having spent a night above 3000m during the 2 months before the climb to Damavand ($r=-0.23$, $p<0.01$), and having spent at an altitude of above 2000m on the night before ascending from 3000 to 4200m ($r=-0.15$, $p<0.05$). Age, gender, body mass index, smoking, and ascent rate from 3000 to 4200m had no significant correlation with the further AMS score.

DISCUSSION & CONCLUSION In conclusion, a higher SPO₂% on arrival at altitude, pre-acclimatization and good experience at high altitude are the factors that could be negatively related to Lake Louise AMS score. The resting SPO₂% measured about 1 to 2 hours after arriving at high altitude is the strongest of the examined related factors to Lake Louise AMS score.

KEY WORDS Acclimatization, Arterial oxygen saturation; High altitude ; Lake Louise Questionnaire

Survey of drug abuse in Japan: Analysis of consultations on the bulletin board of an internet sports website

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OBJECTIVE Drug abuse, most notably anabolic-androgenic steroid (AAS) use, in athletes is widespread. There have been publicly accessible websites managed by drug abusers that provide athletes information about ASS and other

drugs. We surveyed the state of drug abuse in resistance training enthusiasts in Japan by analyzing consultations on a bulletin board of one such website.

METHODS We accessed a Japanese-language website on it that was presumably managed by drug abusers. Specifically, we accessed a bulletin board that drug abusers were using to communicate with each other. We analyzed the contents of all consultations on the bulletin board from 2004 to 2006.

RESULTS Although there were 105 consultations in 2004, the number of consultations increased to 205 in 2005 and to 196 in 2006. In 2006, the method of doping was discussed in 61 consultations, the efficacy of drugs in 40, the side effects of drugs in 53, the selection of drugs in 30, and the cost of drugs in 20. Among those who posted items, 70 individuals were thinking to use drugs, 77 were using drugs at the time, and 49 had previously abused drugs.

DISCUSSION & CONCLUSION Drug abusers exchanged information about doping over the Internet in Japan. They especially wanted knowledge on methods of doping.

KEY WORDS Drug abuse, Androgenic anabolic steroid, Internet

A comparison study of university students' knowledge levels about doping who are interested in individual and group sport

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OBJECTIVE This study was planned to compare university students' knowledge levels about doping who are interested in individual and group sport. The study was carried out at Karamanoğlu Mehmet Bey University during fall term in 2008-2009 education-training year. 103 university students voluntarily participated and all were actively engaged in sport.

METHODS Data obtained by survey method. Socio-demographic features and a knowledge about doping were asked.

RESULTS %35.9 of the students were girls and %64.1 were boys. Students age average was 22.42 ± 1.74 . It has been found that %18.4 of the students has done sport for 1-3 years, %36.9 of them for 4-7 years, %27.2 of them for 7-11 years and %17.5 of them for 12-15 years. It was found that the dispersion of students' branches are %62.1 of team sport and %37.9 of individual sport. They have indicated that students tend to do sport %65 with their own will, %14.6 intervention of family and friends, %8.7 media and %11.7 physical education teacher and trainer.

DISCUSSION & CONCLUSION It has been found that the knowledge levels about doping of sportmen, who are interested in individual sports, is different from the knowledge level of sportmen who are interested in team sport and it is statistically meaningful ($p < 0.05$).

KEY WORDS Individual sports, Team sports, doping awareness level.

The effect of dark chocolate supplementation on c-reactive protein, immunoglobulins, leucocytes and platelets in response to submaximal exercise in male swimmers.

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OBJECTIVES The objective of the study was to estimate the changes in C-reactive protein, immunoglobulins, leucocytes and platelets in male swimmers subjected to submaximal exercise after dark chocolate supplementation.

METHODS Highly trained competitive swimmers ($n=11$) aged 18-21 years were recruited from athletic club Academic, Sofia, Bulgaria. The swimmers participated in randomized experimental protocol including a washout period with no chocolate intake and a supplementation period with daily ingestion of 50 grams dark chocolate, of 10 days length each. Two submaximal tests on bicycle ergometer of 15 min each (10 min at 60% $\dot{V}O_{2max}$ and 5 min at 90% $\dot{V}O_{2max}$) were conducted to induce oxidative stress. Blood samples were obtained for baseline measurements and at the end of each period after performing the submaximal testing.

RESULTS Significant increase was found after the pre-supplementation submaximal test carried out at the end of washout period in leukocytes and lymphocytes by 24.6%, monocytes by 16.7%, neutrophils by 27.5% and platelets by

15.8%. C-reactive protein was elevated 2.3 times up to 3.44 mg/L. The submaximal testing performed after the chocolate supplementation period did not precipitate an increased response in these parameters and they were found to return to their baseline values. No changes were recorded in the IgA and IgM immunoglobulins.

DISCUSSION & CONCLUSION In conclusion short-term dark chocolate supplementation may have an attenuating effect on the immune system by favourably improving C-reactive protein, leucocytes, neutrophils and platelets responses to oxidative stress induced by submaximal exercise.

KEY WORDS c-reactive protein, leucocytes, lymphocytes, neutrophils, platelets, submaximal exercise, oxidative stress, swimmers

Employees lifestyle contrastive analyse with focus of (Sport and Preventing of Drug Habitation) on 2008 Year.

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OBJECTIVE The aim of this study was to consider lifestyle and compare this between athletics employees and non athletics employees on 2008 year.

METHODS 60 subjects from the employees were cross-sectional randomized.

RESULTS The result of this study entirely shows that 48.8% of their lifestyle is undesirable. Undesirable lifestyle of athletic and non athletics employees in arrangement is 68.5 and 31.5 percentage. If their parents have high educational degree, their lifestyle is more undesirable. Between genus and nourishment was seen significant relationship but in Tarigat's studying it wasn't seen. There were significant relationship between activity and preventing of drug habitation and also, between preventing of drug habitation, age average, parents' education, financially and different kind of sports. Between lifestyle's variables such as nourishment and preventing of drug habitation, activity and preventing of drug habitation were seen significant relationship. Whatever, if nourishment and activity develops more preventing of drug habitation is more desirable, and vice versa.

DISCUSSION & CONCLUSION We can also see significant relation between lifestyle of athletics and non athletics employees, that exactly is like the studying in Michigan State but in the research of Mohammadzade, it wasn't seen. Therefore, significant changes were seen in educationally of their parents. The researches of the Taft and Who universities show such a relationship in component of lifestyle. So, for helping people, to change their lifestyle and preventing of drug habitation and approach desirable, we should encourage them to exercise, eat healthy food and pass over the stress, avoid smoking and drug, alcohol and dangerous things.

KEY WORDS nourishment, physical activity, lifestyle, stress, drug habitation

Increasing capacity for performance in junior rowers by taking nutritional supplements

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OBJECTIVE In a world of sport in which the administering of nutrient supplements has become a basic component for seniors' rowers training, we considered it is important to experiment in this work the effects, the limits and the advantages of using some nutrient supplements, administered to a group of young rowers, which could become the performers of tomorrow. The nutrient supplements can improve the sportive performance by modifying the corporal composition and the capacity to effort of junior rowers.

Methods The present research was developed on a number of 50 subjects, girls (25) and boys (25), who were practicing rowing; they were administered nutrient supplements between the two medical visits.

RESULTS During the experiment's developing period we performed tests for observing the active body mass, the adipose tissue and the VO_{2max} .

DISCUSSION & CONCLUSION In what concerns the active body mass we observe that along the administering of nutrient supplements, corroborated with a specific training brought about increases from 70% initially to 86% in the final testing, fact that proves the efficiency of the program. With a rigorous training and a controlled administering of nutrient supplements, the level of the adipose tissue decreased from 23% to 12%. In what concerns the aerobic capacity to effort, the degree of the oxygen use increased from the average value of 72.22% in the initial testing to 73.16% in the

final one. The essential amino acids with the ramification chain are of a special importance in preserving the muscular mass of the athletes who train hard, and also for the fact that they could be catabolised into muscles, thus protecting the muscular tissues from degrading when submitted to special effort.

KEY WORDS nutrient supplements, junior rowers

The effect of voluntary fluid intake of a carbohydrate-electrolyte solution or flavored water on fluid balance and soccer skill performance of preadolescent boys

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OBJECTIVE The purpose of the study was to examine the effect of voluntary fluid intake (FI) of a carbohydrate-electrolyte solution (CHO-E) or flavored water (FW) on fluid balance and soccer skill performance (SSP) of preadolescent boys exercised for 60 min in warm (29 °C) and dry (humidity: 37%) conditions.

METHODS Sixteen boys (Tanner stage 2) aged 10-11 years performed two 60-min soccer training sessions while drinking voluntarily every 15 min either a CHO-E or FW in a random order. After completion of training the boys were tested in 5 SSP tests (Malina et al., Journal of Sports Science, 23: 515-522, 2005).

RESULTS FI was higher in CHO-E compared to FW (CHO-E: 665 ± 47 ml vs. FW: 481 ± 55 ml; mean ± SE; $p < 0.05$). However, 10 min after SSP tests percentage body weight loss (%BWL) was not different between trials (CHO-E: $-0.06 \pm 0.2\%$ vs. FW: $-0.2 \pm 0.2\%$) neither was %BWL corrected for FI (CHO-E: $-2.0 \pm 0.1\%$ vs. FW: $-1.7 \pm 0.1\%$). Body mass was not significantly reduced after exercise in both conditions. No difference was observed in heart rate (CHO-E: 163 ± 3 beats.min⁻¹ vs. FW: 160 ± 2 beats.min⁻¹), rate of perceived exertion and subjective feeling of thirst or abdominal discomfort between trials. With the exception of shooting (CHO-E: 8.9 ± 0.7 points vs. FW: 6.9 ± 0.7 points; $p < 0.05$) no difference was recorded in SSP tests between trials. Also, SSP after training in both conditions was not reduced compared to the SSP obtained after boys had undergone only a warm-up.

DISCUSSION & CONCLUSION For the recorded time period, ad libitum fluid intake of CHO-E or FW proved equally effective in maintaining SSP and fluid balance in boys exercised for 60 min at 29 °C.

KEY WORDS Sports drink, soccer skill performance, preadolescence

Clinical efficacy of a hyperproteic low-carb diet in obese patients with medical co-morbidities

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OBJECTIVE Classic obesity management has usually low efficacy, especially in long standing cases with serious obesity co-morbidities. Recently it has been showed that hyperproteic (HP) low-carb diet has confirmed efficacy for short term weight loss. Safety and long term effectiveness remain to be proved. Therefore, the aim of this study was to access the efficacy and adverse effects of a 4 month hyperproteic (HP) low-carb diet approach in obese patients with clinical obesity co-morbidities.

METHODS The subjects were 32 obese patients (16 males vs 16 females, 52.8 ± 7.1 vs 53.7 ± 10.7 years, 108.4 ± 18.0 kg vs 94.9 ± 12.6 kg) with diabetes, sleep apnea syndrome or hypertension. They were engaged in a 4 month intervention program, consisting of weekly group sessions and a nutritional schedule. All patients received polivitamin and mineral supplements, and had to drink at least a litter of a potassium and oligo-element enriched beverage, divided in 5 to 7 meals. Patients on insulin, thyroid treatment or with renal or hepatic failure were excluded. Seven patients left the study: 1 because of pregnancy and 6 for no adhesion. The 4 months were divided as follows: 1st month 1000 (± 100) kcal daily: CH 30 ± 5 g, protein 100 ± 15 g and fat 35 ± 5 g and began a light walking program, 30 to 45 min; 2nd month: lunch became a 150 to 200g lean meat or fish meal, with legumes, and in the 3rd month the same with dinner. Patients should be slow walking 45 to 60 min now; 4th month breakfast, lunch and dinner were normal food, but limiting CH to 50g. Midmorning and afternoon snacks were still protein bars. Laboratory evaluation was performed monthly, whereas weight, fat mass (bioelectric impedance Tanita BC-418 Segmental Analyzer), glycaemia, blood arterial pressure and K⁺ were assessed weekly.

RESULTS Significant weight and waist loss have been obtained in both genders ($p < 0.05$). No hunger or significant clinical adverse effects were reported. The only significant ($p < 0.05$) laboratory changes (mg/100ml) were: iron, ferritin,

glycaemia, total cholesterol, HDL, LDL, triglycerides and insulin.

DISCUSSION & CONCLUSION Results suggested that a HP low-carb diet is effective and safe for significant weight and waist loss. This dietary approach, in short term, promotes improvement of cardiovascular risk. Long term follow-up is being carried out, including variables driven by economical and behavioural factors.

KEY WORDS Obesity, diet, nutrition

The effect of intensive short-term exercises on protein catabolism in fasting and unfasting conditions among the elite wrestlers

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OBJECTIVE Metabolic responses to the physical activities in subjects with normal diet are identified to a great extent, but, in few researches, the athletes' functions are studied in fasting conditions of the holy month of Ramadan. The objective of the present paper is to study the effect of one session of intense short-term exercise (with a maximum heart rate of 85% to 95%) on protein catabolism (urea, uric acid, and keratin in blood and urine) in fasting and unfasting conditions among the elite wrestlers.

METHODS 16 elite wrestlers with a weight range of 60-84 kg from Khorassan Razavi province participated in this research voluntarily. Before exercising, blood and urine samples were taken from the subjects. The specialized exercise program included three periods of five minutes each during which the wrestlers changed their techniques rapidly. Immediately after exercising, the blood and urine samples were taken from the subjects. F Test was used to analyze the data and to examine the changes of urea, uric acid and keratin in subjects' blood and urine in Alfa level of 5%.

RESULTS The data analysis indicted that there was a significant difference between the rates of uric acid and keratin in the subjects blood in fasting and unfasting conditions. Additionally, there is no significant difference in rates of blood urea, urine urea, uric acid and keratin in subjects urine in fasting and non-fasting conditions.

DISCUSSION & CONCLUSION According to the results obtained from the research, there was no significant difference in protein catabolism between fasting and unfasting conditions. So, we can claim that in spite of exercising in short period of time with a maximum rate heart rate of 85-95%, the subjects probably will not face with insufficiency of carbohydrate resources; therefore, the share of protein catabolism in providing energy is insignificant and there is no worry in this regard.

KEY WORDS Intense short-term exercise, protein catabolism, fasting and unfasting conditions.

The influence of aerobic exercise and caloric restricted diet association at young patients with metabolic syndrome

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OBJECTIVE Metabolic syndrome is characterized by the presence of obesity, hypertension, insulin resistance, glucose intolerance and dyslipidemia. Lack of physical exercise and excess caloric intake leads to an imbalance between free fatty acid uptake, lipid storage, and fatty acid oxidation. This results in a progressive intramuscular accumulation of both lipids and fatty acid metabolites, which could cause abnormal insulin signaling, leading to skeletal muscle insulin resistance. This excess lipid deposits are prone to enhanced lipid peroxidation, which could also lead to the development and/or progression of skeletal muscle insulin resistance by increasing tumor necrosis factor - and/or by inducing mitochondrial damage. The aim of this study was to evaluate the effect of caloric restricted diet and aerobic exercise on blood pressure, heart rate, LDL-cholesterol, and waist circumference at young subjects with metabolic syndrome versus caloric restricted diet only.

METHODS An experimental, randomized, study was designed with twenty male subjects (average age 24±2.7 years) with metabolic syndrome. The subjects were distributed in two groups: group A (n=20) who has undertaken during 3 months a program of individualized physical exercises, 3-5 sessions/week, 40 minutes of aerobic training, at moderate intensity (70-75% from the maximum heart rate); group B (n=15) has not undertaken any physical exercise program during 3 months. The subjects in both groups were undertaken a moderate caloric restricted diet, low fat (15% of total calories), moderate protein (20% of calories), unrefined carbohydrates (65% of calories) and fiber (more than 40 grams).

RESULTS After 3 months, we noticed following results at group A: Systolic Blood Pressure (SBP) decreased with

9.2±3.5 mmHg; Diastolic Blood Pressure (DBP) decreased with 5.1±2.5 mmHg; mean blood pressure (MBP) decreased with 5.1±3.2 mmHg; heart rate (HR) decreased with 9.3±2.1 beats/min; total cholesterol (TC) diminished with 55.5±5.6 mg/dl; LDL cholesterol decreased with 42.1±3.9 mg/dl; waist circumference (WaC) decreased with 5.8±1.5 cm. At group B: SBP decreased with 3.5±1.5 mmHg; DBP decreased with 2.1±1.9 mmHg; MBP decreased with 3.9±3.8 mmHg; HR decreased with 5.1±1.8 beats/min; TC diminished with 21.2±5.7 mg/dl; LDL cholesterol decreased with 11.5±3.5 mg/dl; WaC decreased with 3.5±1.5 cm.

DISCUSSION & CONCLUSION Our results show that, in the treatment of the metabolic syndrome, using of association between moderate caloric restricted diet and aerobic exercise has better results comparative with the caloric restricted diet only. The aerobic exercise played a major role in the reductions in serum LDL cholesterol, abdominal adiposity and blood pressure. Our results suggest that the aerobic exercise is a central key for management of metabolic syndrome and the prevention of cardiovascular diseases.

KEYWORDS diet, aerobic exercise, metabolic syndrome

Herbal-derived supplements and risks for athletes health

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OBJECTIVE Herbs are generally believed to be 'natural', and hence safe. There is much interest in "alternative natural approaches" in sport. It is appealing for athletes to use 'natural' substances with similar activity to 'pharmacological' ones in term of increasing performances. Indeed, many herbal dietary supplements marketed on internet are presented as legal alternative to illicit drugs.

METHODS The aim of the present study was to investigate the use and the potential side effects of herbs-derived supplements containing ecdysteroids and phytoestrogens among non professional athletes. Among the 1000 subjects recruited, 317 declared the use of supplements of "natural" origin. All participants were requested to fill an anonymous questionnaire containing questions regarding the use of supplements, drugs, illicit substances, other substances aimed to raise sport performances, the modality of prescription and the source mainly used for obtaining information on the assumed compounds. Only 7 athletes accepted to undergo the venipuncture in order to perform the laboratory evaluation. Testosterone, DHEA, Oestradiol, Progesterone, LH, FSH, TSH, FT3, FT4 and Cortisol were evaluated immunometrically (Axym Abbott Diagnostics Laboratories, Abbott Park, Illinois, USA), aspartate aminotransferase, alanine aminotransferase, lactate dehydrogenase, gamma glutamyl transpeptidase, total and partial bilirubin were measured spectrophotometrically (Integra 800, Roche).

RESULTS The use of herbs-derived supplements was declared by less than 40% of the recruited athletes with only a few subjects knowing or using ecdysteroids and phytoestrogens containing products. All of the 7 athletes who accepted to undergo venipuncture used a product containing Guggulsteron and Naringin. Four of them (1 female and 4 males) showed remarkably elevated oestradiol levels (1220 to 1605 pg/ml, reference range 40-500 pg/ml depending on the ovarian phase). The remaining tests were within the reference ranges indicating that no organ-specific toxicity was present.

DISCUSSION & CONCLUSION The use and the knowledge of herbs derived supplements containing ecdysteroids and phytoestrogens is still limited in Italy. The use of herbs-derived products with the aim of improving performances is considered as potentially illicit by athletes. The use of the product containing Guggulsteron and Naringin was associated with remarkably incremented oestradiol levels. This result gains even more strength when considering that this observation was performed on male subjects. No signs of acute organ-specific toxicity were observed. Longitudinal follow up is needed in order to exclude the possibility of long term side effects. This preliminary observation strongly suggests to extend the study in order to identify the effects of those kind of herbs-derived compounds.

KEY WORDS Herbal supplements, Athletes, Hormones, Risk Factor

Development of novel antioxidant-rich beverages for athletes from aqueous extracts of Mediterranean plants: Preliminary results pertaining to bioavailability, biosafety and bioactivity

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OBJECTIVE Performance of most forms of sport requires enhanced oxygenation of muscle cells, that typically generates extra reactive oxygen species in the body. One way to alleviate this problem is via inclusion of antioxidants in the athlete's diet. On the other hand, several Mediterranean plants possess a great potential for inclusion as nutritional supplements in beverages designed thereto, owing to their intrinsic richness in antioxidants. This research effort assessed the bioavailability, biosafety and bioactivity of water infusions of savory (*Satureja montana*) and raspberry (*Rubus idaeus*), in terms of antioxidant power.

METHODS In vitro studies were performed that simulate the human digestive process, using simulated gastrointestinal tract and experimental mice.

RESULTS A few antioxidant compounds were found not to be affected by the (simulated) digestive process, whereas other lose activity throughout it – and a few actually see their antioxidant capacity hampered under stomach-like conditions. Rutin (an important flavonoid present in many plant extracts) could be transported across the Caco-2 cell barrier, which simulates intestinal absorption: by 60 min, and using an initial 400 mM solution, 1% was found in cells and 0.1% already crossed the cell monolayer. Replacement of water by plant aqueous infusions in the diet of experimental mice did not affect their body weight and food consumption, up to 14 days. After sub-acute exposure, profiles of lipids and proteins, as well as damage of DNA were assessed as cell oxidation biomarkers, plus the levels of glutathione in liver cells (in both reduced and oxidized forms) and the activity of enzymes involved in its metabolism – glutathione reductase, glutathione S-transferase and glutathione peroxidase, besides the activity of catalase and superoxide dismutase (SOD). Ingestion of both infusions protected significantly against lipid oxidation. However, damage of DNA molecules was prevented only by raspberry, whereas protein oxidation levels were not significantly different from the control (water) for both plant extracts. The levels of liver glutathione were not significantly different, except in the case of savory – which underwent a significant decrease in reduced glutathione, but without major changes in activity of the enzymes involved in metabolism thereof. Concerning catalase and SOD – which are essential in antioxidant defence, their activity was significantly decreased by savory, and exhibited a decreasing trend in the case of raspberry extracts. Finally, the Ames test pointed at some degree of mutagenicity of raspberry – despite its being the most active extract against B(a)P, a dietary carcinogen.

DISCUSSION & CONCLUSION Our study has clearly unfolded the presence and activity of a number of antioxidant compounds in aqueous infusions of savory and raspberry, that can reach the end of the gastrointestinal tract, can be absorbed in the intestine and are able to alter the oxidative status in the liver; however, care must be exercised in terms of maximum dose ingested of those infusions.

KEY WORDS antioxidants, enriched beverages for athletes, natural plants, in vivo preliminary tests, bioavailability, biosafety, bioactivity

Effects of ribose supplementation on interval sprint performance

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OBJECTIVE We hypothesized that ribose supplementation may decrease blood concentrations of fatiguing substances like inorganic phosphate, ammonia, pH and lactate by increasing ATP regeneration and decreasing the rate of glycolysis. Thus, we aimed to study the effects of ribose supplementation on interval sprint performance and the fatiguing substance concentrations.

METHODS Study cohort (n=15) was consisted in physically active, young (age range: 20 to 30 years) male volunteers. With a double-blind cross over study design, each participant completed two exercise sessions with one week apart, by supplementing maltodextrine or ribose (150 mgs/kg) before exercise tests in a manner that each of them fed once with maltodextrine and once with ribose. Exercise tests were conducted on an elliptical runner (Precor EFx 576i, Precor Inc., Woodinville, WA, USA) against 1.0 watt/kg electromagnetic resistance. Two repetitions of 30 seconds maximal performances with 4 minutes interval were completed. Blood lactate (Biosen C-Line, EKF, GmbH, Barleben, Germany) inorganic phosphate, ammonia (Shimadzu UV 1700S, Shimadzu Co.Ltd., Kyoto, Japan) and pH (Sartorius PB11, Sartorius Co., Edgewood, NY, USA) were analyzed from blood samples taken at rest and five minutes after the second sprint repetition. Shapiro Wilk, Levene and t-tests were used to analyze results. Level of significance was accepted as p<0.05.

RESULTS Biochemical parameters did not affected by maltodextrine or ribose supplementation. However, when participants supplemented with ribose, mean power out-put of two succeeding sprints were higher (p<0.05).

DISCUSSION & CONCLUSION Ribose supplementation may increase repeated anaerobic performance, but biochemical parameters did not support this performance improvement. Further studies should be done with larger study cohorts.

KEY WORDS ribose, anaerobic performance, inorganic phosphate, ammonia, pH, lactate

Use of drugs and dietary supplements in croatian athletes selected for doping control in 2008.

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OBJECTIVE The objective of the present study was to describe the prevalence of drugs and dietary supplements use in athletes participated in the doping control during 2008. in Croatia.

METHODS One issue considering the doping control and used of substances in the days that preceded the doping control was statistically analyzed. The authors analyzed data collected from 239 athletes of 19 sports. There was 201 male and 28 female athletes.

RESULTS According to the questionnaire conducted in the doping control, about 70% athletes used some substances to ten days before the doping control. The substances were classified into dietary supplements (68,6%), non-steroidal anti inflammatory (NSAI) (20.5%), antialergics, antibiotics, and other medicines. More than 10% female athletes used contraceptives. Moreover, 68,6% of athletes reported the use of dietetic supplements, being this group divided into vitamins (36.8%), minerals (30.9%), amino acids (23.8%) and other substances.

DISCUSSION & CONCLUSION We concluded that there was an overuse of antiinflammatory and analgesic medication in many sports, which raises a concern in terms of control of symptoms. Besides that, there was an widen use of dietary supplements. This fact may cause an eventual adverse analytical finding in the doping control.

KEYWORDS Croatian athletes; Use of drugs; Dietary supplements; Doping control

The effects of short-term dehydroepiandrosterone supplementation on body composition in young athletes

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OBJECTIVE Dehydroepiandrosterone (DHEA) is a weak steroid and precursor to testosterone, produced by the adrenal gland. It can be also found in some plants or chemically synthesized and was one of the first prohormones to enter the dietary supplement market after the 1994 US Dietary Supplement Health and Education Act, which had a significant impact on the sports supplement industry. Although DHEA is considered to be an anabolic steroid, and is banned by many sports governing bodies, including the International Olympic Committee (IOC), DHEA is a legal substance available from many retail outlets, including health food stores and supermarkets. The overall prevalence of DHEA use is not known, although several reports indicated that DHEA is one of the most popular dietary supplements especially in adolescent athletes (7).

METHODS Twenty young (19 to 22 years) male soccer players were allocated to two randomly assigned trials in double-blind design - ingesting 100-mg daily oral DHEA or placebo (PLA) for 28 days.

RESULTS There was no baseline differences in age, height, body mass, maximal oxygen uptake or body fat between groups (Table 1). Body mass was not affected by 4 weeks of DHEA supplementation ($P > 0.05$) (Table 2). No significant changes in BMI, WHR, body fat or total muscle mass for the two groups were detected at the end of the trial. There was no within- or between-group difference in AFI and cAMA. Treatment with DHEA resulted in significant increase of total testosterone, estradiol and DHEA-S levels in treated athletes versus the placebo group ($P < 0.05$) (Table 3). The increase in total testosterone, estradiol and DHEA-S over time was significant in the DHEA group only ($P < 0.05$). Serum free testosterone values were not significantly changed during DHEA and PLA administration. No athletes reported any vexatious side-effects of supplementation.

DISCUSSION & CONCLUSION Results of this study suggest no beneficial effect of DHEA supplementation on body composition in young competitive athletes. Treatment with a 100 mg oral daily dose of DHEA for 28 days had no significant effect on body mass, body fat and muscle mass in soccer players, while the levels of androgens and estradiol significantly increased after supplementation in DHEA as compared to placebo. DHEA and DHEA-S are the most abundant adrenal steroid hormones in men with physiological roles yet to be determined. DHEA has been proposed as a treatment for a wide variety of conditions including obesity, aging, cardiovascular and autoimmune disease, cancer and depression (25, 30). In the field of sports and exercise nutrition, DHEA is promoted as muscle-building and fat-burning agent which could increase immune function and enhance recovery after exercise (13). However, clear evidence supporting the use of DHEA in athletic environment remains less clear. It is well known that age-related decreases in DHEA are associated with increases in obesity and a decline in lean body mass (15) yet the potential usefulness of DHEA as a slimming agent is mostly indicated by previous research in animals, particularly lower mammals.

KEY WORDS Testosterone, Body Fat, Muscle Mass, Estradiol

Relation against passive recovery and active in the 48 hours after a 4-km race

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OBJECTIVE Coaching and athletes do not clearly understand what type and duration of recovery works best after a hard run to restore the body to peak racing condition. This study compared 48 hr of active recovery after a 4-km running performance with 48 hr of passive recovery.

METHODS A sample of 4-km runners of above-average ability completed 3 trials within 6 days. Each 4-km trial was followed by 48 hr of passive recovery (PAS) or 48 hr of active recovery (ACT), a counterbalanced protocol. The 2 initial 4-km trials constituted separate PAS and ACT baselines.

RESULTS Mean finishing times did not differ significantly between ACT (17.25 ± 1.5 min) and baseline (17.11 ± 1.7 min); nor was there significant difference between PAS (17.10 ± 1.5 min) and baseline (16.34 ± 1.6 min). Average heart rate for PAS (175.9 ± 6.3 beat/min) was significantly higher than baseline (168.4 ± 6.5 beat/min), but ACT average heart rate (175.9 ± 6.6 beat/min) was significantly lower than baseline (168.9 ± 6.4 beat/min). For PAS, perceived rate of exertion at ending (17.25 ± 0.6) was significantly greater than baseline (17.11 ± 0.9), yet for ACT, perceived rate of exertion at ending (17.10 ± 0.8) did not differ significantly from baseline (16.34 ± 0.7). During PAS trials, 3 individuals ran a mean 12.0 ± 2.8 seconds slower, 2 individuals ran a mean 33.0 ± 21.0 seconds faster, and 5 individuals ran within 5.1 ± 2.5 seconds of their first run.

DISCUSSION & CONCLUSION During the ACT trials, 1 participant ran 13.0 seconds slower, 3 participants ran a mean of 34.7 ± 13.5 seconds faster, and 8 nonresponders ran within 5.5 ± 2.7 seconds of baseline. Results indicate that 48 hr of passive and active recovery result in similar mean 4-km performance.

The reliability and the objectivity of ankle volume measurement with the volumetric and the figure of eight method.

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OBJECTIVE The evaluation of ankle edema is useful after trauma. The measurement of ankle volume with the volumetric and with the figure of eight method can be used for indirect ankle measurement. The aim of this study was to find the reliability and the objectivity of volumetric measurement of the ankle with volumetric method or with the figure of eight method.

METHODS Forty-two healthy athletes, 32 men and 10 women, 18 to 29 years old, participated in this study. The measurement of the ankle volume with the volumetric method was performed using a tank and with the figure of eight method was performed using with a tape measure, two times by two different testers.

RESULTS We found high reliability between the first and the second water volume measurement with the volumetric method ($r = 0.99$) and with the figure of eight method ($r = 0.98$). Also there was high objectivity between the two testers measurements with the volumetric method ($r = 0.99$) and with the figure of eight method ($r = 0.97$) for all the measurements.

DISCUSSION & CONCLUSION Both methods are reliable and objective for the measurement of ankle volume. The figure of eight method is easier to be used.

KEY WORDS Ankle volume, volumetric method, figure of eight method

Effect of vibration training on body composition and flexibility in healthy and sedentary women

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OBJECTIVE The objective of this study is to investigate effects of 8 weeks whole body vibration training on body

composition and flexibility.

METHODS This study involved 60 voluntary participants. The whole body vibration group included 30 women with mean age of 36.83 ± 03.38 , mean height of 164.33 ± 11.23 cm and mean weight of 67.28 ± 05.21 . They performed unloaded static and dynamic exercise on vibration platform (35-40 Hz, 2.5-4.0 mm., Power Plate) 3 times a week for 8 weeks accompanied by a trainer. The control group (n=30) was selected randomly and didn't participate in any training. The tests were done on both groups before and after 8 weeks. Body composition was determined (BIA - InsBody 230 Model). Standard anthropometric methods were used for measurements. Data were gathered from the right side of the body based on Anthropometric Standardization Reference Manual procedures. Posterior body flexibility was determined by sit-and-reach test.

RESULTS After 8 weeks, no significant change occurred in waist/hip ratio ($p > 0.05$). Significant differences were observed in muscle weight ($p = 0.001$), fat mass ($p = 0.001$), total body water ($p < 0.001$), fat free mass ($p < 0.001$), body fat ratio ($p < 0.001$), basal metabolic rate ($p < 0.001$), and flexibility ($p < 0.001$). No significant changes were found for all the outcome measures of the control group.

DISCUSSION & CONCLUSION Regular exercise causes changes in body composition; while there is reduction in fat mass, there is increase in fat free mass. This study showed that, whole body vibration exercise performed 3 times a week during 8 weeks causes changes on body composition and flexibility.

KEY WORDS body composition, vibration training, flexibility, women, exercise

Relationship of handgrip strength with anthropometric and body composition variables in young gymnasts

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OBJECTIVE Handgrip strength is an important test to evaluate physical fitness and nutritional status. The purpose of this study was to examine the relationship of handgrip strength with basic anthropometric variables in young gymnast population.

METHODS The study included 93 children aged 5-10 years from Catanzaro (Italy). Descriptive statistics, chi(2) tests, analysis of variance, Student's T test, Pearson Correlation and logistic regression analysis were performed. Continuous variables are presented as mean \pm standard deviation. A P value < 0.05 was considered statistically significant. SPSS for Window was used. Height, body mass, body mass index (BMI kg/m²) was calculated. Biceps and triceps skinfolds, arm relaxed, arm flexed, forearm and wrist girths, acromiale-radiale, radiale-styilion-radiale and midstyilion-dactyilion length and humerus breadth were measured. Bioelectrical impedance analysis was performed. Maximal handgrip (HG) strength of the right hand was measured with the hand dynamometer.

RESULTS Handgrip strength increases with age. The correlation between HG (the dominant arm) and the variables anthropometric and bioimpedenziometric examined was significant with sex ($r = 0.391$; $P = 0.000$), body weight ($r = 0.412$; $P = 0.000$), body surface area ($r = 0.774$; $P = 0.000$), BMI ($r = 0.447$; $P = 0.000$); circumference muscle arm ($r = 0.519$; $P = 0.000$), fat free mass ($r = 0.447$; $P = 0.000$) and reactance ($r = 0.390$; $P = 0.000$). Stepwise multiple regression analysis indicated that the most important predictive value from the basic anthropometric variables was Fat free mass ($r = 0.204$; $P = 0.000$).

DISCUSSION & CONCLUSION Sex, body weight, body surface area, BMI, circumference muscle arm and reactance, were associated with hand strength. Fat free mass was an additional independent predictor of hand static force. It was concluded that in young gymnast, fat free mass contribute more to the prediction of handgrip strength than others anthropometric parameters.

KEY WORDS handgrip strength, body composition

Relationship of body mass index with blood pressure in young gymnasts

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OBJECTIVE The study aims are investigating the effect of body fat and fat localization on both systolic and diastolic hypertension in a group of young gymnasts.

METHODS The study included 93 children (21 M, 72 F) aged 5-10 (8.44 ± 2.68) years old, from Catanzaro (Italy). Descriptive statistics, chi(2) tests, analysis of variance, Student's T test, Pearson Correlation and logistic regression

analysis were performed. Continuous variables are presented as mean±standard deviation. A P value < 0.05 was considered statistically significant. SPSS for Window was used. Anthropometric measures, systolic and diastolic blood pressure were measured. We also collected the information about other confounding social variables (family history of obesity and mother's education) and behavioural variables (preferred diet and physical activity). Bioelectrical impedance analysis was performed.

RESULTS There was significant relation between BMI and systolic ($P < 0.000$) and diastolic ($P < 0.000$) blood pressure. Applying the multiple linear regression analysis to fix the confounding effect of age, sex, social and behavioural factors, anthropometric variables; the fatness index, BMI, was significantly related to systolic ($P < 0.012$) and diastolic ($P < 0.022$); while waist-to-hip circumference ratio (WHR) was not significant ($P = 0.778$ in systolic and $P = 0.675$ in diastolic blood pressure respectively).

DISCUSSION & CONCLUSION Systolic and diastolic blood pressure showed a positive relationship with the fatness index BMI, but not with WHR, in both boys and girls. This is an evidence that WHR may not be a reliable indicator of body fat distribution in children.

KEY WORDS Body mass index Blood pressure

Study concerning the connection between the body composition and aerobic capacity of judo athletes

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OBJECTIVE The purpose of this study was to establish the connection between the body composition and aerobic performance in junior judo athletes.

METHODS For our study we used a transverse correlational design on a group of judo players selected within the Sports Club of Pitesti (CSM Pitesti). This group was represented by six girls and six boys (the average age was of 13, 6 years). In order to establish the body composition we used the bioelectrical impedance method, determining body fat mass (FM, kg) and the percentage of adipose tissue (AT, %), as well as body mass index (BMI). Maximal Oxygen Consumption (VO_2 max) was measured through the Astrand method (6 minutes of pedaling on a static bike with a charge of 110-125 W).

RESULTS The BMI values registered in girls were higher than those of the boys (with the average of 24, 7 respectively 22, 6) for similar weight categories. The same tendency was noticed also regarding the body fat mass, being lower on boys than on girls, on a significant threshold ($p < 0, 01$). Also, our findings showed a reverse relation between VO_2 max and body fat mass both in girls and boys.

DISCUSSION & CONCLUSION At juniors, the dynamic of the evolution of the adipose tissue is much more obvious in girls than in boys. Maintaining an optimal body weight and body composition are significant factors for determining the sports performance of judo athletes. A proper aerobic capacity helps to recover the energetic reserves that the body needs between matches.

KEY WORDS body composition, aerobic capacity, judo, athletes

The validity of anthropometric and bioelectrical impedance analysis regression equations in predicting body composition for adolescent male athletes between the ages of 15-17 years.

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OBJECTIVE This study was designed to assess the validity of previously-developed anthropometric and Bioelectrical Impedance Analysis(BIA) RE for male adolescent athletes.

Methods 155 male adolescent athletes (training for at least 1 year, 2 hours/3 days/week.) participated voluntarily. BD, BF%, and LBM were determined by using Hydrostatic Weighting (HW). Oxygen dilution method was used to determine residual volume (RV). Body weight (BW) in kg, height (Ht) in cm, skinfold thicknesses in mm, and circumferences in cm were measured. Resistance (R)(Ω) was measured by using BIA. Resistance Index (RI) (cm^2/Ω) was determined, Pearson Product Moment (rp) and intraclass correlation coefficient (ri) values were calculated between the reference values by HW and RE parameters. Bland-Altman plots of BD, BF% and LBM calculated corresponding RE compared with reference HW parameters to determine validity of the previously developed RE. Correlation coefficient values between reference and predicted parameters were given in parenthesis with significance level of 0.05.

Results To estimate BD by using Sloan ($rp=0,64$, $ri=0,68$) and Behnke&Wilmore ($rp=0,74$, $ri=0,81$) were found valid, however, Lohman ($rp=0,53$, $ri=-0,41$) and Durnin&Womersley ($rp=0,63$, $ri=-21,33$) were not. Similarly BF% RE by Katch and McArdle ($rp=0,60$, $ri=0,36$), Acikada ($rp=0,63$, $ri=0,03$), Dogu ($rp=0,77$, $ri=0,79$), Yuhazs ($rp=0,74$, $ri=0,80$), Slaughter ($rp=0,59$, $ri=0,72$) were found valid. To predict LBM by using Chumlea ($rp=0,88$, $ri=0,93$), Houtkooper ($rp=0,94$, $ri=0,94$), Segal (13) ($rp=0,95$, $ri=0,96$), Segal, fatness specific ($rp=0,96$, $ri=0,97$), Kushner and Schoeller ($rp=0,93$, $ri=0,94$), Lukaski ($rp=0,88$, $ri=0,93$), Oppliger ($rp=0,96$, $ri=0,96$) were found valid, Deurenberg ($rp=0,94$, $ri=-2,55$) wasn't.

DISCUSSION & CONCLUSION Although, BIA and anthropometric RE were significantly related to reference values, results approved that RE were population specific. Population specific RE is necessary to be developed for the male adolescent athletes.

KEY WORDS Body composition, regression equation, validity, male adolescent athletes, bioelectrical impedance analysis.

The effect of a fitness period for 8 weeks on cardio-respiratory fitness and body composition in national team boxers

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OBJECTIVE The aim of this study is to assess the effects of 8-week training program on cardio-respiratory parameters, body composition and Basal Metabolic Rate (BMR) in elite athletes and correlation among cardiorespiratory, body composition, and BMR.

METHODS 7 male boxers of national team (height 176.2 ± 22.3 , weight 74.91 ± 18.51) were selected. They were evaluated by gas analyzer and body composition analyzer before and after finishing of the program. Cardiorespiratory variables (including: lactate threshold oxygen consumption [VO_2 -LT], maximal oxygen consumption [VO_2 max], rest ventilation [VE-R], lactate threshold ventilation [VE-LT], ventilation in VO_2 max conditions [VE- VO_2 max], lactate threshold heart rate [HR-LT], and lactate threshold in maximal heart rate [HR-LT], BMR, and body composition variables (such as : weight, fat mass (FM), Body Fat Percent (%BF), Body Mass Index (BMI), Lean Body Mass (LBM), Muscle Mass (MM), and Total Body Fluid (TBF) were measured. Subjects participated in exercise protocol for 6 days (2 times a day). Training program included General box training (performed each day PM), Resistance exercise (weight training consisting 10 muscles, performed for 3days, AM), and Aerobic exercise (running 30-40 min, 3 times a week, with 70-80% VO_2 peak, AM).

RESULTS Results of paired T-test showed that our training program didn't have any effect on body composition, but, cardiorespiratory variables (VO_2 peak, $p=0.048$). Results of Pearson Correlation test indicated that some cardiorespiratory variables (such as VE) was associated with body composition. Also, this correlation exists between BMR and body composition parameters.

DISCUSSION & CONCLUSION Our study shows that this program can improve cardiorespiratory indexes, especially when it is extended.

KEY WORDS Special Exercise Program, Cardiorespiratory Fitness, Body Composition, Elite Athletes

Investigation the effects of water resistance training on maximal strength and anaerobic power of adolescent basketball players

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OBJECTIVE Water resistance exercises are rehabilitation methods for injured athletes but its potential effects on healthy adolescent needs investigation. Thus the aim of this study was to investigate the effects of water resistance training on maximal leg press strength and anaerobic power of the adolescent basketball players.

METHODS 20 adolescent (10 male, 10 female) basketball players (Xage: $16,3 \pm 0,6$ years, Xsport age: $2,3 \pm 1$ years, XBMI: $21,2 \pm 3,3$ kg/m²) were attended the study voluntarily. Water plyometrics were performed twice a week for eight weeks in a swimming pool. One repetition maximum (1RM) leg press strength and vertical jump (VC) performance was recorded before and after the training sessions. Anaerobic power was calculated by using VC performance. SPSS 11,5 Statistical program used to analyze data. T-Test was used to evaluate differences between pretest and the post test. "Repeated measures for ANOVA" was used to evaluate differences between pretest and post test of groups.

Significance was set at $p < 0.05$

RESULTS There were significant differences between pretest and post test on 1RM leg press strength ($T: -16,244$, $P: 0,01$) and the anaerobic power ($T: -11,179$, $P: 0,01$). Conversely, there were no significant differences between male and female players according to 1RM leg press strength ($F: 1,927$, $P: 0,182$) and the anaerobic power ($F: 0,130$, $P: 0,723$).

DISCUSSION & CONCLUSION It is possible to say that 8 weeks water resistance training can be effective method for improve maximal leg strength and anaerobic power of adolescent basketball players.

KEY WORDS Basketball, sport, adolescent, water resistance training.

Anterior tibial translation in elite handball and basketball players

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OBJECTIVE The aim of this study was to assess the differences in anterior tibial translation (ATT) among leg dominance, sports and sex in elite handball and basketball players with no previous anterior cruciate ligament (ACL) injury.

METHODS We evaluated 18 handball players (10 males, 8 females; age: 21.67 ± 2.82 years) and 14 male basketball players (age: 22.71 ± 4.49 years). A KT1000 arthrometer was used to measure ATT for both dominant (the leg used in a single-leg landing jump) and contralateral leg. Passive displacement tests (at flexion and 15lb, 20lb and 30lb of force), manual maximum displacement test buradaki simgenin neye karşılık geldiğini anlamadım°30 (MMT) and quadriceps active test (QAT) were performed.

RESULTS Significant higher ATT was found for the dominant leg compared with the contralateral one, for all the performed tests ($p < 0.006$). Basketball players had significant higher ATT values in their dominant leg when compared to the handball players at 15lb, 20lb and 30lb of force ($p = 0.01$, $p = 0.02$ and $p = 0.01$, respectively), but not in MMT and QAT. For the contralateral leg, significant higher differences were found between basketball and handball players at 20lb and 30lb of force and QAT ($p = 0.04$, $p = 0.02$ and $p = 0.04$, respectively). No significant differences were found between males and females players.

DISCUSSION & CONCLUSION Our results revealed higher ATT in the landing leg of elite handball and basketball players with no history of ACL injury. Differences in ATT among sports were found in both legs, with higher ATT in basketball players. No sex differences were found.

KEY WORDS knee, anterior tibial displacement, sports

Differences in ball shooting between futsal and soccer balls

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OBJECTIVE In a soccer and futsal game, the shot presents itself as a decisive action in the game. However, despite being a technical action common to both games it is used in different circumstances each time, due to various differences between the two games. One, basic, but not least is related to the characteristics of the ball. The purpose of this study is to analyze the differences in ball velocity of shot with both limbs, using the soccer and futsal ball.

METHODS 33 students of Sport and Physical Education performed 3 maximal velocity instep kicks with the preferred leg and 3 shots with non-preferred leg on a stationary placed standard soccer and futsal ball. The balls were of standard size, weight and inflation (soccer ball: circumference, 70 cm; weight, 430g and pressure equal to 0,6 atmosphere (600g/cm²); futsal ball: circumference 63 cm; weight, 430g and pressure equal to 0,4 atmosphere (400g/cm²) - FIFA, standard) and kicked towards a goal on 15m distance. The ball velocity was measured using a radar gun (Sports Radar 3300, Sports Electronics Inc, with ± 0.03 m/s accuracy within a field of 10 degrees from the gun). Only the best attempts with each ball were used for further analysis.

RESULTS The ball velocity was significant higher with the soccer balls (22.3m/s) compared to the futsal balls (20.1 m/s). The same was found when kicking with the non-preferred leg (19 vs. 17.1m/s). Furthermore a positive significant correlation ($r = .84$) between ball velocity with the soccer ball and the futsal ball was found indicating that subjects that shot with higher velocity with the soccer ball, also shot higher with the futsal ball.

DISCUSSION & CONCLUSION Although the shot is a similar action in soccer and futsal, it can present different characteristics, just change the type of ball used. Simple causes such as the size of the ball may require different requirements in the coordinative control (biomechanical profile of execution) in shot with the different balls.

KEY WORDS Ball velocity; shotting, soccer

The relationship among anaerobic performance, sprint ability and hufa agility test in soccer players

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OBJECTIVE Soccer is gaining popularity throughout the world and is a game that is dominated by anaerobic power-capacity, endurance and strength. Also running is the predominant activity, yet explosive type effort such as sprints, jumps, duels and kicking are important factors for successful soccer performance. This critical factors relative to anaerobic performance, agility and strength (Cometti et al., 2001). The purpose of the present study was to investigate the relationship among anaerobic performance, sprint ability and HUFA test in soccer players.

METHODS 40 soccer players participated in this study voluntarily (10 defender, 18 midfielder, 6 forward, 6 goalkeeper subjects joined this study) (age: 17.03 ± 0.45 yrs). Wingate Anaerobic Power Test (WAnT), squat (SJ) and counter movement jump (CMJ) was used for the determination of anaerobic performance, sprint-ability of the soccer players was determined by 10-20-30 meter single-sprint and Hacettepe University of Football Research (HUFA) without ball were used for the determination of agility.

RESULTS Anaerobic performance, sprint ability and HUFA agility test of soccer players are given in Table 1. Table 1. Anaerobic performance, sprint ability and HUFA agility test of soccer players Variables Means SD Variables Means SD Peak Power (W) 738.9 101.6 Single-Sprint time(s) Relative Peak Power(W.kgBW-1) 11.0 1.1 0-10m 1.7 0.07 Mean Power (W) 557.9 66.5 0-20m 3.06 0.12 Relative Mean Power (W.kgBW-1) 8.3 0.6 0-30m 4.21 0.12 SJ (cm) 46.3 5.2 Agility CMJ (cm) 45.5 6.2 HUFA (s) 10.46 0.37 Results of Pearson Product Moment correlation analysis indicated significant correlation between HUFA and peak ($r=0.420$; $p<0.01$), mean ($r=0.358$; $p<0.05$) powers and SJ ($r=-0.353$; $p<0.05$). Similarly 10 meter sprint times was significantly correlated with 20 meter sprint times ($r=0.619$; $p<0.01$), 30 meter sprint times ($r=0.737$; $p<0.01$) and relative peak ($r=-0.351$; $p<0.05$) powers. In addition, 20 meter sprint times was found to be significantly correlated with 30 meter sprint times ($r=0.793$; $p<0.01$) while peak power was found to be correlated with relative peak ($r=0.564$; $p<0.01$), mean ($r=0.867$; $p<0.01$) and relative mean ($r=0.334$; $p<0.05$) powers. Similarly mean power was significantly correlated with relative mean ($r=0.436$; $p<0.01$) power, SJ ($r=-0.354$; $p<0.05$) and CMJ ($r=-0.374$; $p<0.05$). Also SJ was found to be correlated with CMJ ($r=0.774$; $p<0.01$).

DISCUSSION & CONCLUSION Although aerobic metabolism dominates the energy delivery during a soccer game, the most decisive actions are covered by means of anaerobic metabolism. To perform short sprints, jumps, tackles and duel play anaerobic energy release is determinant with regard to who is sprinting fastest or jumping highest. This is often crucial for the match outcome. In most of studies in the literature anaerobic power and capacity are highly correlated with sprint ability, SJ, CMJ, cross-sectional area of thigh, isokinetic knee extension and flexion strength and muscle size (Stolen, et al., 2000). As a conclusion, the findings of the present study indicated significant correlation among HUFA and anaerobic power-capacity and single-sprint performance in soccer players.

KEY WORDS Anaerobic Performance, Sprint Ability, HUFA Agility Test, Soccer Players

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Factors influencing the performance in the YO-YO intermittent endurance test – level 2 in youth football players

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OBJECTIVE The Yo-Yo Intermittent Endurance Test – Level 2 (YYIEL2) evaluates the ability to perform intense exercise repeatedly. However, despite its common use in football training at different competitive levels, little information exists regarding the responses of youth football players to the YYIEL2 and the physical factors associated with performance in this test. The purpose of this study was to examine whether the ability to accelerate, decelerate and turn may contribute to performance during the YYIEL2 in youth football players.

METHODS A sample of 239 youth male football players from three age groups (U15: n=102; U17: n=59; U19: n=74) was evaluated in sprint performance (5m and 30m) and agility (T-test shuttle run) using photoelectric cells. The YYIEL2 was performed as a measure of intermittent exercise performance. Self-reported stage of pubic hair indicated

maturity status. Analysis of variance and Bonferroni's post hoc test determined differences by age group. Multiple regression models weighted for maturational status estimated whether the sprint and agility performances were associated with the distance covered during the YYIEL2. Statistical significance was set at 0.05.

RESULTS As expected, the older the players the higher was the performance in all functional tests conducted. However, significant differences in performance were only found between the U15 and both the other two groups in all the tests considered ($p < 0.001$). The YYIEL2 was significantly correlated with 5m sprint, 30m sprint and agility tests results (respectively: $r = 0.36$; $r = 0.50$; $r = 0.56$; $p < 0.001$), when controlling the performance by maturity status. The explained variance on the distance covered in the YYIEL2 was estimated in 31% ($r^2 = 0.31$; $p < 0.001$), although excluding the variables 5 and 30m sprint. The shuttle run test was the single factor that could predict the YYIEL2 performance ($b = 0.56$; $p < 0.001$).

DISCUSSION & CONCLUSION We found moderate correlations between the distance covered during the YYIEL2 and the performance in sprint and agility tests. Previous studies found similar correlations between VO_{2max} in a treadmill protocol and the YYIEL2, pointing out that the performance in the YYIEL2 seems to be a weak indicator of maximal aerobic power in football players. Thus, despite the usefulness of the YYIEL2 as an aerobic fitness-related field test to be used in football, other factors than VO_{2max} , such as peripheral limitations and the ability to accelerate, decelerate and turn, may influence the performance during the test.

KEY WORDS Soccer, Endurance, Fitness, Training

Jump analysis in the futsala top players

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OBJECTIVE Until now, jump analysis has mainly been used to indirectly measure the explosive strength of the knee extensors and to obtain valuable information about the strength training process in both individual and team sports (Noyes et al., 2005). For most open skill sports, asymmetry is observed in the neuromuscular behaviour of the athlete and in the distinct uses of the lower limbs in order to achieve the specific movements required for that sport (Sannicandro, 2008). This study is established to individualize differences in the phase of overstretching (eccentric phase) of the jump among two lower extremity in futsala top player.

METHODS 20 futsala top players (175.7 ± 3.2 cm, 72.6 ± 4.7 kg, 28.9 ± 2.2 yrs) have been valued with a Counter Movement Jump (CMJ) to measure time of the eccentric phase and produced peak eccentric strength. Athletes that had reported a lower-limb injury during the previous 18 months of competitive activity were excluded from the study. To evaluate the load that the single limbs are placed under, a CMJ was analyzed by means of two unilateral strength platforms (Twin Plates, Glubus Italia, 1000 Hz). The individual platforms gave separate readings for the different limb. Prior to the evaluation, every soccer player declared which was his dominant kicking leg (non-jumping leg) and which was his dominant leg for performing a single-leg-jump (jumping leg) as has already been observed in literature (van der Harst et al., 2007; Myer et al., 2006). Statistical analysis was performed using the Wilcoxon test and its statistical significance was set at $p < 0.05$.

RESULTS The results are summaries in table 1. Parameters jumping leg non-jumping leg CMJ (cm) 32.6 ± 2.5 32.6 ± 2.5 Duration of overstretching (sec) $0.13 \pm 0.01^*$ 0.15 ± 0.02 Peak Eccentric Force (N) $-6203.6 \pm 1784.2^*$ -5323.9 ± 2332.9

DISCUSSION & CONCLUSION Comparison of the jumping and non-jumping leg reveals differences in the neuromuscular behaviours of the limbs during the eccentric phase of the CMJ. The futsala player shows a functional asymmetry of the lower extremity as also individualized in other open skill sports: this could constitute a potential increased risk of muscle injury for 5-a-side football players. They are had to individualize strategies able to reduce such functional asymmetry for the prevention of the injuries. References Myer et al., J Strength & Cond Res, 2:345-349. 2006 Noyes et al., Am J Sports Med, 33: 197-207. 2005 Sannicandro, Br J Sports Med, 42 (6): 541. 2008 van der Harst et al., Clin Biomech, 22 : 674-680. 2007

KEY WORDS prevention of injuries - functional asymmetry - jump

The use of full squat power test as predictor of sprint running ability in soccer players

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OBJECTIVE To the best of our knowledge, we have not found any study prior to ours that studied the relationships between muscular power using light loads in the Full Squat (FS) exercise and sprint ability. Therefore, the aim of this study was examine the associations between power out with light loads in the FS and sprints in under-21 soccer players.

METHODS Twelve soccer players under-21 were asked to perform FS. All performed trials of FS with 20, 30, 40, 50, and 60kg in a Smith Machine. Each subject executed three reps of each load in order to determine maximum concentric Average Power (AP). Bar displacement, average velocity (m.s⁻¹), and average and Peak Power (PP) (w) were recorded by attaching a rotary encoder to the end of the bar. Sprint testing was performed with photocell gates, placed at 0, 10, 20, and 30m. Only the best sprint was considered for 10(T10), 20(T20), 30(T30), 10-20(T10-20) and 20-30m (T20-30). Correlations were determined using Pearsons r. Statistical significance was accepted at p <0.05 for analysis.

RESULTS Significant correlations ($r = -0.62/-0.81$; $p < 0.05/p < 0.01$) were observed between AP (30, 40, 50, and 60kg) and T10, T20, T30, T20-30. T20, and T30, also correlated significantly with PP ($r = -0.63/-0.65$; $p < 0.05$).

DISCUSSION & CONCLUSION As predictor, AP and PP produced during the FS must be maintained with high values to explain short sprint performance in soccer players. These findings suggest that resistance training with light loads can be an alternative for heavy load training programs in soccer players under-21.

KEYWORDS Full squat, sprint, soccer

Relationship between weighted countermovement jumps and sprint performance in soccer players under-21

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OBJECTIVE The countermovement jump (CMJ) is related with sprint performance in soccer players. Despite the increasing research, no study examined the relationship between power in weighted CMJ and sprint in soccer players. The aim of this research was to verify the relationships between CMJ power out put with light weights and short sprints in soccer players.

METHODS Twelve soccer players under-21 were asked to perform CMJL. All performed two reps of CMJL with 20, 30, and 40kg in a Smith Machine. The highest peak concentric velocity repetition was taken for analysis. Bar displacement, peak velocity (m.s⁻¹), and Average (Ap) and Peak power (Pp) (W) were recorded by attaching a rotary encoder to the end of the bar. Sprint testing was performed with photocell gates, placed at 0, 10, 20, and 30m. The best sprint was considered for 10(T10), 20(T20), 30(T30), 10-20(T10-20) and 20-30m (T20-30). Correlations were determined using Pearsons r. Statistical significance was accepted at p <0.05 for all analysis.

RESULTS Significant correlations ($r = -0.65/-0.82$; $p < 0.05/p < 0.01$) were observed between Ap in CMJ with 20, 30, and 40kg and T30, and T20-30. In addition, we also observed significant correlations ($r = -0.64/-0.79$; $p < 0.05/p < 0.01$) between Pp and T10-20, T30, and T20-30.

DISCUSSION & CONCLUSION This research indicated that Ap and Pp produced during weighted CMJ can be an important parameters to explain short sprint performance in soccer players. These findings suggest that CMJ training with light loads can be added to sprint training programs in soccer players under-21.

KEYWORDS Countermovement, peak power, sprint

Determination of the anaerobic power and capacity after long high intensity loading in professional soccer players

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OBJECTIVE Analyses of energy systems have very important role of to determination sport performance, planning and processing training process. Obtained results give us information, answers orgnisam about alactate and lactate anaerobic capacity the soccer player during the anaerobic training season, up to measurement blood lactate obtained information how to load soccer players, across to detection fatigue index date how much will be do recovery time after two long high intensity loading. The purpose of this study its the determine anaerobic power capacity and fatigue index after three long high intensity loading in professional soccer players. In this way we determine the anaerobic power at professional soccer players and the index of fatigue between three high intensive loadings, with purpose to

get informations which will be used in designing trainings to enlarge the anaerobic power at soccer players.

METHODS Anaerobic power and capacity fatigue index was determined with modified Wingate test. (3x30sec.). Blood lactate was taken with portable lactate analyser after 1 test 1 sample, after 2 test 2 sample, after 3 test 3 sample 3 and 4 sample 5 minute after loading.

RESULTS Obtained results soccer players was product highest values (peak power/kg, lactate mmol/L) after first and second test. In the 3 test soccer players was manifested more down values results. This situation we explain like the fact the soccer players its not been enough conditioning in the phase we are done measurement. During the prepare measurement protocol we detecting 4 th test soccer players its not been finished and they cannot more energy the 4 th maximal loading.

DISCUSSION & CONCLUSION We found there statistical values of fatigue index W1YI 40.06%±7.29 ; W2 YI 51.07%±6.85 ; W3 Yi 54.11%±13.78. With which we conclude that the index of fatigue increases after every interval, in case to develop a stimuli (maximum power/kg) we want, the periods of relaxation in the first two intervals should be increased gradually. There were statistical significant relationship between Peak power/kg and Minimal power/kg during 3 measurement ($p<0.001$). The differences in manifesting maximum and minimum power in three tests remained considerable at same proportion. There was significant relationships between blood lactate 2 values and fatigue index W2 YI 51.07%±6.85 ($p<0.05$). With increasing of the level of lactates also increases the index of fatigue. There were significant differences between lactate values ($p<0.001$). Which gives us the information of varying of the development in inserting (including) of anaerobic lactating energetic system during high intensive loading.

KEY WORDS Soccer, anaerobic power and capacity, fatigue index

Following the training proces with heart rate and blood lactate monitoring of professional soccer players

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OBJECTIVE High intensity interval intermittent training is very important for increasing the functional ability of soccer players. There are a lot of methods and parameters that could help to monitor and evaluate the effects of this kind of training. The aim of this study is to evaluate the effects of high intensity interval intermittent training using continues monitoring the heart rates and blood lactates on the field.

METHODS 30 male soccer players at the age of 17 to 35, all from the professional soccer football team “Rabotnicki – Kometal” – Skopje, were examined during the researching period. The researching process was realized in 3 periods: Pre-preparation (first research), Pre-competition (second resech), Post-competition (third reaserch). All periods mentioned were tested in laboratory and field conditions. Testing was repeted 3 times by using the high insensitive interval intermittent training that included 6 series multiplied by 4 min with a 2 min. rest between intervals. Also, during the breaks blood tests were taken to view the levels of lactates 8 times (after every interval), and 12 min. slow (easy) running – jogging. During the all 3 period of measurement soccer players was monitored with heart rate monitor polar S610i.

RESULTS In soccer players with bigger VO_{2max} before starting the 1-th interval less levels of blood lactate ($p>0.05$) were found. In soccer players with more muscle mass higher levels of blood lactate ($p>0.05$) were found. In soccer players with high level of body fat percentage, higher levels of blood lactate ($p>0.05$) after the 5-th and 6-th interval were found. During the recovery period in soccer players with high levels of VO_{2max} higher values of blood lactate were found because this athletes have high lactate tolerance. We did not find the significant differences in heart rate between the intervals, ($p>0.05$).

DISCUSSION & CONCLUSION We found that the rest time after 4-th and especially 5-th series it's not enough for recovery soccer players. Recovery running (12 min. jogging) after specific high intensity interval intermittent soccer drills its not enough period for recovery soccer players.

KEY WORDS Soccer players, lactate, heart rate, interval intermittent, recovery.

The effects of detraining on lower force and maximum aerobic power in pre-pubescent football athletes

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OBJECTIVE Detraining results in the loss of cardiovascular and metabolic characteristics and consequently results in the reduction of VO_{2max} and muscular strength (Coyle, 1994, Evangelista & Brum, 1999). For most researchers the VO_{2max} is an indicator of greater fidelity in the characterization of aerobic power of an individual, as well as their level of fitness (1,2,3,4,5,6). Because detraining in young athletes has received little attention, is important to discuss this area. In adults, training-induced increases in muscle strength and VO_{2max} appear to decline during detraining about and in the same rate as they increase during training. To date, only one study (Blimkie et al., 1989) looked at the effects of 8 weeks of detraining in prepubertal boys following 20 weeks of resistance training. The training-induced strength gains regressed towards the growth-adjusted control level during the detraining period, suggesting that alike with adults, training adaptations are reversible (Blimkie et al., 1989). The aim of this study was to know the effect of detraining in a period of 34 days on the Maximum Aerobic Power (MAP) and Lower Force (LF), in pre-pubescent children football players.

METHODS Eight pre-pubescent male football players (age 12.75 ± 0.71 years; weight 41.46 ± 6.66 kg; height 1.51 ± 0.06 cm; BMI 19.30 ± 3.59) were assessed before and after 5 weeks of a detraining period. A Modified Balke maximal protocol using ergo-spirometry procedures (Cosmed® K4b2) was selected to determine VO_{2max} and the Ventilatory Anaerobic Threshold (VAT) as estimates for the aerobic capacity. To access the LF a Countermovement Jump (CMJ) was made in the Ergojump®. Data comparisons were set to determine the relationships between the parameters resulting from testing.

RESULTS The MAP (VO_{2max}/kg) show a significant difference from the pre vs post detraining period (69.27 ± 5.41 ml.kg.min⁻¹ vs 63.22 ± 4.95 ml.kg.min⁻¹, $p=0.002$) however the LF doesn't report significant changes.

DISCUSSION & CONCLUSION The results suggest that 5 weeks of detraining decrease the MAP (VO_{2max}/kg) of pre-pubescent football players although not significant changes were report on the LS parameter.

Keywords Detraining; prepubescent children; football; maximum aerobic power, lower strength

Relationship between kicking ball velocity and explosive strength in physical students of both genders

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OBJECTIVE Soccer kicking, due to its relevance in the soccer game, continually raises the curiosity of researchers and can be seen from different perspectives. The purpose of this study was to evaluate explosive strength of lower limbs and its relationship with ball velocity in kicking performance in male and female sport students

METHODS 32 (16 men and women) students of Sport and Physical Education participated in the study. A radar gun (Sports Radar 3300, Sports Electronics Inc., with ± 0.03 m/s accuracy within a field of 10 degrees from the gun) was used to assess ball speed during soccer kicking performance. The height of a countermovement jump with arm (CMAJ) and without arm (CMJ) was measured in order to calculate the explosive strength of lower limbs. The vertical height was measured using a trigonometric carpet (Ergo jump Digitime 1000, Digest Finland).

RESULTS In all tests the men always showed better results than the women (ball velocity: 26.6 vs. 18 m/s; CMJ: 0.36m vs. 0.27m; CMAJ: 0.42m vs. 0.29m). However, no significant correlation was found between ball velocity and explosive strength for neither gender ($r < .30$).

DISCUSSION & CONCLUSION This study indicates that explosive strength of the lower limb, measured by countermovement jumps, is not of major importance for the ball kicking performance. This shows that there may be other factors, possibly in the coordinative control (technique of kicking), acting in complementarily, in a similar kicking to the tested with positive or negative influence at the final outcome. Furthermore, although there are studies that relate the CMJ with the force produced by the lower limbs, may be necessary in this case, the use of more specific tests.

KEY WORDS Soccer, explosive strength, ball speed, kicking

Effect of physical activity in young gymnasts

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Body composition is influenced by many factors. Especially during the adolescence period, an important role is played by the practice of physical activity, with large variations due to the type, intensity and frequency of the activity. There, the idea aroused to check the influence of a specific preparation program for the gymnasts drafted by the Federal Technical Board on body composition, in a population of young athletes. The programs consisted of 6 hours in 4 training sessions in the first group and 3 hours in 3 training sessions in the second group, for 8 months. The objective was to evaluate the effect of these programs on anthropometric parameters. All the athletes, after the anamnesis, have been subjected to medical examination, and measurement of anthropometric and functional parameters. The verification of body composition has been carried out with bioelectrical impedance analysis (BIA). Our population consisted of 93 athletes (21 M, 72 F), 8.44 ± 2.68 years old. The results of the study yielded statistically significant correlation between weekly training hours and body weight ($r=0.359$; $P=0.000$), body surface area ($r=0.436$; $P=0.000$) and lean body mass ($r=0.320$; $P=0.002$). After the creation of multiple linear regression models to highlight the effect, training hours ($\beta=0.204$; $P=0.000$) and years of sports practice ($\beta=0.158$; $P=0.000$) remained as principal predictors of lean mass. The results of the study confirm that estimation of fat tissue with BIA and detection of the studied parameters, are highly related in our population ($r=0.846$; $P=0.000$). The percentage of lean mass increases significantly in direct proportion to the intensity and frequency of physical activity carried out. Based on our data, we aim to provide important information regarding the influence of such an intervention on these measures in young gymnasts and to allow improving physical activity in children.

Keywords Physical activity, bioelectrical impedance analysis

The effect of plyometric training associated with the practise of handball on the evolution of explosive force of young male handball players

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OBJECTIVE The main of our research is to compare the effects induced by a program of plyometric training associated with the practice of handball on the evolution of explosive force of young male handball players.

METHODS Twenty (20) players (age: 17 ± 0.56 years old; height: 179.75 ± 7.91 cm; weight: 74.8 ± 13.15 kg; BMI: 23.08 ± 3.34 kg/m²) participated voluntarily to this study. They were spread into two groups: Experimental group G.E. (n=10) and group of control G.C. (n=10). The GE followed a program of plyometric training inspired from that elaborated by Robert W. Spurrs and al in 2002, integrated with the practise of handball while the G.C followed another training system (handball). All the players have been tested and rested before and after six-week training. The test carried out are squat jump test, free-arm counter movement jump, five jump test standing long jump and the shuttle test 10*5 m.

RESULTS The results obtained have shown at the high jumping level in squat jump the values achieved allow to distinguish significant ameliorations at the experimental group level with $p<0.001$. As for the counter movement jump, the two group have achieved significant ameliorations with $p<0.001$ for the G.E. and $p<0.005$ for the G.C. Concerning muscular elasticity and the distance covered in five jump test, the ameliorations are not significant. We also noticed a significant amelioration for both standing jump and shuttle test 10*5 m, respectively with $p<0.001$ and $p<0.032$.

DISCUSSION & CONCLUSION This research showed the effect of plyometric training associated with the practise of handball on the evolution of velocity and explosive force of young handball players.

KEY WORDS Plyometric training, explosive force, young male handball players, velocity, explosive force

A comparative survey of the offensive efficiency of the high-level handball players of the front and the rear lines

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OBJECTIVE Team Handball is an Olympic sport now played professionally in Europe. However, despite increasing professionalization, there is a paucity of research data concerning performance. Here, the analysis of performance is correlated with a certain number of factors. Therefore, the aim of this study was to investigate and identify patterns of efficiency in the offensive actions composed by the front and rear lines in high-level Team Handball players.

METHODS 74 professional male Team Handball players participated in this study (age: 28.24 ± 3.72 years; height: 190.03 ± 9.6 m; weight: 91.03 ± 12.90 kg; lean body mass: 25.03 ± 2.80 kg/m²). The following parameters were measured: the circulation of the ball; shooting (a. successfully, b. shooting defended by the goalkeeper, c. missing shooting); the length of the attack; and the shooting velocity

RESULTS The players of the central axis were more offensive effective than the players of the two side axis. Further, the shooting velocity determined significantly ($p < 0.001$) the success of the attacks. The duration of the attacks concluded with goal was more important than the duration of the attacks defended by the goalkeeper and with missing shootings ($p < 0.001$).

DISCUSSION & CONCLUSION The rate of goal success of the players of the central axis was significantly higher than the success goal rate of the players of the front and rear lines.

KEY WORDS Team Handball, shootings, "front" line, "back" line, length of the attacks, shooting velocity

Effect of plyometric training on vertical jump performance and neuromuscular adaptation in volleyball players

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OBJECTIVE Successful sporting performance at elite competition levels often depends heavily on explosive leg power of the athletes involved. Volleyball players rely heavily upon anaerobic energy systems to supply energy demands. Successful participation in volleyball requires athletes be able to propel themselves into the air during both offensive and defensive maneuvers. Although, in relation to enhancing VJ performance, plyometric training has been helpful, the effects of such training on neuromuscular responses have yet received less attention. Because there is no specific research on the efficacy of plyometric training on neuromuscular responses, the purpose of this study was to examine the effects of plyometric training on vertical jump performance and neuromuscular adaptation in volleyball players.

METHODS A semi experimental research was conducted. Statistical methods were t tests and two way ANOVA. Thirty male volleyball players (Age: 17.53 ± 0.74 yrs; Height: 177.7 ± 3.1 cm; Weight: 61.31 ± 5.32 kg), who had a minimum of two-years volleyball training volunteered to participate in a 12-week plyometric training program. The subjects were divided into plyometric training (PT) ($n=15$) and control (C) ($n=15$) groups, based on vertical jump heights.

RESULTS The results showed that there were no pre-test significant differences between the two groups. Two way ANOVA showed significant differences between pre- and post-test in the PT group in M wave parameters: latency (ms), nerve conduction velocity (m/s) and vertical jump height, but there were no significant differences in IEMG (mV/ms) and amplitude (mv), also there were no significant differences between pre- and post-test in the control group in IEMG, latency, amplitude and nerve conduction velocity. But after the training period, more significant differences in latency, NCV and VJ height were observed in the PT group than in the C group, there were also no significant differences in amplitude and IEMG ($P=0.789$, 2.57%) between the two observed groups ($P>0.05$).

DISCUSSION & CONCLUSION It is possible to conclude from this study that coaches and trainers consider PT as a strategy for increasing volleyball players' explosive performance. This may have taken place in neuromuscular responses including: optimizing motor units (MU) pattern (intra-muscular activation), optimizing MUs recruitment, augmentation in nerve conduction velocity (NCV), decrement in reflex excitability of the motor pool.

KEY WORDS Plyometric training, EMG, M-wave amplitude, vertical jump, nerve conduction velocity

Asymmetry of force fluctuation during low-intensity isometric knee extension

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OBJECTIVE Although there are few reports on the asymmetry of force fluctuation (FF) in the muscles of the upper limbs, the asymmetry of FF in the leg muscles during <30% MVC remains unclear. The purpose of this study was to investigate the asymmetry of FF in the leg muscles during isometric knee extension at 10% MVC.

METHODS 20 healthy males (21±2 years) performed unilateral isometric knee extension that was measured by a strain gauge force transducer. After obtaining the maximal voluntary contraction (MVC), the subjects performed force matching tasks; sustained isometric knee extension for 15s at levels corresponding to 10%, 20%, and 30% MVC with the visual feedback. During the force matching tasks, the mechanomyogram (MMG) signal was detected by an accelerometer arrangement placed on the vastus lateralis, midway between the greater trochanter and the lateral condyle of the femur.

RESULTS (1) a greater FF and MMG-amplitude were found in the 30% MVC task than in the 10% or 20% MVC tasks; (2) a lower mean power frequency (MPF) of MMG was found in the 10% MVC task than in the 20% or 30% MVC tasks; (3) a greater FF and MMG-amplitude were found in the stronger limb in MVC than in the weaker limb in MVC at 30% MVC task; (4) no differences were found in FF and MMG-amplitude between the stronger and weaker limbs at 10% and 20% MVC tasks; (5) no difference was found in MPF-MMG between the stronger and weaker limbs at all tasks; and (6) significant positive correlations were found between the target force values and the FF at each contraction intensity.

DISCUSSION & CONCLUSION These results suggest that (1) FF asymmetry at intensities of MVC below 20% is not due to differences between the contraction intensities and discharge rate properties; (2) FF asymmetry at intensities of 30% MVC is found by the difference of discharge rate properties; and (3) FF increases with absolute load (i.e. target force value) by increased discharge rate variability, in same relative loads (i.e. % MVC).

KEY WORDS Force fluctuation, mechanomyogram (MMG), asymmetry, isometric contraction

Path-flow analysis model for anthropometric, hydrodynamic and biomechanical variables in age-group swimmers

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OBJECTIVE The aim of this research was to develop a path-flow analysis model for age-group swimmer's speed based on anthropometric, hydrodynamic and biomechanical determinants. The theoretical model was developed according to main review papers about these determinants (e.g. Lavoie and Montpetit, 1986).

METHODS Thirty eight male swimmers (12.97±1.05 years-old) with several competitive levels were evaluated. It was assessed: (i) anthropometrical variables such as body mass (SECA, 884, Hamburg, Germany), height (SECA, 242, Hamburg, Germany), fat mass (Tanita, BC-545, Middlesex, UK), body surface area (Haycock et al., 1978); (ii) hydrodynamic variables including vertical buoyancy (Costa et al., 2009), prone gliding after wall push-off (Costa et al., 2009) and; (iii) the biomechanical variables stroke length, stroke frequency and velocity after a maximal 25-m swim with an underwater start being data recorded in the middle 15-m (Craig and Pendergast, 1979). Path-flow analysis was performed with the estimation of linear regression standardized coefficients between the exogenous and endogenous variables. When appropriate, according to the theoretical model, simple or multiple linear regression models were computed. The standardized regression coefficients ($\hat{\alpha}$) were considered and significance of each $\hat{\alpha}$ was assessed with the t-Student test ($p < 0.05$). The effect size of the disturbance term for a given endogenous variable, which reflects unmeasured variables, was 1-R². To verify the quality of the model, root mean square residuals (RMSR) was computed.

RESULTS Confirmatory path-flow model can be considered as being close to the RMSR milestone, but even so not suitable of the theory (RMSR = 0.11).

DISCUSSION & CONCLUSION The confirmatory model excluded the vertical buoyancy and the relationship between height and fat mass.

KEY WORDS Swimming, children, performance, relationships

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Longitudinal assessment of elite swimmers performance leading to 2008 Beijing Olympic Games

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OBJECTIVE The aim of this research was to track and analyze the stability of 400-m freestyle performance throughout elite swimmers preparation to the 2008 Beijing Olympic Games.

METHODS One hundred and six male swimmers were analyzed for five consecutive seasons (2003 to 2008). All swimmers were in the top 150 of 400-m Freestyle 07-08 FINA World Ranking. Swimming performance was collected using best personal time in 400-m Freestyle event, on official competitions in each season, on a short course pool. An exploratory data analysis was performed (Shapiro-Wilk). Longitudinal assessment was made by: (i) mean stability; (ii) normative stability. For mean stability quartiles, means plus standard deviations were computed for each season. Data variation was analyzed with ANOVA repeated measures followed by a post-hoc test (Bonferroni). Normative stability was analyzed with self-correlation (Pearson) between the performances throughout the five seasons. Cohen's Kappa (K) was computed in Longitudinal Data Analysis software (v. 3.2, Dallas, USA) with a 95% confidence interval.

RESULTS There was a trend for a performance improvement throughout the swimmer's preparation. Significant variations in the mean swimming performance were verified [$F(1,11) = 171305.9$; $p < 0.01$]. Post-hoc test revealed significant variations between all swimming seasons analyzed ($p < 0.01$) except for the pair wise comparison between third and fourth seasons. Self-correlation values ranged between moderate and high throughout the swimmer's preparation. Stability becomes high in the fourth season ($r = 0.723$). The K value, was low ($K = 0.331 \pm 0.043$).

DISCUSSION & CONCLUSION The prediction of final swimmer's performance, based on initial season's performance is moderate. The change from third to fourth season can be a milestone were the ability to predict the swimmer's final performance level increases strongly.

KEYWORDS Swimming, Performance, Prediction

Hormonal and metabolic evaluation of 12 weeks swimming training in females

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OBJECTIVE The biological safety margin in people regularly practising physical exercises is greater, which in the context of health may be of particular importance. Therefore, the aim of our study was to evaluate the selected metabolic and hormonal indices in female participants of swimming training involving aerobic components.

METHODS Two groups were examined: the experimental group ($n=19$, 21.0 ± 1.3 years, BMI 22 ± 2) and the control group ($n=19$, 20.0 ± 1.1 years, BMI 22 ± 2). The swimming training covered a period of 12 weeks, 3 times per week for 60 minutes. Blood samples were collected before the training (cycle I), following 6 weeks (cycle II) and 12 weeks of training (cycle III), before and after each swimming session, in order to determine the level of lactic acid, glucose, free fatty acids, growth hormone, leptin, insulin, cortisol and testosterone. Body mass, fat and fat free mass were measured in resting conditions using bioelectrical impedance. Heart rate was recorded during an hour-long training. Endurance level was evaluated using the Cooper test in water.

RESULTS In each testing cycle physical exercise caused significant ($P < 0.05$) increase in lactic acid and free fatty acid levels and decrease in glucose levels. Similar significant ($P < 0.05$) training-induced increases in growth hormone level and decreases in insulin and leptin levels were observed. In the case of cortisol and testosterone the changes were insignificant. The mass of adipose tissue (25-26%) remained at a similar level throughout the experiment. In the

successively conducted testing cycles, the distance covered during the Cooper test was longer with each cycle. Lower post-training lactic acid level was determined in cycle III as compared with cycles I and II. Similar results were observed in the case of free fatty acids, glucose and growth hormone levels. Decreases in leptin levels were significant in cycles II and III.

DISCUSSION & CONCLUSION Training induced decrease in the biological cost of 60 minutes' physical effort, and improvement in the endurance level in the tested female swimmers. Lack of adverse hormonal response, continuous anabolic-catabolic balance, stable energy profile and maintenance of similar body mass are indicative of beneficial health-promoting effects of the training.

KEY WORDS Swimming training, anabolic-catabolic balance, leptin

Qualitative versus quantitative analysis of the behavior patterns of the elite butterflyers

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OBJECTIVE The purpose of this study was to find patterns in the swimming technique of butterfly based on Behavioral Observation System of Technical and compare the data obtained from the kinematic analysis (quantitative).

METHODS In the analysis of temporal patterns (T-pattern) and a sequence of five cycles gestures executed at maximum speed at 25 meters, studied the behavior of three technical elite swimmers of Portuguese participants in the Olympics, with a record 259 and a full alphanumeric codes 120 configurations. The instrument based on a mixed system of categories and field formats, with technical features observed during the execution of hand cycles. The validity was assured by the index of intra-observer reliability (95%) and inter-observer accuracy (96%). To detect patterns exist, each swimmer, using the Theme 5.0 software, which allowed to identify the stable structures of technical performance within a critical interval of time ($P < 0.05$) - t-patterns. To compare the data we performed a kinematic analysis. The calculation of kinematic variables was performed by software Ariel Performance Analysis System (APAS).

RESULTS The patterns were different, adjusting to the characteristics of technical implementation of the swimmers. Each swimmer may display settings with different levels of complexity of structure, depending on the implementation of changes within the hand cycle. By comparing the codes with the kinematical values found that complement and show the same information.

DISCUSSION & CONCLUSION The potential quality of this instrument is evident by the patterns obtained from a temporal sequence and that when faced with mathematical models describe the same information.

KEY WORDS Technical Analysis, Patterns; Butterfly; Chronology; Kinematics

Observation of the stability of a technical implementation of evidence in 200m butterfly

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OBJECTIVE The aim of this study was find patterns in the swimming butterfly technique at a distance of 200 meters using the system Behavioural Observation System of the Technical Butterfly, qualitative analysis allows the observation and study of the stability of the technical implementation.

METHODS Instrument for ad-hoc, with the structure of the instrument based on a mixed system Categories and Field Formats which we can record specific techniques observed during the gestural cycles. We performed the analysis of temporal patterns (T-pattern), a sequence of five gestural cycles of the butterfly style in each part of 50 meters. To study the sequence of codes and their interaction representative of the technician in two swimmers at the national level. Swimmers performed the tasks with speed competition, with the same control by the GBK PACER. To detect the

temporal patterns of each swimmer, using the Theme 5.0 software, which allows to identify the structures of the technical standard within a range of critical time ($p < 0.05$) - T-patterns

RESULTS In the results the patterns found settings are different and different levels of complexity depending on the adjustments made by the swimmers in gestual cycles. Variations of codes in each time producing different settings, to determine the differences between cycles of the swimmer.

DISCUSSION & CONCLUSION Comparing patterns found distinct differences between swimmers, the records demonstrated a clear behavioral similarity when compared the result with the biomechanical model of the general butterfly technique. Technique is objective for the purpose it was created and is a valuable instrument for qualitative analysis.

KEY WORDS Technical Analysis, Stability, T-Patterns, Butterfly, Temporal

Training control in young female swimmers: a case study

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OBJECTIVE The need to improve competition times encourages coaches to use different methods to control the training process. However, not always, the available processes are easy to be applied in a large group of female competitive swimmers. Furthermore, the use of some tests in young swimmers is questionable. Hence, the aim of this study was to apply a simple protocol to assess the process of training in a group of female swimmers.

METHODS Eleven female swimmers participated in this study (11.45 (0.52) years old, 1.50 (0.08) m, and 39.81 (7.84) kg). All the swimmers belonged to the same swimming club. After 3 weeks of general training tasks, the swimmers were engaged in a 9 week training period in order to prepare the participation in the Regional Championship. During this period the swimmers performed 6 units of training per week (week 1: 19.0 km, week 2: 22.0 km, week 3: 22.0 km, week 4: 24.0 km, week 5: 26.0 km, week 6: 23.0 km, week 7: 25.0 km, week 8: 26.0 km, week 9: 21.6 km). Every Thursdays, after a 30 min warm up each swimmer performed two trials of a 50 m front crawl all out test, with a 15 min rest. Only the best performance was used to control the training process. A repeated-measures analysis of variance with Bonferroni adjustment was used to analyze the differences between the mean values of each week performance. The significance level was set at $p < 0.05$.

RESULTS 50 m performance did not change during the first three weeks of training ($p > 0.05$). In the week four the performance significantly decreased (week 1: 39.09 (4.51) s, week 4: 39.86 (5.12) s; $p < 0.05$). The present study also showed no significant differences in performance between week 1 and weeks: 5, 6, 7 and 8. Nevertheless, at the last week of preparation there was a performance enhancement (week 9: 38.72 (4.38) s, $p < 0.05$).

DISCUSSION & CONCLUSION With a simples and easy test it was possible to monitor swimming training. We believe that these data could be used by coaches to control training in young competitive swimmers and simultaneously promote some adjustments during the preparation. Here, we were able to notice a performance improvement in the 50 m front crawl trial during the last week of training, before the competition, which corresponded to a decrease in the overall training volume. It seems that in short distances events the reduction of training volume could enhance young competitive swimmers performance.

KEYWORDS Performance, training volume, monitoring, short distance events.

Training evaluation in male age-group swimmers

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OBJECTIVE Monitoring the training process represents an important task during sports preparation. However, not always the applied protocols help to address the coaches' concerns, namely regarding its complexity and difficulty to be used in large samples. Therefore, the aim of this study was to apply a simple protocol to control the training process in a group of male age-group swimmers.

METHODS Thirteen age-group male swimmers were involved in this study (12.46 (0.52) years old, 1.53 (0.10) m, and

42.81 (5.93) kg). All the swimmers belonged to the same swimming club. After 3 weeks of general training tasks, the swimmers were engaged in a 9 week training period in order to prepare the participation in the Regional Championship. This period comprised the months of October, November and December and corresponded to the first training macro cycle. During this period the swimmers performed 54 units of training (6 units per week) (week 1: 3.17 km/unit, week 2: 3.67 km/unit, week 3: 3.67 km/unit, week 4: 4.0 km/unit, week 5: 4.33 km/unit, week 6: 3.83 km/unit, week 7: 4.17 km/unit, week 8: 4.33 km/unit, week 9: 3.6 km/unit). Every week, each swimmer performed two trials of a 50 m front crawl all out test, with 15 min of rest between them. Only the best performance was used to monitor the training process. A repeated-measures analysis of variance with Bonferroni adjustment was used to analyze the differences between the mean values of each week performance. The significance level was set at $p < 0.05$.

RESULTS 50 m performance did not change during the first eight weeks of training ($p > 0.05$) (week 1: 33.58 (2.44) s). Nevertheless, at the last week of preparation there was a significant performance enhancement (week 9: 33.12 (1.89) s, $p < 0.05$).

DISCUSSION & CONCLUSION In the last week of training it was possible to verify a performance increasing in the 50 m front crawl test. This week corresponded to a decrease in training volume attempting to achieve a better competitive performance. The 50 m test trials seemed to be a very simple test that can be used by swimmers' coaches to control and monitor the training process in swimming, especially in age-group swimmers.

The energetics of surface events in finswimming, analysis by the concept of critical velocity method

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OBJECTIVE This study aimed to investigate the energetics of surface events (SF) by the analysis of the concepts of critical velocity (CV) and anaerobic swimming capacity (ASC), in finswimming.

METHODS The subjects were 9 finswimmers (5 males and 4 females, 24 ± 5 years) who were members of the Japanese national team. Subjects performed five different swimming distances (100m, 200m, 400m, 800m and 1500m SF) at maximal effort in a 50m long course swimming pool. On the basis of the previous study (Oshita et al. Int J Sports Med, 2009), CV was calculated using 400m and 800m swim times. Velocity (V) multiplied by swimming time (T) implies that swimming distance (D); $D = V \times T$. The equation of regression line can be expressed as follows: $D = a \times T + b$, thus $V = a + b/T$. Theoretically, if we could set the swimming velocity at a level where one can perform indefinitely, b/T will approach zero and V will approach a. Therefore, CV can be expressed as the slope of the regression line; $CV = a$. Further, ASC was employed as the linear coefficient (y-intercept) of each individual regression.

RESULTS The findings of this study were: (1) V of all distance SF (100m to 1500m) showed significant positive correlation with the CV ($r = 0.73$ to 0.94); (2) V-100m, V-200m and V-400m revealed significant positive correlation with the ASC ($r = 0.69$ to 0.81); (3) V-800m and V-1500m did not show significant correlation with the ASC ($r = 0.59$ to 0.64); and (4) ASC was significantly correlated with the residual error, calculated from the regression analysis for the relationship between CV and the V-800 ($r = 0.94$) and V-1500 ($r = 0.95$).

DISCUSSION & CONCLUSION These results suggest that: (1) the anaerobic performance (expressed as ASC) contributes to SF performance below 400m; (2) the aerobic performance (expressed as CV) contributes to SF performance from 100m to 1500m; and (3) the performance of 800m or 1500m SF could be considerably explained by the aerobic performance; however, unexplained residual error could be explained by the anaerobic performance.

KEY WORDS Finswimming, surface event, critical velocity, anaerobic swimming capacity

Study of the drag coefficient during the first and second gliding positions of the breaststroke underwater stroke using computational fluid dynamics

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OBJECTIVE The underwater phases of swimming, after starts and turns, are an important component of the total event time in swimming, being essential to minimize the hydrodynamic drag during the gliding. Additionally, the underwater passive drag (D_p) of swimmers in a streamlined position has been measured experimentally. These studies revealed the difficulties involved in conducting such experimental research. An alternative approach is to apply the numerical technique of computational fluid dynamics to determine a swimmer's passive drag. Computational fluid dynamics (CFD) analysis is a tool to examine the water flow around a submerged swimmer's body. The purpose of this study is to determine and compare the passive drag and the drag coefficient (CD) in the first and second gliding positions of the underwater breaststroke using the CFD.

METHODS A swimmer's model was created using AutoCAD. Gambit allows to built the fluid mesh and improve the swimmer's model. This model, then the turbulent model was used on the commercial code. The k- ϵ model was processed by Fluent and applied to the fluid flow on a tridimensional model of an adult male swimmer. Two gliding positions were studied: a ventral position with arms extended at the front and a ventral position with arms along side the trunk, corresponding to the first and second glide positions of the breaststroke underwater stroke. Five velocities ($v=1.0, 1.39, 2.0, 2.5$ and 3.0 m/s) were used in the simulations. Non-parametric Mann-Whitney test was used to compare the differences between the variables. The significance level was $\alpha=0.05$.

RESULTS 46.89 N for the first glide position, 66.97 \pm 90.85 N for the second glide position. For both positions the D_p and 128.18 increase, while the CD decrease, with increasing velocity. For the second glide 0.308 are significantly higher ($p=0.008$) than position the CD values (0.775 \pm 0.022) for the first glide position (0.407).

DISCUSSION & CONCLUSION The position with the arms extended at the front yielded a smaller CD, suggesting that swimmers shall adopt this position. Additionally, we propose that it should be given more emphasis to the first glide position in the underwater breaststroke, after starts and turns, rather than the second glide. The use of CFD allows the assessment of fluids characteristics and the drag forces in swimming.

KEY WORDS Biomechanics, swimming, hydrodynamic position, underwater breaststroke, computational fluid dynamics, passive drag, drag coefficient

Analysis of selected physiological and kinematic performance parameters during incremental test in elite young swimmers

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OBJECTIVE The purposes of this study were to investigate and evaluate the relationships between stroke kinematics (i.e stroke rate and stroke frequency) and physiological (i.e heart rate and blood lactate concentration) parameters during incremental exercise in young elite swimmers and moreover to examine the extent which changes in these parameters are associated with swimming performance as indicated by average velocity.

METHODS 15 male (age, 15.93 ± 1.7 years; height, 172.8 ± 6.31 cm; weight, 65.86 ± 6.11 kg) and 18 female (age, 15.62 ± 1.2 years; height, 165.5 ± 3.2 cm; weight, 57.43 ± 3.09 kg) swimmers participated in this study. Subjects performed an incremental 7x200m test in their specialized stroke. Stroke rate (SR), stroke frequency (SF), velocity (V), heart rate (HR), rating of perceived exertion (RPE) and blood lactate concentration (BLa) were measured for each 200 m. Pearson product moment correlation was used to determine the relationships between variables for all strokes and for both genders. Significance was accepted at the $p < 0.01$ level.

RESULTS Statistically significant correlations were found between SR and V ($p < 0.01$; $r = 0.63$ to 0.99), SF and V ($p < 0.01$; $r = 0.64$ to 0.99), BLa and V (except for men's and women's freestyle) ($p < 0.01$; $r = 0.63$ to 0.94).

DISCUSSION & CONCLUSION According to results V increased by increasing SR and SF. Different combinations of SR and SF produced similar velocities with different fatigue levels as indicated by BLa levels, while the best combination for reaching a given V varied both between and within swimmers. The fastest times reached in the test were generally slower than expected. It is possible that the swimming speeds were not maximal in the final 200 m. swim because of cumulative fatigue, which is a major limitation for assessing race pace. An additional test that produces velocities similar to those used in competitions would be more useful for the purpose of providing optimal kinematic information specific to racing speeds, which would facilitate performance improvement through regular monitoring in training.

KEY WORDS swimming, stroke rate, stroke frequency, lactate, incremental exercise test.

Fatigue electromyographic analysis during the 200m front crawl

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OBJECTIVE Surface electromyography (EMG) is a non-invasive method for assessing athletes' neuromuscular function. EMG amplitude - mean or root mean square - and spectral EMG parameters - mean and median frequency of the power spectrum - are traditionally used to evaluate the motor unit activity pattern during exercise, as well as skeletal muscle fatigue. The purpose of this study was to examine the changes in the EMG spectral parameters during a 200m front crawl maximal effort.

METHODS It was conducted a case study with a male swimmer (2008 Olympic Games participant, 21 years old, 71kg, 180cm, 182cm of arm span and 8.8% of body fat mass). The EMG activity of the relevant muscles for the front crawl technique (flexor carpi radialis, biceps brachii, triceps brachii, pectoralis major, upper trapezius, rectus femoris, biceps femoris and tibialis anterior) was assessed during 200m front crawl test performed at maximum intensity. Bipolar active differential electrodes were positioned over the skin on the surface projection of the muscle after shaving and cleaning. The electrodes were fixed and isolated by plastic films and strapping tape, being used a complete swimsuit. The data was assessed by surface EMG, recorded by a water protected 8-channel system, with a sample frequency of 1000 Hz. All information was processed by the Acknowledge 3.9.1 software, being the data filtered with a pass-band (5-500 Hz). Afterwards, for its analysis, it was determined the mean frequency of stimulation of the muscular fibres during the time window corresponding to a stroke cycle for each 25m lap. The mean frequency was computed for every muscle in each stroke cycle analyzed (using the Fast Fourier transform spectral analysis algorithm). The relationship between mean frequency and the studied laps was assessed using linear regression analysis and Pearson correlation coefficient ($p \leq 0.05$ was accepted).

RESULTS It was found high inverse correlation values between mean frequency and the laps for the flexor carpi radialis ($r = -0.71$, $p = 0.049$), biceps brachii ($r = -0.80$, $p = 0.018$), triceps brachii ($r = -0.96$, $p < 0.001$), pectoralis major ($r = -0.70$, $p = 0.05$), upper trapezius ($r = -0.89$, $p = 0.003$), rectus femoris ($r = -0.87$, $p = 0.005$), biceps femoris ($r = -0.76$, $p = 0.031$) and tibialis anterior ($r = -0.80$, $p = 0.017$) muscles.

DISCUSSION & CONCLUSION These facts evidence a significant involvement of the studied muscles in this specific swimming technique, as well as a progressive installation of internal fatigue during the 200m front crawl distance. These fatigue electromyographic analysis could be useful to assess the swimmer's individual neuromuscular limitations along swimming exercise.

KEY WORDS Fatigue, EMG, Swimming

Relationship between intracyclic velocity variation and arm coordination in 200m front crawl

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OBJECTIVE Intracyclic velocity variation (IVV) is an up-to-date biomechanical parameter used to characterize swimming technique. From this point of view, front crawl is the most efficient technique since its actions allow more continuous propulsion: the arms move rhythmically in an anti-phase inter-limb relationship, reflecting an intrinsic coordination mode. Indeed, movement coordination emerge as a consequence of the constraints imposed on each action, reflecting a propensity towards self-organizing optimality in biological systems. The purpose of this study was to establish the relationship between the IVV and arm coordination (using the Index of Coordination parameter - IdC) throughout a 200m front crawl maximal effort.

METHODS Six male swimmers of national level (20.2 ± 1.94 years old, 70.5 ± 5.86 kg, 176.4 ± 6.46 cm, 183.6 ± 6.30 cm of arm span, and $10.1 \pm 2.34\%$ of fat mass) performed a 200m front crawl test at maximal intensity. Tests were conducted in an indoor 25m swimming pool, being the swimmers monitored when passing through a specific pre-calibrated space six stationary video cameras (two surface and four underwater, Sony® DCR-HC42E). One complete arm stroke cycle, without breathing, was analysed in each 50m length, being assumed a six-beat kick synchronization. An anthropometric model of 21 points was adopted and digitized with APASystem (Ariel Dynamics, USA) at a frequency of 50 Hz, manually and frame by frame. Image coordinates were transformed to 3D object-space coordinates using the DLT algorithm. Afterwards, data was smoothed by a low pass digital filter of 6Hz. IVV was determined through the coefficient of variation of the velocity of the centre of mass in x, y and z axes. After the data normality was verified, a

one way repeated measures ANOVA was used to compare IVV and IdC along the test. Regression equations, as well as its coefficients of determination and Pearson correlation coefficients, were computed to assess the relationships between IVV (x, y, z) and IdC. The level of statistical significance was set at $p < 0.05$.

DISCUSSION & CONCLUSION The analysis of IVV throughout the 200m front crawl effort revealed a non-significant difference between laps in the three axes of motion and significant differences for the IdC between each 50m length. These results are in accordance with previous (unpublished) data from our group. The main finding of this study was non-correlation between IVV and IdC for the three axes, suggesting that the stability of the IVV was ensured by changes in the arm coordination. The high inter-variability of IdC suggests future studies with larger samples.

KEY WORDS Intracyclic velocity variation, arm coordination, swimming

Tethered swimming in crawl: Arm stroke propulsive force at different 5 swim rates

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OBJECTIVE A swimmer's performance results from the interaction of propulsive and resistive forces, which can only increase by reducing the resistive forces, or increase the propulsive forces (Toussaint, 2006). Researchers have developed many methods for this type of evaluation, tethered swim (Dopsaj et al., 2003, Taylor et al., 2001) and Mad-System (Toussaint, 2006).

METHODS Six males swimmers of the portuguese national team (21.8±9yrs, 73.64±6.9 bm, 182.26±6.1bh) performed only the arm crawl swimming task, on an ergometer without breathing, with tied and supported legs, and with the head placed in a helmet containing a sensor of force, connected to a computer. The frequency increment was set at 5 cycle/min(C/M) from 35C/M to 55C/M. Four underwater cameras were used to kinematical analysis with APAS. Descriptive statistics were used, and Pearson correlation to identify the correlation between the increase of the propulsive force and swim rate, with a level of significance of $p < 0.05$.

RESULTS The swimmers reaches a high value of propulsive force in the entry of the arm due to join the insweep and upsweep action of the other arm. The 45 C\M is the rate that reach a higher propulsive force, while the insweep action on the 55 C\M rate is where the swimmers reach the maximum propulsive force. The correlation between the increase in strength and the swim rate was significant ($r = 0.754$, $p < 0.05$).

DISCUSSION & CONCLUSION The most effective swim rate is the 45C\M which the swimmer can develop greater propulsive force (128.01 N) whether or not the fastest swim rate analyzed, and the insweep action is the most propulsive on all stroke phases.

KEY WORDS Tethered Swim; Propulsive Force; Crawl; Swimming Biomechanics

Handgrip is associated with swimming performance in female elite swimmers but not in male

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OBJECTIVE Several authors have been trying to isolate, from a wide range of variables, those which determine mostly the success in competition. The hand grip isometric strength, long used as a measure of total body strength was, recently, associated with swimming performance in young and elite master swimmers. In this context, the aim of this study was to associate the hand grip isometric strength with swimming performance in male and female elite swimmers.

METHODS 35 elite Portuguese swimmers from both genders were selected (19 males and 16 females, 18.8 ± 3.2 years). For each subject the grip strength in both hands was measure using an adjustable mechanical hand dynamometer. The best performance in 100, 200 and 400 meters front crawl were used as dependent variables.

RESULTS Our results show, in females, a relationship between right grip strength and swimming performance in 100 meters front crawl ($r = -0.562$, $p = 0.029$). There was no relationship between swimming performance in longer distance competitive events (200 or 400 meters) or among males ($p > 0.05$).

DISCUSSION & CONCLUSION Despite the general type of this strength assessment, grip strength seems to be a good and stable estimator of swimming performance in short distance events, namely in elite female swimmers.

KEY WORDS Swimming, handgrip, genders

Comparison of body mass index between swimmers and non-trained individuals with down syndrome

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OBJECTIVE Overweight and obesity are predisposing factors for the development of several debilitating diseases. A standardized estimate of an individual's relative body fat assessed from his height and weight - the Body Mass Index (BMI) - has become a useful and simple measure to estimate overweight and obesity. Moreover, studies report that obesity is prevalent in individuals with Down Syndrome. The purpose of the present study was to compare the BMI between Down Syndrome competitive swimmers and non-trained Down Syndrome individuals.

METHODS Six swimmers (19.8 ± 4.5 years old, 2.5 ± 2.0 years of training background, 5.2 ± 1.2 training units per week - being each unit composed of 1.4 ± 0.2 h of water training and 0.9 ± 0.4 h of dry land training, namely flexibility and/or weight lifting), from the Down Syndrome Portuguese swimming team and 10 Down Syndrome non-trained individuals (19.6 ± 2.9 years old) were evaluated. The assessed anthropometric characteristics were height and weight, from which BMI was calculated [$BMI = (\text{weight (kg)} / \text{height (m)}^2)$]. A non-parametric Mann-Whitney test was used to compare the anthropometric differences between the swimmers and the non-trained individuals (a significance level of $p \leq 0.05$ was accepted).

RESULTS Mean and SD values of weight, height and respective BMI were: (i) 58.4 ± 14.1 kg, 154.3 ± 12.1 cm and 24.3 ± 4.1 BMI for the swimmers' group and (ii) 74.3 ± 8.1 kg, 143.4 ± 9.5 cm and 36.8 ± 5.3 BMI for the non-trained group. As expected, differences between the two groups were observed in weight ($p = 0.016$) and BMI ($p < 0.001$).

DISCUSSION & CONCLUSION In fact, the higher BMI in non-trained group seems to indicate that a sedentary way of life contributes to obesity. Indeed, subjects with Down Syndrome that are physically active (involved in regular swimming practice) had a BMI in normal weight score for the general population, being, nonetheless, higher when compared with swimmers without disability. Therefore, regular competitive swimming training seems to be significant to achieve a fit weight among Down Syndrome population, being advised their increasing participation namely for health purposes.

KEY WORDS Down syndrome, adapted swimming, obesity, BMI

Stability of patterns of behavior in the butterfly swimmers

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OBJECTIVE The purpose of this study was to find patterns in the swimming technique of butterfly, with an adaptation of the Behavioral Observation System Tech. This, as a instrument for ad-hoc qualitative analysis enables the study of the stability of the technical implementation, an applicant in optimization sport. When used in the training of swimmers, can turn, reduce the variability in behavioral tuning technique of swimming. Through the analysis of temporal patterns (T-pattern) and a sequence of five cycles run at maximum speed hand, studied the behavior of four technical elite swimmers in Portuguese, with a record 259 alphanumeric codes and a total 160 configurations. The structure of the original instrument based on a mixed system of categories and formats Field, which can record technical features observed during the execution of hand cycles. The validity was ensured through the index of intra-observer reliability (95%) and inter-observer accuracy (96%). To detect patterns exist, each swimmer, using the Theme 5.0 software, which allowed to identify the stable structures of technical performance within a critical interval of time ($P < 0.05$) - t-patterns.

METHODS Through the analysis of temporal patterns (T-pattern) and a sequence of five cycles run at maximum speed hand, studied the behavior of four technical elite swimmers in Portuguese, with a record 259 alphanumeric codes and a total 160 configurations. The structure of the original instrument based on a mixed system of categories and formats Field, which can record technical features observed during the execution of hand cycles. The validity was ensured through the index of intra-observer reliability (95%) and inter-observer accuracy (96%). To detect patterns exist, each swimmer, using the Theme 5.0 software, which allowed to identify the stable structures of technical performance within a critical interval of time ($P < 0.05$) - t-patterns.

RESULTS The patterns were different, adjusting to the characteristics of technical implementation of the swimmers. Found that the swimmer can make settings with different levels of complexity of structure, depending on the implementation of changes within the hand cycle. Variations of codes in each configuration obtained using the SOCTM,

determine the differences between swimmers.

DISCUSSION & CONCLUSION However, the records show a clear behavioral similarity compared the result with a general pattern of the butterfly technique. Conclusion: As we can see that the potential quality of this instrument is evident by the patterns obtained from a temporal sequence.

KEY WORDS Technical Analysis, Patterns, Butterfly, Chronology

Kinematical constrictions during breaststroke swimming with a portable gas analyzer snorkel

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OBJECTIVE To determine the kinematical constrictions in maximal breaststroke swimming bouts with the AquaTrainer® snorkel (Cosmed, Rome, Italy).

METHODS Seven national level breaststrokes performed two maximal bouts of 100-m swims (separated by 48 hours): (i) one bout connected to the AquaTrainer® snorkel (constricted swim); (ii) one bout without the snorkel (free swim). The swims were videotaped in sagittal plane with a pair of cameras providing a dual projection from both above and underwater. The study comprised kinematical analysis of stroke cycles using APAS and a VCR (f = 50 Hz). To create a single dual projection image, the independent digitalization from both cameras was reconstructed with the help of a calibration volume and a 0.01). The $\pm 2D$ -DLT algorithm. Digitalization reliability was high (ICC=0.97 following measures were assessed: (i) swimming performance (T100); (ii) stroke parameters (stroke cycle period, stroke rate, stroke length and mean swimming velocity); (iii) estimated swimming efficiency by the swimming index; (iv) speed fluctuation (dv) and the mathematical characterization of dv. Mean dv curves normalized to time were computed with MATLAB. The polynomial regression (7th power) between dv and normalized duration of the full stroke cycle was calculated. Wilcoxon tests were performed to compare significant differences in the dependent variables (performance, stroke mechanics and efficiency variables) according to the independent variable (free versus constricted swim) ($P \leq 0.05$).

RESULTS T100 was significantly higher for constricted swimming than in free condition (6.26%; $Z = -2.366$; $P = 0.02$). The remaining variables showed no significant differences between the two swimming conditions. In both exercise conditions, dv was characterized by a bi-modal profile. The determination coefficients for the dv mathematical model were significant ($P < 0.01$) and 0.47.

DISCUSSION & CONCLUSION None of the stroke mechanics and efficiency variables evaluated presented significant differences between both swimming conditions. The AquaTrainer® constrictions might be related mainly to the start and turn phases. (Supported by FCT grant: POCI/DES/58362/2004)

KEYWORDS Kinematical constrictions, swimming performance, stroke parameters, AquaTrainer snorkel, breakstroke

Relation between energy expenditure and time spent in physical activity and fitness in middle age adults

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OBJECTIVE Physical fitness is often considered as a good measure of individual physical activity. The aim of the study was to assess the relations between energy expenditure and time spent in physical activity of different intensities and aerobic fitness indicators in adults.

METHODS In the sample consisted of employed urban living adults (31 men and 20 women aged 40 ± 3.7 years). Relation between energy expenditure and time spent in physical activity (PA) and fitness were analyzed. Energy expenditure (EE)-total relative EE (TEErel) and relative EE during PA (AEErel), and the time spent sedentary and in low (1.5-3MET) moderate (3-6MET) and high (> 6 MET) intensity PA was measured by combined system Sense Wear Armband™ (Body Media, Pittsburgh, PA) during seven consecutive days. Aerobic fitness indicators – maximal oxygen uptake ($VO_{2maxrel}$), aerobic threshold (VO_{2AT}) and anaerobic threshold (VO_{2AnT}) were determined during direct treadmill spiroergometric testing using K4 Cosmed equipment.

RESULTS To reveal the relations between EE and aerobic fitness indicators Pearson's partial correlations controlled for gender were calculated. The results showed significant positive correlations between the EE indicators (total and EE

during activity) aerobic fitness indicators. The time spent in sedentary activities was significantly negatively correlated with VO_2maxrel and VO_2AT . The time spent in low intensity activities didn't show significant correlations with aerobic fitness indicators. Moderate activity was partially correlated with VO_2maxrel ($r=0.36$) and VO_2AT ($r=0.43$). Only time spent in vigorous activity was significantly correlated with VO_2AnT .

DISCUSSION & CONCLUSION Activities of at least moderate intensity were positively connected with aerobic fitness indicators. Only vigorous activity was related to anaerobic threshold.

KEYWORDS Energy expenditure, physical activity, physical fitness

Ventilatory responses to incremental exercise during menstrual cycle of active and inactive females

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OBJECTIVE The effects of menstrual cycle hormones on exercise performance have been studied previously. However, the results remain controversial. Particularly, the respiratory responses to progressive intensity exercise have shown inconsistent results. It is thought that the higher levels of circulating estrogen and progesterone are the stimuli for altered ventilatory responses during the luteal phase of the cycle. Our purpose is to compare the ventilatory equivalents in the early follicular and luteal phases of active and inactive females' during incremental exercise.

METHODS Twenty healthy active and inactive Females volunteered to participate in the study. Recruitment will be limited to young (19-25yrs) with no known history of cardiopulmonary, metabolic or musculoskeletal disease. Furthermore, The luteal phase was determined by the level of Progesterone, Prolactin, FSH and LH hormones in blood samples. The pulmonary gas analyzer (K4B2) was applied to measure the, minute ventilation (VE), ventilatory equivalents (VE/VO_2 , VE/VCO_2) in two phases. An incremental graded exercise test was conducted on a cycle ergometer in menstrual phases.

RESULTS T-test was performed to detect baseline differences across menstrual phases. The results indicated no significant differences ($p>0.05$) in minute ventilation and ventilatory equivalents across the menstrual cycle of active and inactive females.

DISCUSSION & CONCLUSION There were no significant differences in gas exchange variables during incremental exercise test between the early follicular and luteal phases of active and inactive females. These results provide additional data suggesting that the timing of the menstrual cycle phase may not be as critical as once thought when designing future exercise ventilation studies. This may have important implications for individuals whose work, athletic competition, or recreation schedules.

KEY WORDS Menstrual cycle, incremental exercise, females

The relationships between squat jump and short sprint performance in trained track and field athletes

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OBJECTIVE In many team sports and track and field (T&F) events, sprints most frequently occur over short distances from both standing and rolling starts. Although squat jump (SJ) has been extensively used in training, data concerning kinematics factors across a sample of T&F is scarce. The goal of this study was to examine the relationship between short sprint performance and kinematics of SJ exercise in a sample of trained T&F athletes.

METHODS 13 T&F athletes (range 20-28 years) were asked to perform 3 maximal SJ weighted jumps (17kg) while ground reaction forces were sampled using a portable force platform. During a testing session, T&F performed three trials with 3 minutes of rest between each jump. Only the best attempt was taken to analysis. Jumping height, peak force, peak power, average power, and impulse were analyzed during the concentric phase. In addition, sprint testing was required to perform 3 maximum effort sprints (30 and 40m). Here, only the best sprint was considered for each distance. Correlations were determined using Pearson product-moment correlation coefficient. Statistical significance was accepted at $p<0.05$ for all analysis.

RESULTS Significant correlations ($r=-0.60$ and $r=-0.78$; $p<0.05$) were observed between SJ performance and 30 and 40m sprints, except for impulse and peak power ($p>0.05$).

DISCUSSION & CONCLUSION As predictors, is important that the peak force, peak power, and velocity produced during the SJ must be maintained with high values to explain sprint performance in short distances. However, more noticeable was the non significant predictive value of the peak power out put for 30m.

KEY WORDS Squat jump, sprint, track and field

The relationships between sprint run and countermovement jump kinematics in elite track and field athletes

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OBJECTIVE During the past 50 years countermovement vertical jump (CMJ) has been extensively used in training and testing. However, there is a paucity of research examining the relationships between sprinting and jumping performances. In addition, data concerning kinematics factors across trained subjects is scarce. The aim of this research was examine the relationship between sprint run and kinematics measures on CMJ performance in a sample of trained track and field (T&F) athletes.

METHODS 10 elite T&F athletes (range 22-27 years) were asked to perform 3 maximal CMJ weighted jumps (17kg) while ground reaction forces were sampled using a portable force platform. During a testing session, T&F performed three trials with 3 minutes of rest between each jump. The best two jumps were taken to analysis. Jumping height, peak force, peak power out put, average power out, and impulse were analyzed during the concentric phase. In addition, sprint testing was required to perform three maximum effort sprints of 30 and 40m. Only the best sprint was considered for each distance. Correlations were determined using Pearson product-moment correlation coefficient. Statistical significance was accepted at $p < 0.05$ for all analysis.

RESULTS Significant correlations ($r = -0.688$ and $r = -0.91$; $p < 0.05$ and $p < 0.01$) were observed between 30 and 40m sprints and CMJ performance, except for impulse ($p > 0.05$).

DISCUSSION & CONCLUSION As predictors, is important that the force and power produced during the concentric phase must be maintained with high values to explain sprint performance in short distances. Nevertheless, more noticeable was the non significant predictive value of impulse. These readings suggest that the positive impulse is not a major variable in predicting CMJ performance.

KEYWORDS Countermovement jump, sprint, track and field

Study regarding the morpho-functional changes occurring after sport retirement in Romanian elite athletes

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OBJECTIVE Sport performance represents a temporary activity during lifespan, due to inevitable constraints such as loosing of eligibility, injuries or aging per se. Taking into account the medium and long time physiological evolution of the retired athletes represents an important objective for sport professionals, offering the basis of a prophylactic approach of these individuals, who show sometimes fragility in the passing process to a new life style.

METHODS We evaluated the morpho-functional changes occurring after sport retirement using a semi-structured interview, anthropometrical measurement (weight, body mass index, thoracic perimeters, range of motion for major joints) and functional tests (electrocardiography-EKG, spirometry, posturography and hand dynamometry) on 50 Romanian elite athletes. The experimental group (sex ratio 1/1, average age 37,8 years) consists of athletes from different sport branches such as soccer, handball and volleyball, in the first 10 years after sport retirement. We compared the tested parameters with old recorded data (when the athletes were active), using the chi square test.

RESULTS We ascertained significant changes ($p < 0.05$) regarding the athletes' morpho-functional status: weight gain (35% of the athletes), EKG borderline abnormalities (30%), reduced spirometric parameters (20%), rising area of the statokinesigram (20%) and self-image deterioration (25%).

DISCUSSION & CONCLUSION The deconditioning of the retired athletes is potentially dangerous because it determines a level of physiological deterioration of the athletes, in absence of the habitual stressing factor represented

by the physical training. Athletes' deconditioning syndrome is a reality with large implications, associating cumulative risk factors for the sport retirement pathology.

KEY WORDS sport, retirement, deconditioning, athletes

Flexibility asymmetries of the lower extremities in professional soccer players

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OBJECTIVE Almost every soccer player possesses some degree of functional footedness, which leads to consistent asymmetrical loads and significant anatomic and functional adaptations in the musculoskeletal structures of the lower extremities. Gradually, these adaptations induce a potential impact to the mechanisms of injury, also by means of flexibility asymmetries. The purpose of this study was to investigate selected flexibility asymmetries in the lower extremities of professional soccer players.

METHODS Ninety (90) professional soccer players of the 3rd Greek National Division (age 23.4 +/- 4.8 years; height 1.78 +/- 6.7 cm; body mass 74.2 +/- 7.6 kgs) participated in this study. Flexibility measurements were taken using a universal goniometry for hip, knee and ankle joint

RESULTS Significant flexibility asymmetries were found between the dominant and the non-dominant side. The dominant leg was more flexible only in hip internal and external rotation, while the non-dominant leg was more flexible in all other joint measurements with a significant difference in hip flexion (87.3 deg. vs 89.37 deg, p<0.05) and hip abduction (50.76 deg. vs. 57.72 deg, p<0.01).

DISCUSSION & CONCLUSION Professional soccer players tend to demonstrate significant muscle flexibility asymmetries. During soccer practise power movements are accumulated with higher shifts of mechanical impact not only to the preferred side but also to the non-preferred one. Interestingly, this laterality process produces significant flexibility adaptations on the femoral muscles "in favour" of the non-dominant side. The findings are discussed with regards to their potential implication for injury prediction in soccer players.

KEY WORDS Soccer, Flexibility, asymmetries

Knee and ankle isokinetic strength asymmetries in professional soccer players with right footedness

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OBJECTIVE Nearly every soccer player possesses some degree of functional footedness, which leads to consistent asymmetrical workloads and significant adaptations in various aspects of functional muscle capacity in the lower extremities. The purpose of this study was to investigate selected strength asymmetries in the lower extremities of professional right-footed soccer players.

METHODS Seventy-nine (79) Greek professional soccer players comprised the right-footed subgroup selected via a footedness-specific questionnaire out of a larger sample of 104 athletes totally studied. Maximum voluntary extension and flexion concentric torque of the knee (60, 180 & 300 deg / sec) and ankle (60 deg / sec) was assessed bilaterally

RESULTS Significant isokinetic muscle strength asymmetries were found between the dominant and the non-dominant side for knee extension at 60 deg/s ((244.8 +/- 37.6 Nm vs. 238.3 +/- 35.3 Nm, p<0.05) and knee flexion at 60 deg / sec (142.2 +/- 28.4 Nm vs. 137 +/- 27.9 Nm; p<0.05) and at 180 deg / sec (107.7 +/- 18.2 Nm vs. 103.5 +/- 18.7 Nm; p<0.05). In all cases the knee extensors and flexors of the dominant leg were stronger than those of the non-dominant leg. No significant asymmetries were found for the rest of the variables regarding the ankle measurements.

DISCUSSION & CONCLUSION Our study confirmed the presence of muscle strength specific asymmetry in the lower extremities of right-footed soccer players. Soccer players with a definite right-footed dominance tend to demonstrate significant muscle strength asymmetry in favour of the dominant side under low angular velocity concentric contractions.

KEY WORDS Soccer, lateralities, strength asymmetries

The effect of aerobic training on improvement of the balance in Multiple Sclerosis patients

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OBJECTIVE MS is a disease of central nerve system which involves brain and spinal cord. The cause of this disease is still unknown. This cause makes disorder in conducting nerve and electrical current by destroying myelin and consequently. Studies on MS patients began in 1868 by Sharcot. In a research which was done on 112 M.S patients by Rosava (2004) the finding showed a relative improvement in balance of M.S patients after 8 week of aerobic training Purpose study the effect of an aquatic exercise for 8 weeks, on the improvement balance of female MS patients .

METHODS It is an applied research with semi-experimental method. From 100 MS patients, 25 people on the basis of illness degree and age range were selected randomly with EDSS 1-4 with average illness time of (41) and age range of (20-50) years. They were divided into two groups. Experimental group consists of 15 people and controlled group consists of 10 people. The experimental group participated in the exercise for 8 weeks, three sessions per week with intensity of 40-50 percent of the maximum heart-beat rate. Stabilometer device was used to measure the balance in experimental and controlled groups before and after exercise. The gathered data were analyzed by using descriptive statistic and dependent sample t- test. **RESULTS** The research has shown that after 8 weeks, in the experimental group the balance was meaningfully improved ($P < 0.01$).

DISCUSSION & CONCLUSION Considering the results of this research, which has caused an improvement in the balance MS patients with low EDSS. So it seems necessary to apply an aquatic exercise for such patients. Therefore, it is recommended these exercises to be used by specialists as a supplementary remedy beside medical treatments for MS patients.

KEYWORDS Multiple sclerosis, aquatic exercise, balance

Acute effects of static and ballistic stretching on strength-power and sport specific performance parameters in elite female fencers

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OBJECTIVE Stretching as a part of a pre-exercise warm-up routine has become traditional practice in multitude sports. Recent studies have shown that stretching actually create acute decreases in strength and jumping performance. Only a few studies have investigated performance related parameters. The purpose of this study was to examine the effects of different modes of stretching on strength-power and fencing specific performance related parameters in 10 elite female fencers.

METHODS The subjects were tested for squat jump (SJ), countermovement jump (CMJ), drop jump (DJ), time of lunge, power of lunge and time of shuttle fencing test, after different warm-up protocols consisting of static or ballistic stretching. Subjects underwent 3 repetitions of 3 static or ballistic stretching exercises for quadriceps, hamstring and the gastrocnemius muscles lasting for 20 s with a 20 s rest period each. Data were analyzed using a 2 (pre-post) x 2 (static-ballistic stretching) analysis of variance and post-hoc t-test with Bonferroni corrections. Significant was set at $\alpha = 0.05$ probability level.

RESULTS There were not pre-post significant differences in flexibility, drop jump and contact time of the drop jump, elasticity (CMJ-SJ), time and power of lunge, shuttle specific fencing test after static stretching protocol. On the other hand, significant pre-post differences were observed in SJ (24.7 ± 3.1 vs. 23.6 ± 3.1 , $p < 0.05$) and CMJ (29.71 ± 4.9 vs. 28.02 ± 4.4 , $p < 0.05$) after static stretching while ballistic stretching did not affect strength-power parameters and fencing performance.

DISCUSSION & CONCLUSION Given these data, it is advisable that fencers avoid any static stretching in the later stages of a general warm-up, while ballistic stretching seems to be not beneficial in improving fencing performance.

KEY WORDS Fencing, warm-up

Effect of different rest intervals during resistance training on Insulin-like Growth Factor-1, Cortisol, Creatine Kinase and Blood Lactate

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OBJECTIVE It has been well known that the stress of heavy-resistance exercise has a potent effect for both strength development and muscle fiber hypertrophy. This may be due, at least in part, to exercise induced acute increase in serum anabolic hormone. Therefore, the purpose of this study was to compare the effects of three different rest intervals on IGF-1, cortisol (CO), Creatine Kinase (CK), and blood lactate concentrations.

METHODS Hence, ten recreationally strength-trained men (age=20.37 ± 2.44 years, body mass= 65.6 ± 26.70 kg) volunteered as subjects that in 4 separate sessions with 48 h from each other performed 4 different resistance trainings (RT). In the first session, one repetition maximum (1RM) was determined. From second to forth session, subjects performed 4 sets of squat and bench press with 85% of 1RM until exhausted and one of the rest intervals (60, 90 and/or 120 second) was used in a random order between sets.

RESULTS It wasn't observed a significant difference among the three programs in IGF-1 concentration. However, it was observed a significant increment of 3.6 and 23 percent in IGF-1 concentration immediately and 30 min after exercise during RT with 60 s rest between sets. CO concentration in protocols with 60 and 90 s rest increased significantly more than 120 s protocol. CK and blood lactate concentration changes weren't differing between protocols but post exercise CK concentration significantly increased in each protocol.

DISCUSSION & CONCLUSION Growth factors, including IGF-I are known to be mediators of satellite cell activation, increased protein synthesis, decreased protein degradation, hyperplasia, and myofibril hypertrophy during muscle growth and development (Jennische, 1987). The response of IGF-I to acute RT is less clear. In the present study, although postexercise values of IGF-1 during three protocols increased but IGF-1 concentration changes immediately after protocols were significant only in RT program with 60 s rest between sets, which was consistent with the results of Boroujerdi & Rahimi (2008). Based on the findings could be said that heavy RT (4 sets × 85% of 1RM) with short rest between sets was resulted higher increases in IGF-1, CO concentration and muscle fiber injury. Because of acute hormonal responses to RT augmented training-induced adaptations, these results shows that rest interval between sets may be resulted in long-term increases in muscle size and strength. Also, because of these two hormones stimulate muscle protein synthesis, so this type of training was recommended to athletes who train in order to gain muscle hypertrophy.

KEYWORDS Insulin-like Growth Factor-1, Cortisol, Creatine Kinase, Rest Intervals between sets

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A case report: Effects of Intermittent hypoxic exposure on anaerobic performance of two orienteering athletes

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OBJECTIVE Introduction Intermittent normobaric hypoxic exposure has been used for increasing anaerobic sportive performance of athletes. The results from previous studies have been conflicted. The purpose of this study was to evaluate the effectiveness of intermittent normobaric hypoxic exposure on anaerobic performance of two orienteering athletes.

METHODS Methods Two orienteering athletes participated in this study aged 21 and 23 years. Participants underwent clinical and instrumental diagnosis excluding any cardio-respiratory problems. The participants breathed the hypoxic gas mixture in 5-min intervals interspersed with 5-min recovery periods of normal room air for a total of 60 minutes at each session 3 days per week for a 3-week period. The percent of the oxygen in the hypoxic gas concentration was at %13 during the intervention. We evaluated anaerobic performance by using peak power (PP), mean power (MP) before and after the study. Hemoglobin (Hgb) and hematocrit (Htc) were also measured.

RESULTS Results PP and MP of the first athlete increased %8.6 (5.18 -5.62) and %6.7 (9.65-10.29) respectively. The other's values showed the following increases %9.1 (4.50-4.94) and %7.8 (8.64-9.61) respectively. Hgb and Htc also improved (the first athletes' %5.2 and %6.7; the others %7.3 and %8.3)

DISCUSSION & CONCLUSION Conclusion The effect of 3 weeks intermittent hypoxic exposure used in this study seems to improve anaerobic performance and hematological parameters. It is necessary to confirm these results by using with control group studies.

KEY WORDS intermittent hypoxic exposure, anaerobic performance

Evaluation of postural status and general health of students

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OBJECTIVE It is shown that incorrect motor habits, weaknesses of abdominal or back muscles usually result in postural abnormalities, and these may affect social communications. It is believed that modification of these abnormalities can improve general health.

METHODS Aim of this research was to investigate postural status of students, therefore 44 girls and 43 boys were randomly selected and was evaluated by using posture screen, Conformator apparatus, flexible ruler, and NewYork test. We measured the general health of participants by GHQ-28 questionnaire of Goldber & Hilier. It is applied Chi Square test and Spearman correlation coefficient for extraction of results

RESULTS We observed that degree of scoliosis ($P<0.04$) and lumbar pain ($P<0.01$) of girls is higher than boys, but there are no differences between their kyphosis and lordosis. There was a significant negative correlation between degree of kyphosis and general health ($r=-0.26$, $P<0.01$) and a significant negative correlation between degree of lordosis and physical signs ($r=-0.33$, $P<0.004$). In addition, there was a significant negative correlation between degree of lordosis and housework ($r=-0.30$, $P<0.05$), degree of kyphosis and upstairs ($r=-0.22$, $P<0.04$), degree of scoliosis and daily physical activity ($r=-0.30$, $P<0.004$).

DISCUSSION & CONCLUSION This study revealed the relative distribution of posture abnormalities in the students and it is, therefore, recommended that they must learn relevant motor patterns, apply principles of proper daily movements, and try to carry out regular exercise in order to remove weaknesses of the abdominal and back muscles.

KEYWORDS Body Status, General Health, Physical Activity.

Effects of aerobic-step trainings on the body composition, physiological and psychological characteristics of middle-aged healthy women

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OBJECTIVE Aerobic-Step trainings are cardiovascular programmes that provide a high energy cardio workout to music, and features high intensity intervals followed by muscle conditioning tracks designed to shape and tone the entire body while pushing fat-burning systems into high gear. The purpose of this research is to study of aerobic-step trainings on the body composition, physiological and psychological characteristics of middle-aged healthy women.

METHODS 15 regularly active women in the aerobic-step trainings and 15 sedentary women participated in the study. We applied Mann-Whitney U test for comparing groups and statistical significance was accepted if $P<0.05$.

RESULTS Results show that aerobic-step trainings significantly decreased waist to hip ratio($p<0.03$) and waist circumference($p<0.01$), and also significantly increased flexibility($p<0.004$), strength of back muscles($p<0.002$), endurance of shoulder muscles($p<0.003$) and maximal oxygen uptake($p=0.000$). Furthermore, it is revealed that aerobic-step trainings significantly improved ($p<0.05$) mood states in the context of depression, tension, fatigue, confusion and vigor.

DISCUSSION & CONCLUSION In conclusion, participation in the aerobic-step trainings for 3 months, 3 session per week and each session minimally 45 minutes will be associated to beneficial improvements in the most physical, physiological and psychological characteristics of middle-aged women. However, more improvement needs increasing of training frequency and focuses on the strength enhancement of the upper body.

KEYWORDS Aerobic-Step Trainings, Psychological Adaptations, Physiological Adaptations.

Determinaion of the best pre-jump height for two-legged vertical jump

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OBJECTIVE High jumping ability is a very crucial advantage in many sporting activities. The purpose of this study was to examine the effect of different pre-jump heights on two-legged vertical jump and to determine the best pre-jump height(s).

METHODS Subjects included 35 females and 45 males. By matched randomized sampling, subjects were assigned in 4 groups, namely: control, 10 cm pre-jump, 20 cm pre-jump, and 30 cm pre-jump. Every group participated in their own specific training program for 6 weeks. Statistical analyses were based on analysis of variance. Mean (\pm SD) of weight and height for males vs. females were 67.3 (\pm 1.22) vs. 55.8(\pm 0.96) Kg and 177 (\pm 0.93) vs. 163(\pm 0.71) cm, respectively.

RESULTS The results showed that both groups of males and females had a significant increase in their post tests compared to pre-tests ($p < 0.05$). It was shown that jumps with pre-jump were generally better than jumps with no pre-jump, anyway no significant difference was found among pre-jumps of 10, 20, and 30 cm heights. Therefore, we concluded that since 10 cm pre-jump consumes less energy, it is more advantageous. Especially in the competition, where players need hundreds of consecutive jumps, 10 cm pre-jumps will make them less tired.

DISCUSSION & CONCLUSION In present study, for both sexes, the rate of spike improvement was much better in experimental groups than control groups. It was independent from the rate of progress in jump which was relatively less. It is likely that rather than increasing jump height, training enables the players to use more of their jump potential during the game.

KEYWORDS two-legged vertical jump, pre-jump height

Determination of proper hieght of jump for plyometric training

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OBJECTIVE Jumping in different directions is very important in many sports. Also jumping plays an important role in most ball games and some non-ball games. Plyometrics is known as the best training method for development of explosive power. One of the problems here is how to determine the intensity of training to increase the efficiency of training and to reduce the chance of injury at the same time. The purpose of this study was to determine the proper height of jump for ten repetitive jumps over hurdles.

METHODS 78 male (36) and female (42) university students (height: 1.70 ± 0.08 , weight: 62.09 ± 8.93) voluntarily participated in the study. The subjects performed two different height jumps, namely 1 repetition maximum (1RM) and 10 repetitions maximum (10RM) height jumps. Tests were administrated in two different sessions with 48 hours rest between them.

RESULTS Considering the rate of drop in height of 10RM compared to 1RM jump, statistical analysis showed there were 3 groups of individuals, namely under 15 cm, 20-25 cm, and more than 30 cm drops. Correlation matrix of anthropometric and other measures of the study showed that the best correlation was found between 1RM and 10RM jumps height. It meant that we could estimate 10RM height jump by only knowing the 1RM jump height. This finding was also verified by discriminant analysis. It showed that for 59% of cases, 1RM jump could correctly determine the 10RM grouping.

DISCUSSION & CONCLUSION The rate of drop in height of repetitive jump compared to 1RM jump is varied (from 10 to 35 cm) in different individuals. The best predictor of the rate of drop is 1RM performance; simply the more the 1RM, the more the rate of drop. Anyway, some other unknown variables also play roles here. This study showed it had nothing to do with anthropometric measures. We suggest it is likely that the technique of jump which determines the energy cost of every jump should make a very important role in this regard.

KEY WORDS jump, jump height, plyometric training.

Effect of 12-Wk low intensity exercise with slow movement and tonic force generation: Is it possible to improve the motor functions in older men?

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OBJECTIVE Age-related sarcopenia results in functional weakness. Recently, low intensity resistance training with slow movement (LST) performed by older adults has proven effective for increasing muscle size and strength compared with a typical program (LN). Our goal was to determine whether motor functions in related activities of daily living are altered with periodized LST machine exercise in old men.

METHODS In this randomized control trial (RCT), 19 physically active old men aged 60-73 years were assigned into 2 groups and performed knee extension and flexion at low intensity (50% of one-repetition maximum) following two regimens proposed by Tanimoto et al. (2006): with slow movement (LST group); with normal movement (LN group). Muscle power gain and functional ability were measured before and after 12-wk intervention. Intention-to-treat analysis was performed ($P < 0.05$). **RESULTS** No pre-intervention differences were seen in all outcomes. Both LST and LN program improved 12% and 11% in leg press power, respectively. LST improved 4% in hand grip strength, while LN did not. LN improved 12% in stand and reach test, while LST did not. No significant changes were seen in 5 times sit-to-stand test, 1-leg balance time, and walking speed. We could not find any significant between-group differences.

DISCUSSION & CONCLUSION We conclude that 12-wk LST can improve muscle power and strength, but is not effective for optimizing functional abilities in active older men.

KEY WORDS slow movement, community-dwelling older men, motor function, RCT, PRT

Relationship between isokinetic knee strength and vertical jump performance in 12-13 years old male football players

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OBJECTIVE The purpose of the study was to evaluate the relationship between isokinetic knee strength and vertical jump performance in 12-13 years old football players.

METHODS A total of 30 healthy football players (age= 12.73 ± 0.44 years, height= 150.53 ± 7.56 cm, body weight= 43.03 ± 6.89 kg, percentage of body fat= 10.54 ± 1.06 %) participated in this study. Isokinetic knee extension and flexion torques were determined at $60^\circ.s^{-1}$ and $180^\circ.s^{-1}$ (Cybex Norm 6000, USA). Beside this, the subjects was asked to do two different jumping types which composed of squad jumping (SJ) and counter movement jumping (CJ) by the use of Bosco test protocol (Bosco Contact Mat; New Test 1000).

RESULTS Results indicated a significant correlation between $60^\circ.s^{-1}$ dominant quadriceps peak torque and CJ ($r = 0.36$) ($p < 0.05$). Additionally, $60^\circ.s^{-1}$ non-dominant quadriceps peak torque was correlated with SJ, $r = .43$ ($p < 0.05$) and CJ, $r = .51$ ($p < 0.01$). But no significant correlation were found for $180^\circ.s^{-1}$ dominant and non-dominant quadriceps peak torque and vertical jump performance.

DISCUSSION & CONCLUSION The present study may be useful as comparison basis for future studies aiming evaluate the isokinetic muscle function in young football players. This finding provides new evidence in elucidating the relationship between strength and vertical jump performance, but it should be noted that while cybex test performed with one leg, the vertical jump test performed with two legs.

KEY WORDS Isokinetic strength, jump, young football players

Assesment of the effects of short training period by incremental intermittent maximal test in track athletes

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OBJECTIVE The study was aimed at assessing the outcome of short-term training period on oxygen uptake (VO_2), heart rate (HR) and lactate by using newly designed incremental intermittent maximal test.

METHODS Ten competitive middle and long distance runners aged 16-34 years were tested twice at the beginning (test1) and the end (test 2) of 14 days training period. The participants performed on a treadmill a series of increasing bouts of 2 min each with initial velocity of 4.8 $\text{km}\cdot\text{h}^{-1}$ separated by 40 sec pause to collect lactate samples, at work increments by 1.2 $\text{km}\cdot\text{h}^{-1}$ until exhaustion.

Results No significant differences in VO_2 and HR during exercise were observed in both tests. The highest VO_2 ($p<0.05$) was attained at exhaustion in test 2 ($3.76\pm0.30 \text{ l}\cdot\text{min}^{-1}$ vs $3.45\pm0.53 \text{ l}\cdot\text{min}^{-1}$). The maximal velocity (Vel_{max}) in both tests was 19.2 $\text{km}\cdot\text{h}^{-1}$. Lactate threshold (LT) defined as 2.5 mM/l and anaerobic threshold or the onset of blood lactate accumulation (OBLA) at 4.0 mM/l were found to be improved ($p<0.001$) from 50% to 62.5% Vel_{max} and from 62.5% to 81.2% Vel_{max} respectively, reflecting better training outcome.

DISCUSSION & CONCLUSION It appears that LT and OBLA are more informative estimates contributing to the assessment of the effects of short-term training period.

KEY WORDS Oxygen uptake, heart rate, anaerobic threshold, maximal treadmill test, middle and long distance runners

Body composition of visually impaired students

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OBJECTIVE Increased body fat in childhood is associated with significant preventable health risks. The purpose of this study was to estimate the body composition of students with visual disabilities as well the impact of the degree of visual impairment and the level of physical activity on it.

METHODS 190 visually impaired students (106 boys and 84 girls), 9-19 y aged, underwent anthropometrical measurements for determination of body composition. BF% was predicted by skinfold equations of Slaughter M. et al. (1988). The subjects were divided into 2 groups according to the severity of visual impairment (totally blind and with residual vision) and into 2 groups on the basis of whether participate in extracurricular sports or not. Statistical significance between means was tested by independent samples t-test.

RESULTS The results showed that 42% of the boys and 40,8% of the girls with visual impairment had BF% above the proposed by Slaughter M. et al. optimal range. BF% was higher in the subjects with total blindness than in these with residual vision in all age groups. BF% was optimal in pupils involved in sports activities, but had increased values in pupils, who do not practice sport. However, the degree of visual impairment and the physical activity level did not influence the lean body mass (LBM) of the assessed subjects.

DISCUSSION & CONCLUSION Almost a half of investigated children and adolescents with impaired vision have increased BF%. Residual vision and increased physical activity have impact mainly on the amount of BF, but have low influence on LBM.

KEY WORDS Body composition, visually impaired students, skinfold method

Effect a period of selective program training on body composition and physical fitness factors on non athlete women

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OBJECTIVE In this research the effect a period of selective program training (decreasing number of practice session versus increasing exercise intensity) was investigated over some factors of physical and physiological fitness (aerobic power, body fat percentage, flexibility of back muscles, endurance of abdomen muscles, endurance of shoulder girdle muscles, power of leg muscles and body mass index).

METHODS The among 18-22 year old non-athlete students of Ilam university 60 subjects were divided into 4 groups (3 experiment groups and one control group). The experiment groups exercised with certain intensity one, two and three sessions per week for 8 weeks. The exercise consisted of walking and running with certain speeds for each experiment group in a way that three session group exercised with low intensity, the two session group exercised with moderate intensity and the one session group did exercises with high intensity.

RESULTS The findings showed that in factors such as aerobic power, body fat percentage, body mass index and endurance of abdomen muscles the more the number of session and the less the intensity, it was among better results .

But in factors such as flexibility of back muscles, power of leg muscles, the more the intensity and the less the number of the session.

DISCUSSION & CONCLUSION The better results were obtained and in factor endurance of shoulder girdle muscles, this with two session practice showed better results.

KEY WORDS Exercise intensity, frequency, non-athlete women

Gender effect at the reaction time in the sedentary individuals

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OBJECTIVE Reaction time is considered a complex task. Reaction time is defined as the amount of time an individuals takes to respond and complete a movement after a stimulus has been presented. The aim of this study is to compare the the lower extremity reaction time in sedentary and healthy young women and men.

METHODS 25 women and 26 men college students, ages 18 to 26 years, were included to the study voluntarily. Age, height, weight, body mass index and ankle reaction time measurements were recorded. Lower extremity reaction time was measured with the Nelson Foot Reaction Test.

RESULTS While there were no significant differences between women and men in age and height values, the weight and body mass index values were higher in men. There was a significant difference in the Nelson Foot Reaction Test outcomes between men and women, with better levels in men than women ($p<0.05$).

DISCUSSION & CONCLUSION There is a direct relationship between the reaction time and the injury. The reaction time was compared in the athletes, elderly individuals, only in women, only in men, and in female and male athletes. Female athletes have ligament injury risk three times higher than men. In our study, it was found that the reaction time of the sedentary and healthy women was worse according to men. We suggest that in the evaluation of the sedentary individuals starting with any recreational sport, and at the determination of the activity type which will be recommend, it will be useful to consider the lower extremity reaction times.

KEY WORDS reaction time, gender, sedentary individuals

Muscle strength and cardiorespiratory fitness across aging: Effects of a two times-a-week exercise training program

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OBJECTIVE The lack of time of modern life makes difficult to reach the exercise recommendation of 2-3 and 3-6 times-a-week resistance and aerobic training, respectively. However, there is little information about the effect of lower training volumes in women. Our purpose was to analyze the effect of two times-a-week exercise training program on muscle strength and aerobic capacity, as well as to compare these effects among women of different age groups.

METHODS 117 healthy sedentary women, divided in four groups according to their age (G1 – $n=30$, 30.3 ± 6.2 years; G2 – $n=37$; 44.1 ± 2.5 years; G3 – $n=27$; 53.7 ± 3.5 years; G4 – $n=20$; 66.4 ± 6.9 years), were submitted to a two times-a-week exercise training program with aerobic (20 minutes at 60-75% of reserve heart rate), whole-body resistance (2-3 sets of 8-12 repetitions at 60-80% of 1-RM), and stretching exercise, performed for 12 month. 1-RM strength test were performed at baseline, and after three, six and twelve months of follow-up. Maximal graded exercise test (GXT) was performed at baseline and after twelve months of follow-up.

RESULTS Exercise training improved muscle strength in $24.1\pm8.9\%$, $10.7\pm4.5\%$ and $7.2\pm4.7\%$ after three, six and twelve weeks of follow-up, respectively ($p<0.05$). Cardiorespiratory fitness was also improved by exercise training as demonstrated by the increase of $10.3\pm5.1\%$ and 5.3 ± 3.2 in the duration and METs at peak of GXT, respectively, after twelve weeks of follow-up ($p<0.05$). The percentage of increase in muscle strength and cardiorespiratory fitness was not significantly different among the four age groups.

DISCUSSION & CONCLUSION The results suggest that two times-a-week multi-component exercise training is enough to improve muscle strength and cardiorespiratory fitness of women, independently of their age.

KEY WORDS Exercise; Cardiorespiratory Fitness; Muscle Strength; Aging

Strategies for monitoring the recovery of junior canoeists

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OBJECTIVE As knowledge in what concerns the phenomena and processes of a great variety within sport's practice developed more and more, it was noticed that in many cases the technology used in training is no longer responsive. The necessity for a more objective control over the athlete's evolution during training and competition emerged.

METHODS The present research is meant to test the efficiency of a new recovery program on junior canoeists. 24 subjects were involved, divided into two groups: one experimental (n=12) and one of control (n=12). The research's design was one of the type pre-after tests.

RESULTS The subjects from both groups were evaluated in the beginning and at the end of the program. There were carried out testings for $\text{VO}_2\text{ Max.}$, T.T.R. - 45'', T.T.R. - 10'', the Dorgo index.

DISCUSSION & CONCLUSION The advantage of the adaptive process concerning the effort specific to canoe is to be found in the increase of the aerobic effort capacity ($\text{VO}_2\text{ Max.}$ within 62, 21% in the 1st testing and respectively 74, 82% in the 2nd one). The anaerobic effort capacity, expressed through two metabolic parameters T.T.R/45'' and T.T.R/10'', varied between 44-83% in the initial testing and respectively 61% and 86% in the final testing. The analysis of the variations of the Dorgo index that we evaluated during the tests represents a short-time prediction regarding the neurovegetative and cardiovascular modifications of the athletes, offering the possibility of a rapid intervention in the process of training and recovery.

Relationship between full squat performance and vertical jump in Track & Field elite athletes

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OBJECTIVE Although the squat exercise has been extensively used in order to increase lower body strength, few studies were conducted on a large subject sample of elite athletes. Therefore, the present study aims to determine the relationships between countermovement jump (CMJ) height and full squat (FS) performance in a large sample of Track & Field top athletes.

METHODS A group of 29 elite male (range 20-28 years) triple and long-jumpers volunteered to participate in this study. Subjects performed three trials with 3 minutes of rest between each CMJ. This was accomplished by measuring jump performance on a trigonometric carpet (Ergojump Digitime 1000, Digest Finland). Additionally, The FS was measured in a Smith Machine starting with resistances of 27kg (FS27); 37kg (FS37); 47kg (FS47); 57; (FS57); 67kg (FS67); 77kg (FS77); and 87kg (FS87); This data was obtained in real time through a linear transducer (T-Force, Murcia, Spain) that was connected to the Smith Machine bar through a steel cable. Four minutes of recovery between each series of repetitions were taken. The test ended for each subject when the average speed of movement was less than 0.4 m• s⁻¹. This speed was chosen as the reference because in a pilot study, it was observed that the maximal strength value (1RM) was attained at near this speed.

RESULTS The FS27 was significantly (acceleration: $r=0.52$; $p<0.01$ and peak power: 0.59; $p<0.01$) related with jump performance. Further, the CMJ height was only significantly associated with peak power obtained with FS47 (0.46; $p<0.05$) and FS77 (0.64; $p<0.01$).

DISCUSSION & CONCLUSION As predictors, is important that the aeration and power produced during the concentric phase of the FS exercise must be maintained with high values to explain CMJ height. Nevertheless, heavier loads can be also important to determine vertical jump performance.

KEY WORDS Full squat, countermovement jump, track and field.

Climatology's applications concerning recovery in sportsmen

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OBJECTIVE This present paper proposes itself to demonstrate the influence of the medium altitude in body recovery to football players, starting from the hypothesis that training in a medium altitude contributes to the counterbalance of

the vegetative nervous system.

METHODS The study was made on a number of 11 football players with ages within 16-18 years old, registered with the International Curtea de Arges sports club. We have noticed the influence of the subalpine climate over the football players' health status as they were on their recovery training in Nucsoara Camp on August, 2008. For evaluation, we performed measurements for cardiac frequency and blood pressure daily, in the morning and we used the parameters that they had noted on the self-control journal. For a better emphasis of the variations concerning the physiological indicators we performed the Schellong test and we used the Dorgo index of recovery.

RESULTS The final testing shows an improvement of the results for the Dorgo index (in the initial testing the average of the indexes was of -3, reaching in the final testing an average of -20; $p < 0.001$) and also for the Schellong testing (in the initial testing the differential blood pressure in clinostatism was of 55 mmHg, and in orthostatism of 65 mmHg; in the final testing the differential blood pressure in clinostatism was of 45 mmHg, and in orthostatism of 52 mmHg; $p < 0.001$).

DISCUSSION & CONCLUSION Combining conducted recovery programs with the influence specific to subalpine climate on the organism shows positive results, by influencing in a significant manner the variability of the physiological indexes pursued. We have to keep into account the fact that sportsman's life regime influences considerably the variability of the physiological indexes pursued. The minimum period of time after which notable physiological modifications occur is of 10 days.

KEY WORDS Climatology, recovery, sportsmen

The rightward shift of v-slope on increasing ramp in cardiopulmonary exercise testing (cpx)

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OBJECTIVE To evaluate the effects of increasing ramp on the v-slope (VO_2 vs VCO_2 relation) and anaerobic threshold (AT) detection in CPX.

METHODS Six college soccer club members (mean age of 20.8 (SD:1.0)) underwent 3 symptomatic maximal bicycle CPX using 3 ramp protocols (15, 25, 50 watt/min). The sequence of tests were varied randomly and each test done on separate days. On the v-slope plot the slope before and after AT was termed S1 and S2, respectively. The v-slope shifted rightwards immediately following exercise and stayed that way (to the right of $R=1$ diagonal line, where R denotes respiratory exchange ratio) until the appearance of AT. The slope before S1, which was significantly less than a rest R value, was termed S transient (Str) and probably represented tissue CO_2 storage effect. The rightward shift was quantified as the average distance between the $R=1$ line and the v-slope, expressed in VO_2 (ml/min).

RESULTS The exercise duration (minute) in 3 protocols was 16.4, 909 and 5.5, respectively. The peak VO_2 (ml/min/kg) was 58.1, 54.5 and 49.8 respectively. The average rightward shift of the v-slope was 122, 188 and 170, respectively (15 vs 50 watt, $p < 0.05$). Generally ramp increase resulted in the lengthening of Str, shortening of S1 with slope unchanged, and a steeper rise in S2. AT, however, remained constant.

DISCUSSION & CONCLUSION The ramp increase in the bicycle exercise using ramp protocol resulted in the rightward shift of the v-slope representing accentuated tissue CO_2 storage effect. Although the shift did not alter AT, it made AT detection procedure more complex.

Continuos incremental field test to estimate velocity and maximal oxygen consumption in not-expert runners

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OBJECTIVE Parameters such as maximal oxygen uptake ($\text{VO}_{2\text{max}}$) and velocity at which $\text{VO}_{2\text{max}}$ occurs ($\text{VelVO}_{2\text{max}}$) are often used to training control purposes to enhance runner's performance. This study had two purposes: (i) determine the relationship between $\text{VelVO}_{2\text{max}}$ obtained in continuous incremental filed test (CIFT)) and $\text{VelVO}_{2\text{max}}$ determined on a treadmill in a laboratory; and (ii) verify if it is possible to estimate the $\text{VO}_{2\text{max}}$ based on CIFT velocity.

METHODS Fourteen recreational runners (3 to 4 training sessions per week) with average body mass $72.87 \text{ kg} \pm 7.35$,

174.78 cm \pm 4.81 in height and 29.85 years \pm 7.12 years-old of age, were tested. The subjects were evaluated in two separate sessions. One session in the field (running in a track field): each subject performed a continuous incremental test until exhaustion; first step 10 km/h, and 1 km/h increment every two minutes. The velocity of the last complete bout was registered and considered as CIFTvel. Respiratory changes were not evaluated. In the second evaluation session we applied a protocol similar to CIFT in the lab (running on a treadmill). Oxygen uptake, respiratory exchange ratio (R) and heart rate (HR) were continuously recorded and averaged for the last 30s of each bout. VO₂ was measured using a stationary breath-by-breath metabolic unit (Cortex, Model MetaLyzer 3B, Leipzig, Germany) which includes a heart rate transmitter (Polar Electro Oy, Kempele, Finland). It was considered the VO₂max the highest value registered during test. The VelVO₂max was the velocity corresponding to the bout at which the increment in the VO₂ to the next bout was lower to 2 ml/kg/min. When this did not occur VelVO₂max was the velocity corresponding to VO₂max.

RESULTS It was found a good relationship ($R = 0.82$, $P < 0.01$) between determined VO₂max and estimated VO₂max by the formula: VO₂max (ml/kg/min) = CIFTvel (km/h) \times 3.5, as proposed firstly by Leger and Mercier (1984)*. It was found a very good correlation between determined VelVO₂max in lab and CIFTvel ($R=0.97$, $P<0.01$). In this sample, this relationship could be expressed as: VelVO₂max (km/h) = 0.99 CIFTvel (km/h) + 0.35.

DISCUSSION & CONCLUSION The estimated VO₂max and VelVO₂max based on the data obtained from CIFTvel seem to be strongly related with VO₂max and VelVO₂max determined in lab. Besides, that is an easy, practical and non-invasive method to estimate those parameters, namely where lab facilities were not available. * Léger L., Mercier D.: Gross energy cost of horizontal treadmill and track running. Sports Med. 1, 270-77, 1984.

KEY WORDS VO₂max, VelVO₂max, Field Test, Running, Estimation.

Estimation of relative load from mean propulsive velocity in the concentric bench press exercise

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OBJECTIVE Several acute training variables have been identified for the purpose of designing resistance training programs (Kraemer and Ratamess 2004). Exercise intensity is generally acknowledged as the most important stimulus related to changes in strength levels (Fry, 2004) and has been commonly identified with relative load (percentage of one repetition maximum, 1RM). Movement velocity is another variable which could be of great interest for monitoring resistance exercise intensity but its role has often been overlooked in the everyday practice of strength training (Izquierdo 2006; Pereira and Gomes 2003). This study examined the possibility of using mean propulsive velocity data to estimate relative load in the bench press (BP).

METHODS One hundred and twenty strength-trained young males performed an isoinertial strength test with increasing loads up to the 1RM for the individual determination of the load-velocity profile in the concentric BP. Vertical instantaneous velocity was directly measured by a linear velocity transducer attached to a Smith machine and sampled at a frequency of 1,000 Hz.

RESULTS A very close relationship between mean propulsive velocity (MPV) and load (%1RM) was observed ($R^2=0.98$, $SEE=0.06$ m/s). Individual second-order polynomial curve fits for each test gave an R^2 value of 0.996 ± 0.003 (range: 0.983-0.999; $CV=0.3\%$) Mean velocity attained with 1RM (V1RM) was 0.16 ± 0.04 m/s and was found to influence the MPV attained with each %1RM. Stability in the load-velocity relationship was also confirmed regardless of individual relative strength, although certain tendency towards slightly lower velocity values with each %1RM was found for the strongest subjects.

DISCUSSION & CONCLUSION The results of this study confirm an inextricable relationship between relative load and MPV in the concentric BP; i.e. each percentage of 1RM has its own corresponding MPV value. This finding has important practical applications for monitoring resistance training, such as: 1) evaluate strength without the need to perform a 1RM test, or a test of maximum number of repetitions to failure (XRM); 2) determine the %1RM that is being used as soon as the first repetition with any given load is performed; and 3) prescribe and monitor training load according to velocity, instead of percentages of 1RM or XRM. An equation for estimating relative load from movement velocity was obtained ($\%1RM = 8.4326 MPV^2 - 73.501 MPV + 112.33$; $R^2=0.981$, $SEE=3.56$ %1RM).

KEY WORDS Exercise testing, muscle strength, 1RM prediction, isoinertial assessment.

Some neurophysiologic assessments trough event related potential in performance sports

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OBJECTIVE Somatosensory evoked potentials (SSEPs) are an electrical response recorded from the human nervous system produced by tactile or electrical stimulation of peripheral sensory or mixed nerve. The objective of our study was to evaluate some of the somatosensory evoked potentials waves parameters (latencies and intervals) at sportsmen from different sport categories: volleyball, handball, fencing and to compare the obtained data, in order to emphasize specific cortical plastic functional modifications induced by performance training.

METHODS The study was made on a lot of 18 professional sportsmen, with ages between 16 and 24 years, which practice sports for at least for 5 years. SEP obtained by stimulating (electric stimuli of an intensity superior by 3-4 mA to the motor threshold, a duration of 0,2 ms and a frequency of 3 Hz) the median nerve at the radiocarpian articulation level, bilateral, successive, was recorded with a MEP 150 Nihon-Kohden device using active electrodes placed on C3\ and C4\ and reference electrode placed on the scalp (Fz); were measured the SEP waves (P14, N20, P22-25, N25-30, P30, N35, P40) latencies and the intervals between waves P14-N20 and waves N20-P25.

RESULTS By analyzing the obtained results, was revealed that the SEP waves parameters differences were not statistically significant both for the whole lot and sports categories.

DISCUSSION & CONCLUSION In our case, the performance training did not influence the somatosensory evoked potentials waves parameters and so, it did not determine any specific cortical functional modifications at the studied professional sportsmen for neither of the sport categories.

KEY WORDS Volleyball, Handball, Fencing, Somatosensory Evoked Potentials (SSEPs).

The load that maximizes the mechanical power output in the bench press depends on the outcome parameter used

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OBJECTIVE When light and medium loads are lifted in typical isoinertial exercises, there exists a final phase during which deceleration is of greater magnitude than what would be expected due solely to the effect of gravity, this being the result of the athlete applying force in the opposite direction to the load's motion. Thus, the concentric portion of a lift can be further subdivided into a propulsive (positive force) and a braking (negative force) phase (Jidovseff et al. 2007). This study aimed to examine the load-power relationship in the bench press (BP) by comparing the relative load that maximizes the mechanical power output (Pmax) using three different measures: mean power over the whole concentric portion (MP), mean power of the propulsive phase (MPP) and peak power (PP).

Methods One hundred strength-trained males performed a concentric BP strength test for the individual determination of the full load-power relationship. An isoinertial dynamometer sampling at 1,000 Hz was attached to a Smith machine and used for all mechanical measurements.

RESULTS The Pmax load was found to be dependent on the parameter used. When using MP, power was maximized at a load of 54.2% 1RM, although no statistically significant differences were found between 40-65% 1RM. For MPP and PP, Pmax was found at 36.5% 1RM and 37.4% 1RM, respectively, with no differences between these loads. No significant differences in power output were found for loads between 20-55% 1RM for MPP or PP. The absolute Pmax values obtained in the BP tests were 453 ± 69 W for MP, 568 ± 84 W for MPP, and 938 ± 148 W for PP, all significantly different from each other ($P < 0.001$).

DISCUSSION & CONCLUSION These results highlight the importance of considering the contribution of the propulsive and braking phases in the assessment of isoinertial strength. Referring the mean values to only the propulsive phase appears necessary to avoid underestimating an individual's true strength capability when light and medium loads are used. The present study also provides evidence that there is not a clearly defined point in the load spectrum that maximizes power output (Cronin and Sleivert 2005), but rather there exist a relatively broad range of loads that yield similar high power values.

KEY WORDS Propulsive Phase, Load-Power Relationship, Muscle Strength, Isoinertial Testing.

The effects of flexibility on the vertical jump and leg strength of sedentary and physically active persons

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OBJECTIVE The main purpose of this study was to determine the effects of low or high capacity of flexibility on leg strength, vertical jump and anaerobic power, and whether these effects are related with age, height, weight, gender and doing exercise or not. Moreover, the other aim of this study is to evaluate the differences in physical and physiological characteristics of active person in sports (active) and inactive person in sports (sedentary).

METHODS For 500 participants aged between 18-30 years, firstly; all participants of age, height, body weight, flexibility, leg strength, vertical jump and anaerobic power characteristics were determined. Height was measured by Holtain Stadiometer, body weight by Tanita Fat Analyzer, leg strength by Tanita Back and Lift Dynamometer, vertical jump by Takei Jumpmeter and flexibility was measured by Sit and Reach Table. In addition, anaerobic power was estimated by Lewis Formula: $P = 4.9 (\text{Body weight})^{\frac{1}{4}} \cdot Dn$. Then participants were divided into groups as active-sedentary, female-male, sedentary female-male, active female-male, active-sedentary male and active-sedentary female and these groups were compared each other with t test and alpha level was set as 0.05 for statistical significance. Then, the relationships among physical and physiological characteristics of groups were determined by correlation analysis.

RESULTS For 500 participants of average values found respectively; in age 21.71 ± 3.02 year, in height 171.69 ± 9.38 cm, in body weight 65.37 ± 12.55 kg, in leg strength 98.85 ± 36.73 kg, in vertical jump 48.49 ± 11.83 cm, in flexibility 24.89 ± 7.95 cm and in anaerobic power 101.11 ± 27.49 kgm/sec. When the active and sedentary group compared; there were significant differences ($p < 0.05$) in height, leg strength, vertical jump, flexibility and anaerobic power and there was no significant difference in body weight ($p > 0.05$). When the groups compared according to gender; there were significant differences ($p < 0.05$) between groups in age, height, body weight, leg strength, vertical jump and there was no significant difference in flexibility ($p > 0.05$). For 500 participants investigated totally, there were significant relationship among age and body weight, height, leg strength, vertical jump, anaerobic power. There were also significant relationship among height and body weight, leg strength, vertical jump, anaerobic power. In addition, body weight related with leg strength, vertical jump and anaerobic power. Moreover, leg strength related with vertical jump, flexibility and anaerobic power and than vertical jump related with flexibility and anaerobic power.

DISCUSSION & CONCLUSION When the active and sedentary group compared each other, active group has higher values in height, leg strength, vertical jump, flexibility and anaerobic power than sedentary group. Only at the point of body weight there was no significant difference between both groups. For genders; male group has higher values than female group in height, body weight, leg strength, vertical jump but there was no significant difference in flexibility for both groups. So, it can claim that flexibility is more closely related to doing sports than effect of gender. According to results of correlation analysis, in 500 participants; flexibility related with vertical jump and leg strength, that is, when the flexibility increases vertical jump and leg strength also increases. In addition, when the participants investigated separately as a male and female groups; another relationship appeared in both of them: Flexibility related with anaerobic power. In this case, it can be considered that anaerobic power can develop via increasing flexibility.

KEY WORDS Sportsman, Sedentary, Leg Strength, Vertical Jump, Flexibility, Anaerobic Power

The effect of recovery periods on heart rate during repeated sprints

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OBJECTIVE There has been an increased interest in the occurrence of fatigue and muscle responses to intermittent work especially during repeated bouts of brief and intensive exercise. However, heart rate responses to repeated exercise have attracted little interest. Therefore the purpose of the present study was to examine the effect of different recovery periods (continuous, 15s, 30s and 45s) on heart rate during repeated sprints.

METHODS Nineteen active male university students participated in this study voluntarily ($M_{\text{age}} = 23.47 \pm 2.01$ yrs, $M_{\text{height}} = 176.24 \pm 8.02$ cm, $M_{\text{BW}} = 74.47 \pm 9.66$ kg, $M_{\text{fat}} = 9.71 \pm 4.46$ %). Subjects performed four 12x20m running repeated sprint ability tests with different recovery periods (continuous, 15s, 30s and 45s) in random order at separate occasions. Continuous repeated sprint ability test was performed as a control condition. During the repeated sprint ability tests heart rates of the subjects were continuously recorded stroke-by-stroke with telemetric heart rate monitors and maximum heart rate and average heart rate were determined for each repeated sprint ability test that was applied with different recovery periods. For statistical analysis one way analysis of variance (ANOVA) with repeated measures was

used and Bonferroni post hoc analysis was used to determine from which group differences occurred.

RESULTS One way analysis of variance (ANOVA) with repeated measures showed significant differences maximal heart rate ($F_{(3,16)}=15.968$; $p=.000$) and average heart rate ($F_{(3,16)}=26.120$; $p=.000$). Bonferroni post hoc analysis indicated that 15s, 30s and 45 s of recovery periods resulted in significantly lower maximum and average heart rate values compared with continuous recovery period ($p<0.05$) and also 45s of recovery period resulted in significantly lower maximum and average heart rate values than that of 15s and 30s recovery periods ($p<0.05$).

DISCUSSION & CONCLUSION Our results indicated during running repeated sprint ability tests maximum and average heart rate is highly affected by different recovery periods. As a conclusion it can be said that 45s of recovery period had more effect on maximal and average heart rates during running repeated sprint ability tests.

Effects of daily physical activity recorded by metabolic armband on peak oxygen consumption, ventilatory threshold and leg extension strenght in physical therapy students

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OBJECTIVE To investigate the influence of practical clinical applications on physical activity levels of physical therapy students and to reveal the relationships between daily physical activity levels and aerobic endurance indices as well as isokinetic strength.

METHODS Forty-two subjects were recruited for the study. Total energy expenditure (TEE), resting energy expenditure (REE), active energy expenditure (AEE) and the total number of steps were measured over a 3-d period with using a portable armband. In a second experiment subjects performed a maximal exercise test. Relationships between the energy expenditure levels and the respiratory indices such as peak oxygen uptake and ventilatory threshold and isokinetic strength were examined.

RESULTS No significant differences were found in the energy expenditure measurements, ventilatory indices and isokinetic test results between junior and intern student groups. Isokinetic strength was highly correlated both with TEE ($r=0,61$; $0,64$) and REE ($r=0,80$; $0,79$). Correlation between fat free mass (FFM) and aerobic endurance indices were poor ($r=0,43$; $0,34$), although there was a high level association between isokinetic strength and FFM ($r=0,81$; $0,81$).

DISCUSSION & CONCLUSION Patient-side clinical practice does not lead to an improvement in physical activity levels of students. There are significant relationships between daily physical activity, aerobic endurance indices and lower extremity isokinetic strength.

KEY WORDS Energy Expenditure, Ventilatory Threshold, VO₂ peak, Isokinetic Strength.

Arterial stiffness, blood pressure, physical activity and maximal oxygen consumption in middle-aged former male athletes

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OBJECTIVE Epidemiological studies have demonstrated that former athletes show lower prevalence of cardiovascular diseases, hypertension, diabetes and cancer. Interestingly, studies are limited and some of them show contradictory results. Purpose of the present study was to evaluate the arterial stiffness of middle-aged former athletes and its relationships with blood pressure, physical activity and maximal oxygen consumption.

METHODS Measurements were performed in 29 (55.2 ± 5.9 yrs; 180.0 ± 8.0 cm; 89.8 ± 15.7 kg) healthy male former athletes. The methods used included DXA for the determining body fat percentage, resting blood pressure, questionnaire for determining physical activity level and maximal oxygen consumption (VO₂max) using modified Balke test on treadmill. To measure arterial stiffness, pulse wave analysis was performed.

RESULTS Study subjects showed relatively high mean physical activity level (2.9 times/week; 4.1 ± 3.2 hours/week). The mean VO₂max/kg of the group was 38.4 ± 8.3 ml/kg/min (varied from 24.0 ml/kg/min to 58.2 ml/kg/min). Hypertensive former athletes ($n=17$) had significantly stiffer arteries compared to normotensive former athletes ($n=12$). Correlation analysis revealed, that blood pressure values were significantly related to different arterial stiffness parameters (augmentation index, pulse wave velocity, small and large artery elasticity, etc). According to different physical activity level, the study groups did not reveal any significant differences in arterial stiffness parameters.

Correlation analysis showed that physical activity had also no significant associations between arterial stiffness variables, at the same time $\text{VO}_2\text{max/kg}$ showed significant inverse relationship between pulse wave velocity, overweight values (body mass index, body fat percentage), systolic and diastolic blood pressure.

DISCUSSION & CONCLUSION In conclusion, our study results revealed that elevated blood pressure is significantly related to arterial stiffness among physically active middle-aged former athletes.

KEYWORDS former athletes, physical activity, endothelial function, arterial elasticity

Influence of block periodization on adaptation in well-trained race walkers

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OBJECTIVE Race walking is the technical and athletic expression of fast walking and it can be considered an endurance performance. Little information exists in the scientific literature relating to the most effective training intensity and periodization for the enhancement of maximal oxygen uptake (VO_2max) in well-trained race walkers. Unlike traditional periodization, which usually tries to develop many abilities simultaneously, block periodization hypothesized that different types of specialized mesocycle-blocks are suitable to various modes of biological adaptation, i.e. homeostatic regulation or a mechanism of general adaptation. The aim of this study was to examine the influence of block periodization on VO_2max and blood lactate variables (lactate threshold-LT, onset of blood lactate accumulation-OBLA, mean velocity at lactate threshold-v at LT) in race walkers of the same performance level.

METHODS Six competitive race walkers (mean age: 28.6 ± 4.4 yrs; height: 176.2 ± 5.1 cm; weight: 64.1 ± 6.2 kg; VO_2max : 61.8 ± 8.5 ml.min⁻¹.kg⁻¹) were studied. The protocol consisted in walking with proper technique at 8, 10, 12 and 14 km.h⁻¹ for 4 minutes without rest in between. Thereafter, speed was incremented by 0.5 km.h⁻¹ every two minute until exhaustion to determine VO_2max .

RESULTS Mean VO_2max was 66.9 ± 9.5 ml.min⁻¹.kg⁻¹ and was reached at 14.4 ± 0.7 km.h⁻¹. After the block periodization, there were statistically significant increases in VO_2max and blood lactate variables (VO_2max at LT, v at LT, VO_2max at OBLA, v at OBLA; $P < 0.05$).

DISCUSSION & CONCLUSION It seems that, for race walkers who are already trained, improvements in endurance performance can be achieved through block periodization. However, considering the low number of the athletes involved, further studies should be conducted before giving training recommendations to athletes and coaches.

KEY WORDS race walking, adaptation, training, VO_2max .

Effect of three different throwing training programs with same workload on throwing performance with soccer ball in females

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OBJECTIVE Several training programs based on the principles of overload, either by resistance or by velocity of the movement exercise, can be employed. The purpose of this study was to determine if different specific throwing programs based upon velocity, resistance or a combination with the same workload would enhance throwing performance with soccer balls.

METHODS 40 female high school students (age 16.4yr, mass 56.5 kg, height 1.62 m.) divided in three groups that were matched on performance, participated in the study. The resistance-training group (RES) trained overhead throwing with a 3kg medicine ball for 3 sets of 6 reps per session while the velocity-training group (VEL) threw 6 sets of 14 reps with a regular soccer ball. The combi-group (COM) threw 9 reps with the 3kg ball followed by 3 sets of 14 reps with a regular soccer ball. These training programs were matched on the same workload. Throwing performance with a soccer ball was tested before and after a training period of six weeks with two sessions per week.

RESULTS All groups significantly ($p < 0.05$) increased the throwing distance with around 1.3m (RES: 0.7m, COM: 1.4m, VEL: 1.7m). The throwing velocity increased also significantly with 4.9% (RES), 6% (COM) and 7.4% (VEL) while no significant differences ($p > 0.05$) between the groups were found after the training period.

DISCUSSION & CONCLUSION This indicates that three types of training regimen with the same workload after a

short period of training, increases the throwing velocity in a similar way, which shows that workload is of importance in designing training programs and comparing training with each other.

KEYWORDS Resistance-training, velocity-training, soccer ball throwing

In-season resistance training in junior volleyball players using different volume distribution

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OBJECTIVE Variation in the volume of resistance exercise completed can be a potent stimulus for positive adaptations and is critical for the researcher and the practitioner to quantify and monitor. To date, however, it has not been very clear how this parameter can influence strength values in junior competitive volleyball players. The aim of this study was to determine the effect of two resistance training (RT) programs and to compare the changes that occurred in maximum strength and power values.

METHODS 12 volleyball players (17.1±0.5 years old, 1.81±7.7 m and 68.8±9.6 kg) were randomly divided into two groups. Apart from normal practice sessions, all players underwent 8 weeks of RT. Subjects performed sets of 3-10 reps with a load of 50-80% 4- repetition maximum leg press; sets of 3-8 reps with a load of 60-85% of 1-repetition concentric bench press; plus vertical jumps. One group executed a volume distribution of 3+3 sets (G1: n=6) while the other group (G2: n=6) completed 4+2 sets muscular during 8 consecutive RT weeks. The total volume and the intensity of training were the same in both groups. Measurements of maximum strength (1RM: bench press and leg press) and power (countermovement jump, ball throwing) were made before the beginning of the program and 8 weeks after the RT regimen.

RESULTS After 8 weeks of RT, both groups increased significantly ($p = .000$) all strength and power parameters. The results showed that both groups presented significant improvement in maximum strength (1RM) without significant differences in either of the two methods ($p > 0.05$).

DISCUSSION & CONCLUSION The present findings suggest that when the total volume and the intensity of training were the same, the maximum strength and power improvements were equally in both training programs.

KEY WORDS Young volleyball players, volume, strength, power

Play and Learning: Effectiveness play-based method in teaching 1th grade elementary mathematics concepts

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OBJECTIVE The aim of this study was to assess effectiveness play-based method vs. traditional style in teaching 1th grade elementary mathematics concepts.

METHODS Sixty two 1th grade elementary school girls selected and assigned randomly in to experimental (31 pupils) and control group (31 pupils). While teaching method in control group was traditional, in experimental group mathematic concepts taught by play-based method (e.g., one way road, ball and wall). One week after each concept teaching, learning exam and three weeks later retention exam with same contents for both groups has been taken simultaneously. Independent t test and Cohen's d (effect size) executed to assess mean scores difference.

RESULTS Results showed meaningful higher scores in experimental group on learning and retention mathematic concepts in left & right, less, more and equal, summation & subtraction as compared control group ($p < 0.05$).

DISCUSSION & CONCLUSION Overcoming challenges such as anti-play opinion require effort by researcher to clarifying connections exist between play and learning. If parents, teachers and policy makers come to believe in the educational value of play, they will be less likely to put pressure to reduce or remove play from childhood curriculum. Results of present study confirm that play can and must hold its central role in early mathematic education.

KEYWORDS mathematic concepts, play, learning

Are 8 weeks of training enough to decrease active drag in front crawl swimming?

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OBJECTIVE Hydrodynamic drag is the force that a swimmer has to overcome in order to maintain his movement through water. Several attempts have been made to apply technology to determine this force (Toussaint et al., 2004). The velocity perturbation method (Kolmogorov and Duplishcheva, 1992) was developed to assess the drag of a person who is actively swimming. Active drag is highly dependent of swimming technique. Thus, the aim of this study was to assess the effects of 8 consecutive weeks of training on active drag in young swimmers.

METHODS 20 age group swimmers of both gender belonging to the same swimming club participated in this study (12.20±0.70 years old, 1.51±0.09 m and 41.28±7.17 kg). All participants have been trained by the same coach and for the same club for the previous two years. Active drag measurements were conducted in two different trials: at the beginning of the season and after 8 weeks of training. The velocity perturbation method was used to determine active drag in front crawl (Kolmogorov and Duplishcheva, 1992). Both trials were conducted in a 25 m swimming pool and in-water starts were used.

RESULTS After 8 weeks of training, mean active drag (drag force and drag coefficient) decreased, although no significant differences were found between the two trials (34.66±16.84 N vs. 32.81±12.60 N; 0.34±0.16 vs. 0.31±0.09; p>0.05).

DISCUSSION & CONCLUSION The present findings suggests that 8 weeks of swimming training (48 training units, 21.0±0.25 km per week) were not enough to allow significant improvements on swimming technique. One can recommend that specific training sets concerning technique correction and improvement in young swimmers should be a main aim during training planning. References: -- Kolmogorov, S.V., Duplisheva, A. (1992). Active drag, useful mechanical power output and hydrodynamic force coefficient in different swimming strokes at maximal velocity. *Journal of Biomechanics*, 25, 311-318. -- Toussaint HM, Roos PE, Kolmogorov S. (2004). The determination of drag in front crawl swimming. *Journal of Biomechanics*, 37, 1655-1663.

KEY WORDS Young swimmers, technique, drag, training effects.

Swimming performance changes in young swimmers: A case study

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OBJECTIVE Critical velocity has been defined as the maximum swim velocity that can be maintained during a long period of time without exhaustion (Wakayoshi et al., 1992). This parameter is widely used by coaches to determine the intensity of swimmers' aerobic ability. Further, some authors suggested the concept of critical stroke rate associated with the aerobic performance (Pelayo et al., 2000). However, these two parameters are not always linked together during training. It is not clear to determine if an improvement on the aerobic ability is dependent on physiological and/or technique enhancement. Therefore, the purpose of this study was to determine the changes in critical velocity and critical stroke rate in young swimmers during a period of training.

METHODS 18 swimmers of both gender participated in this study (13.40±0.29 years old, 1.58±0.10 m, 47.50±13.50 kg). The evaluations took place in two different moments: beginning of the season and after 12 weeks of training. For each swimmer, critical velocity and critical stroke rate were determined in both moments using 50 m and 400 m maximal tests in front crawl.

RESULTS Critical velocity increased between the first and the second moment (1.05 vs. 1.09 m/s; p<0.05) whereas critical stroke rate decreased in the same period (1.10 vs. 1.05 cycles/s; p<0.05).

DISCUSSION & CONCLUSION Critical velocity increased and critical stroke rate decreased between the two evaluation moments, suggesting that technical ability was improved during the training period. The swimmers were able to swim at the same energetic intensity at higher velocities with lower stroke rate. These data could be used by coaches to control training. REFERENCES: -- Wakayoshi, K., Ikuta, K., Yoshida, T., Udo, M., Moritani, T., Mutoh, Y. and Miyashita, M. (1992). Determination and validity of critical velocity as an index of swimming performance in the competitive swimmer. *European Journal of Applied Physiology and Occupational Physiology* 64, 153-157. -- Pelayo, P., Dekerle, J., Delaporte, B., Gosse, N. and Sidney, M. (2000) Critical speed and critical stroke rate could be useful physiological and technical criteria for coaches to monitor endurance performance in competitive swimmers. In:

Proceedings of XVIII International Symposium on Biomechanics in Sport. Eds: Sanders, R. and Hong, Y. Hong Kong: The Chinese University of Hong Kong. 83-87.

KEY WORDS Critical velocity, critical stroke rate, training, monitoring.

Bilateral stress fractures of the calcaneus in a dancer

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OBJECTIVE The etiology of stress fractures is multifactorial, and many risk factors have been implicated. Calcaneal stress injuries are fairly common overuse injuries in military recruits and athletes but it is a rare injury in dancers.

METHODS A case report

RESULTS A case of bilateral stress fracture of the calcaneus in a 26-year-old woman dancer is presented. She has suspended her dancing career for 5 years and then resumed dancing in a professional dance group where folk dance figures were more common including heel strikes and hopping. Dancers were practicing for selection of professional level with very intense training schedule 8 hours a day 6 week in a week. After 4 weeks of starting dance training, non-specific heel pain had been started. It was undiagnosed for a month because of normal x-ray images and treated conservatively as a non-specific heel pain. Because of continuing pain further imaging performed and then bilateral calcaneal posterior oblique stress fracture was diagnosed by MRI. As a risk factor, dancing on a hard floor with unsuitable shoes, intense and long training periods with insufficient resting periods, high motivation because of selection for dance company was detected. Her BMI was in normal range and she had no laboratory or bone mineral density abnormalities. She also didn't have any complain of hormonal diseases. As the treatment, vigorous activities were stopped for 6 weeks, soft heel pads and mild anti-inflammatory drugs were given. Her complain were stopped after 6 weeks, she gradually returned modified dance trainings. But she couldn't continue her dancing career because of not selected to the company.

DISCUSSION & CONCLUSION Bilateral calcaneal stress fractures are uncommon in dancers, but sometimes career ending results. In our case repetitious heel striking, breaking up dancing for a long period, and returning with intense training schedule, insufficient resting periods, dancing on a hard floor and unsuitable shoes were the etiologic factors. In such cases treatment is easy but reaching the previous level of performance is hard.

KEYWORDS dance, calcaneus, stress fracture

Long term analysis of the type, frequency, causality and treatment periods for injuries in PFC Lokomotiv Plovdiv for the 2002-2008 period

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OBJECTIVE Trauma is one of the big problems of the present-day in sports. The frequency and the heaviness of trauma are increasing continuously in the recent years. In spite of the upgraded rehabilitation and prevention of traumas, the problem is getting more serious.

METHODS The aim of the study is to analyze the traumatism of a professional football club for the period of 6 years (2002-2008). The registrated trauma data for the players of PFC "Lokomotiv" - Plovdiv official team have been subject to a strong documentation and analysis.

RESULTS The results were displayed in 10 tables. The results of the allocations of the traumas have been displayed and categorized according to the period they have been sustained (pre-seasonal preparation period/official season; during training/play). They have also been categorized according to the reason for the trauma (rough play, bad pitch conditions, improper equipment, fatigue/overuse), and concerning the location of the trauma (parts of the upper limb, lower limb, head, torso), as well as according to the injury type (acute: wounds, contusions, strains, sprains, fracture or chronic due to overuse: Achilles tendinitis, epicondilitis, insertionitis, chondropathias, myositis, ARS complex) and concerning injury seriousness (sports disability up to 3 days, from 4 to 10 days, from 11 to 20 days, from 21 to 30 days, over 30 days), as well as chronologically and according to the seriousness of the trauma inabilities over 30 days.

KEY WORDS Sports trauma, sports injuries, football, soccer

The relationship between joint hypermobility and sports injuries in female volleyball players

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OBJECTIVE Joint hypermobility is defined as a benign condition in which some or all of the joints have range of motion beyond the normal limits. It is suggested that joint hypermobility increases the risk of sports injuries. The aim of this study was to investigate the relationship between sports injuries and hypermobility in female volleyball players between the ages of 16-22.

METHODS This study was performed on 101 volunteer athletes playing in 12 different teams at various levels of Turkish Volleyball Leagues during 2006-2007 season. Sports injury history was recorded by a questionnaire. Athletes were examined for joint hypermobility determined by Beighton Score which classified into the three categories: 0-2(non-hypermobility), 3-4 (moderately-hypermobility), 5-9(distinctly-hypermobility). In addition to descriptive analysis, chi-square test was used to compare the groups. Significance was set at $p < .05$.

RESULTS Mean age of the players' was 18.45 ± 2.39 years and the mean training age was 4.43 ± 2.36 years. Thirty seven of 101 athletes (36,6%) were non-hypermobility, 22 were (21,8%) moderately hypermobility and 42 were (41,6%) distinctly hypermobility in which 7(18.9%), 11(50.0%) and 20(47,6%) had previous sports injury, respectively. Statistically significant relationship was found between hypermobility and sports injuries ($p < .01$).

DISCUSSION & CONCLUSION It was found that joint hypermobility increased the risk of sports injuries in female volleyball players between the ages of 16-22. Medical examination before the sports participation and appropriate injury prevention methods may provide better protection. Additional research is needed to clearly determine whether a relationship exists between hypermobility and sports injury in volleyball players.

KEY WORDS Volleyball, Sports Injury, Hypermobility.

Investigation the injury condition of amateur football and basketball players

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OBJECTIVE Because of the popularity and the importance of the professional games, scientific researches about sport medicine focus on professional players. In this aspect, while it is possible to find many researches about injury condition of professional players, about the amateur player is need more investigation. Thus the aim of this study was to investigate the injury conditions of amateur players.

METHODS Totally ninety-nine amateur licensed players including forty-nine basketball players (28 male, 21 female) and fifty football players (31 male, 19 female) (Xage: 23.8 ± 4.1 year, Xsport age: 11.9 ± 3.5 year) were attended the study voluntarily. Data collected by using sport injury questionnaire form include; demographic data, injury location, injury type and the reason of the injury which was developed by researcher. SPSS 11,5 statistical program was used to analyze data. "Chi-Square Test" was used to analyze differences between groups. Findings accepted significant at $p < .05$ level.

RESULTS Analysis showed that; while lower extremity was the most injured body part (40,4%), sprain was the mostly seen injury type (27,6%) and improper floor was mostly described reason of the injury (40,4%) among the basketball players, head and neck were the most injured body parts (43,1%), contusion was the most seen injury type (29,5%) and improper floor was mostly described reason of the injury (43,1%) among the football players . Analyze proved that there was no significant differences between football and basketball players according to injury type, location of the injury and the reason of the injury ($p > .05$)

Study showed that even location of the injury and the injury type was different for basketball and football, reasons of the injury were similar for both basketball and football players. Thus it is possible to advice that firstly, standardizing the courts then using protective equipment while playing can be effective to reduce the rate of the injury among amateur basketball and football players.

KEY WORDS Sport, injury, amateur player, football, basketball

Musculoskeletal injuries during the 8th world university wrestling championship 2008

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OBJECTIVE The purpose of the study is to record the incidence of the athletes' injuries, sustained during the 8th World University Wrestling Championship 2008, held in Thessaloniki, Greece (9-13 July).

METHODS Twenty seven countries from all over the world participated in the Championship with 226 athletes. There were three wrestling styles: Free style (LL), Female wrestling (LF), Greco - Roman (GR). Twenty countries participated in Free style, with 77 athletes and 59 matches took place. In Female wrestling 17 countries participated with 65 athletes and 58 matches took place. In Greco-Roman style 20 countries participated with 84 athletes and 77 matches took place.

RESULTS The total of all injuries was 18 and on top of it there was one athlete who suffered from stomach ulcer penetration. In detail there were 7 injuries in Free style, 6 in Female style and 6 in Greco-Roman style. One athlete in Female style sustained 2 injuries. In free style occurred 1 ankle sprain, 1 tooth fracture, 3 knee injuries, 1 neck abrasion, 1 cervical sprain. As for the female injuries 2 ankle sprains 2 knee injuries and 1 mentum laceration were recorded. The Greco-Roman style involved 3 nose contusions, 1 eyebrow laceration and 2 shoulder dislocations.

DISCUSSION & CONCLUSION The incidence of injury was 8.85%. In this study we analyze the type of injury per wrestling style, sex, category, body location and side.

KEY WORDS Sports injuries, wrestling, epidemiology

Effect of static stretching on delayed onset muscle soreness before eccentric contraction

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OBJECTIVE The main purpose of this study was to determine the effect of static stretching before eccentric contractions on DOMS (delayed onset muscle soreness). Many studies showed that DOMS, CK and LDH enzymes increased in recovery period. Eccentric contractions that use in exercise, it is possible have side effect, for example damage to member of cells, releasing macrophages, releasing enzymes and pain until 48 hours after exercise especially in down hill and weight training with over load. This exercise induced damage in muscle fibers. It is possible static stretching inhibits or increased damage of eccentric contractions.

METHODS 21 volunteers female university student (P.E. students) were selected. Who were normal healthy, with no positive clinical finding. After having the procedures fully explained to them written information consent was obtained. Subjects were assigned in one of two experimental group (n=10) (age: 21.6 ± 1.71 years, height: 161.45 ± 2.71 cm, weight: 57.25 ± 6.99 kg, and Vo_{2max} 34.18 ± 2 ml.kg⁻¹.min⁻¹) and control group (n=11), (age: 24.25 ± 4.30 years, height: 159.81 ± 4.86 cm, weight: 54.69 ± 3.82 kg, and Vo_{2max} 36.1 ± 3.79 ml.kg⁻¹.min⁻¹) groups. All subjects were right handed. As pre test venues blood sampling of all subjects were taken and after that experimental group performed static stretching on shoulder, elbow and arm for 15 minutes, then they performed eccentric contraction. Control group performed, only eccentric contraction. Blood sampling were obtained before, immediately after exercise, 24 48 hours after and, were drawn from an anticubital vein with subjects in the seated position. Sensation soreness were assessed by pain chart. Data was analyzed using ANOVA test, α was set at 0/05. Data are presented as mean \pm ME of the mean.

RESULTS There were an increasing CK and LDH enzymes levels in subjects blood. So subjects had pain and inflammatory in their hands. Changes were higher in experimental group. The results showed that eccentric contraction induced DOMS, CK and LDH enzymes levels increased in two groups (especially in experimental group), post test and continuously 24 hours after that the but the effects of static stretching of CK, LDH enzymes and DOMS are not significant.

It shows that the static stretching has a effect on CK and LDH. The results showed warm up not only did not prevent the muscular damage and did not decrease the pain of cellular damage, but also the warm up by eccentric stretching increased CK and LDH. MS (muscle sourness) are acute (Immediately after exercise) or delayed after, 24 - 48 hours after exercise. That is better static stretching use after general warm up, because muscle fibers and member cells do not damage and deplete enzymes.

KEY WORDS muscle soreness, CK, LDH, contraction

An investigation of injury patterns in female futsal players

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OBJECTIVE In futsal, like the other sports, athletes are exposed to various sports injuries. The main purpose of this study was to investigate injury patterns, prevalence and causes in female futsal players.

METHOD This study was performed on 66 volunteer female athletes playing at different teams during 2008-2009 seasons. Clinical interview method was used in this study and sports injuries were detected by means of data forms. The data form was developed by investigator. Ten parameters were examined related sports injuries in futsal. Describe statistic was applied and chi-square test was used to determine whether there was a significant difference between the categorical parameters. Statistical significance level was set at $p < .05$. The SPSS statistical software package program was used to perform the analyses.

RESULTS In this study, the average age of the players was 20.72 ± 2.08 and the average training age was 6.33 ± 2.88 . Totally 93 sports injuries were investigated related futsal. Twenty nine (31.2%) of the all injuries occurred in preseason and 64 (68.8%) occurred in the competition season. Fifty three (57.0%) of 93 injuries occurred in lower extremities and 22 (23.7%) occurred in upper extremity. The overall injury rate of ankle injuries was 25 (26.9%), knee: 20 (21.5%), low back: 15 (16.1%), hip/thigh/leg: 11 (11.8%), shoulder: 8 (8.6%), elbow: 4 (4.3%), hand/finger: 5 (5.4%), and head/face: 5 (5.4%). The proportion of acute traumatic injuries was 73 (78.5%) and overuse was 20 (21.5%) and 24.7% of all injuries were caused by contacting to rival player. In all injuries, the overall duration of return to sports rates were with in 1-3 days: 10 (10.8%), 4-7 days: 32 (34.4%), 2-3 weeks: 24 (25.8%), 1-2 months: 17 (18.3%) and 3+ months: 10 (10.8%). Hospitalization rate due to sports injury was 63 (67.7%) and no applied to hospital for 30 (32.3%) injuries. No significant differences were found in the any frequency of injury between acute and overuse group.

DISCUSSION & CONCLUSION This study showed that competition season injuries were exceedingly higher than preseason injuries. Similarly, acute traumatic injuries had consistently higher proportion than overuse injuries. It results from contact to rival players powerfully under match stress. The lower extremity area showed a higher percentage of injuries than the upper extremity. The most common injury area was ankle with $> 25\%$ rate. Because futsal is a foot sport, high rate of lower extremity injuries (ankle, knee, leg, hip and thigh) may be accepted unexceptional. Wearing protective equipment for body area at risk and efficient warm up/calm down exercises should reduce the risk of sports injuries related futsal. The limitation of our study was to be a retrospective research. Additional prospective research is needed to clearly determine injury patterns in futsal.

KEYWORDS Futsal, Sports Injury.

Injury prevention through logistic regression equations

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OBJECTIVE The difference in the length of the lower members and the foot varus and valgus have shown that they are related to a greater incident in lower extremities injuries, as well as the articular laxity, the flexibility and biomechanics or structural parameters. Prediction of injuries by means of logistic decline. The models of decline include a series of technical math that try to measure the relation among a variable turned out and an or some variables. Shambaugh (1991) relates structural measures with the incident of injuries in the lower extremities in basketball players by means of an equation of logistic decline of three variables that predicted the probability of wound in a 91%. Salazar (2000) contributed a new mathematical injuries predictor formula by means of an analysis of logistic decline. SALAZAR' INJURIES INDEX $1/1 + e^{0.1621 - 0.06344 \cdot \text{Shambaugh Index Medium}}$. Our purpose is to relate them among itself of mathematical form by means of equations of logistic decline.

METHODS We used the SHAMBAUGH' INJURIES INDEX: $\text{IMBALANCE OF WEIGHT} \cdot 0,36 + \text{ANGLE-Q RIGHT DEVIATION} \cdot 0,48 + \text{ANGLE-Q LEFT DEVIATION} \cdot 0,86 - 7,04$ We have submitted to analysis the different predictor variables in athletes (150 athletes, 80 men, 70 women, 14 and the 18 years) obtaining the mathematical algorithm Fernandez's Injuries Index :

RESULTS The analysis by logistic decline can be a valid method in the discrimination of anthropometrics parameters related to the injuries. FERNÁNDEZ' INJURIES INDEX $1/1 + e^{-(0.757 \cdot \text{QA} - 0.647 \cdot \text{DLM2})}$ (QA: Femoral q Angle; DLM: Dismetry Lower Members) The good classification of the model obtained was of the 68.6%. The Cut point (0.5), indicates that the subjects with equal values or over 0,5 would remain fit in in the category of possible injured while a lower value would fit in them inside the category of possible unharmed.

KEY WORDS Fernández' Injuries Index, injuries, Imbalance of lower members.

The analysis of injury patterns in female volleyball players

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OBJECTIVE Athletes are exposed to various sports injuries in volleyball like the other sports. The aim of this study was to analysis injury patterns, prevalence and causes in female volleyball players.

METHODS 101 volunteer female athletes (age: 18.45 ± 2.39 , experience: 4.43 ± 2.36) playing at different teams during 2006-2007 seasons participated to study. Interview method was used in this study and sports injuries were detected by means of data forms. The data form was developed by investigator. Describe statistic was applied and chi-square test was used to determine whether there was a significant difference between the categorical parameters. Statistical significance level was set at $p < .05$. The SPSS statistical software package program was used to perform the analyses.

RESULTS In this study, totally 60 sports injuries were analyzed related volleyball. Twenty eight(46.7%) of the all injuries occurred in preseason and 32(53.3%) occurred in the competition season. Thirty six(60.0%) of 60 injuries occurred in lower extremities and 16(26.6%) occurred in upper extremity. The overall injury rate of ankle injuries was 24(40.0%), knee:10(16.7%),back-low back: 8(13.3%), hip/thigh/leg:2(3.3%), shoulder:5(8.3%) and hand/finger:11(18.3%). The proportion of acute traumatic injuries was 43(71.7%) and overuse was 17(28.3%). In all injuries, the overall duration of return to sports rates were with in 1-3 days: 5(8.3%), 4-7 days: 16(26.7%), 2-3 weeks:28(46.7%), 1-2 months: 7(11.7%) and 3+ months: 4(6.7%). Twenty for(40%) injuries occurred in block position and 10(16.7%) occurred spike position. Center and spiker players suffered from injuries with higher rate. No significant differences were found in the any frequency of injury between playing position.

DISCUSSION & CONCLUSION The lower extremity area had a higher percentage of injuries than the upper extremity and acute traumatic injury rate was extremely higher. It may result from repetitive jumping powerfully and net actions during the play. The most common injury area was ankle because of contact the rival players in the block and spike positions. Center and spiker players had a higher rate of injuries thus these players should be more careful especially in net actions. Wearing protective equipment for body area at risks such as ankle, rehabilitations after the previous injuries and efficient warm up/calm down exercises should reduce the risk of sports injuries related volleyball. The limitation of our study was to be a retrospective research. Additional prospective research is needed to clearly determine injury patterns in volleyball.

KEY WORDS Volleyball, Sports Injury.

Football injuries in youth national teams: A three year prospective study

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OBJECTIVE The aims of this study were to investigate the incidence of injury and to examine the influence of age on the injury profile at youth national football level.

METHODS Starting from 2004, the U-17 Turkish male youth national team was followed by the same team physician for three years during their progression as U-18 and U-19. A total of 52 players were registered throughout the study, and individual player exposure and injuries sustained by the team participants were prospectively recorded.

RESULTS 44 injuries were documented among 24 (46.2%) players. Injury incidence was about five times higher during match play than training (48.7 vs. 10.5). The youngest group (U-17) sustained more training injuries and fewer match injuries than did the oldest group (U-19). The majority of injuries (65.9%) led to time loss and 72.4% of which resulted in absence from football of one week or less. Moderate to severe injury rates were higher in U-19 compared with U-18 and U-17 teams (28.6% vs. 20% and 12%). Traumatic injuries represented 52.3% of injuries and the rest was in overuse nature. In U-18 and U-19 teams, all traumatic injuries happened during matches and mostly with contact mechanism. For U-17 team, 53.8% of traumatic injuries occurred in trainings and all were in non-contact nature leading to time loss. In training injuries of U-17 level, overuse injuries were two times higher than traumatic injuries. However, for U-19 level, 57.1% of overuse injuries occurred during matches. The largest part of injuries (79.5%) was to the lower extremities and the most frequent locations being the thigh and hip/groin. Muscle injury was the leading injury type followed by contusions. For U-17 and U-18 teams, a greater proportion or all of muscle injuries were sustained during trainings. Conversely, in U-19 team, muscle injuries mostly occurred in matches. Re-injury rate was 25% and all were in overuse nature and tended to cause less absence than non-reinjuries.

DISCUSSION & CONCLUSION Finding of increasing match and decreasing training injury incidences with age may indicate a greater risk with higher intensity of competition and advantage of developed technical capability and injury-avoidance skills in trainings. Furthermore, player age seems to have an apparent effect on the nature and severity of injuries with respect to match play or training exposure.

KEY WORDS Injury incidence, youth football, soccer, national team

Sport behaviours and leisure time activities in patients with total knee arthroplasty

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OBJECTIVE Outcome evaluations of lower extremity joint reconstructions should include an assessment of patient activity levels. The aim of this study is to investigate the sport behaviours and leisure time activities of osteoarthritic patients after total knee arthroplasty (TKA).

Methods 103 patients (92 women, 11 men), with the mean age 66.9± 8.1 years, who received TKA approximately 39 months ago, were included to this study. The examination consisted of measurement of the sport behaviour and leisure time activity with the Modified Baecke Questionnaire for Older Adults, and the knee function with the Hospital for Special Surgery Knee Scale (HSS).

RESULTS The HSS mean score of the participants was 89.21±9.44. While there was no pain in 82.8% of patients, there was minimal pain in 17.2% of patients. According to the Modified Baecke Questionnaire for Older Adults, 27.2% of patients have participated to sport activities reported as walking, swimming and aerobic exercises. Walking was reported by all of the patients, who have participated to sport activities, apart from one patient. The most reported leisure time activity was watching television (mean 3.99±2.26 hours per day). 55 patients were watching television more than 4 hours per day.

DISCUSSION & CONCLUSION Although TKA surgery increased patient's functional level and decreased pain, patients with TKA have inactive lifestyle after arthroplasty. The most of patients were not participated to any sport activity and they were spent more time with watching television. A combination of physical exercise and behavior education may enhance the ability of patients with TKA to perform daily activities. These patients must be encouraged to be physically active.

KEY WORDS total knee arthroplasty, sport behaviours, leisure time activities

A recurrent patellar cartilage fissur in a professional football player: A rare case and follow up

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OBJECTIVE Anterior knee pain is a common problem in sport. Football players may sustain such problems more frequently compare to other sport disciplines. Retropatellar cartilage is prone to injuries and problems are difficult to diagnose without proper approach. Injury mechanism and physical examination may lead to suspicion of a cartilage problem however imaging tools are necessary to put correct diagnosis for appropriate treatment. In the meantime, arthroscopy is always a choice for through management.

METHODS A 25 years old male football defensive player (professional for 10 years) had weakness and pain during stair climbing, kneeling and squatting. He explained an onset of pain during training a month ago but subsided with ice application and use of non-steroidal anti-inflammatory drugs. Following a fall on his knee during the last training, pain has become more severe. Physical examination showed limited effusion, retropatellar pain and sensitivity during palpation and (+) patellar aggregation. Knee hyperextension was painful. X-ray was negative. Magnetic resonans imaging (MRI) revealed a 4 mm wide fissur extending to subchondral bone. Subchondral bone was sclerotic and significant bone odema was detected.

It was decided to start conservative treatment after consultations and sportive rehabilitation was commenced. 3 weeks isometric strengthening and non-weight bearing activities were applied. 3 intra-articular hyaluronic acid injections with 10 days interval was done. Straight runs were introduced after 4th. week and terminal range isotonic activities were added. After the 6th. week, his complaints reduced by % 60-70. However, MRI did not show any betterment of cartilage fissur. By the 9th week, his complaints nearly subsided totally and training on the field was resumed. MRI taken on the 12th week showed filling of cartilage over the lesion.

The player had a second trauma (20th weeks after the first problem) on his knee by falling down again (a protest against referee) after fully returned to sport activities on the 8th. week. MRI showed the similar lesion even with greater subchondral odema. After one week absolute rest, intraarticular injections repeated three times with one week intervals. Same conservative sportive rehabilitation program was followed. He started training with the team after the 8th Week as he had no pain and limitation. MRI showed healing on the fissur after 8th week and no odema after 12th week.

DISCUSSION & CONCLUSION Knee problems are more common compare to other anatomical regions in football players. Ligamentous and meniscal injuries are more pronounced. However, injuries to cartilage should also be

considered carefully because these take longer time to recover and may cause recurring problems. Patellar chondromalacia, contusions, dislocations and/or fractures can be associated with cartilage problems. Clinical diagnosis of cartilage problems may pose difficulties because of no specific findings and possible concomitant injuries. A careful anamnesis, through physical examination and imaging methods may help to achieve proper diagnosis and planning treatment. Arthroscopy can be considered for complicated cases.

Results of the anterior cruciate ligament reconstruction in athletes

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OBJECTIVE Rupture of the ACL is common knee injury and often it leads to sudden cessation of successful sport careers. The injury leaves permanent consequences leading to chronic anterolateral rotator knee instability and with time to osteoarthritis. Arthroscopic ACL reconstruction is the treatment of choice, especially for active athletes. The aim of our study is to follow on results of operatively treated patients – active athletes after the arthroscopic reconstruction of ACL, and their return to pre-injury sport activities.

METHODS The analysis included 78 athletes (66 men and 12 women, 55% active and 45% recreational). Arthroscopic ACL reconstruction was in all patient done by using STG graft, along with endobutton, retrobutton, transfix II fixation for femoral condyle and bioabsorbable interference screw for tibia. 75 patients were treated with single bundle technique and 3 with double bundle technique. We analyzed and compared parameters obtained by clinical examination and functional test, before and after the operation.

RESULTS The average follow up period was 19,6 (6 do 34 months). Preoperative Lysholm score was 57,33, and postoperative 92,64 (range, 43-100). Preoperative Tegner activity level was 2,43, and postoperative 6,89 (range, 1-10). Arthrometric measurements of patients before the operation were in average 8,45mm of anterior shift of tibia in relation to femur which was corrected postoperatively to 2,18mm in average. 64 patients returned to sport activities to the pre-injury extent while 14 did not (7 due to change in life style, 5 for not having physiotherapy and 2 for poor operative result).

Results of the ACL reconstruction in our patients are compatible with world results and patients were satisfied with postoperative results. These led to early return to ADL and competitive sport activities (in average, for 6,2 months).

KEY WORDS anterior cruciate ligament, arthroscopy, Tegner, Lysholm score

Combination or not of knee extensors exercise with neuromuscular electrical stimulation in patients with patellofemoral pain syndrome?

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OBJECTIVE Patellofemoral pain syndrome (PFPS) is a common problem among adolescents and young adults, characterised by peripatellar pain when ascending or descending stairs, squatting or sitting with flexed knees. There is an increased interest in the role of exercise for the treatment of PFPS. The aim of this study is the comparison of the effect of non-weight-bearing knee extensor isometric and concentric exercise and their combination with neuromuscular electrical stimulation (NMES) of the knee extensor muscles in patients with patellofemoral pain syndrome.

METHODS Fifty six patients with PFPS, ten men and forty six women, between 18 and 45 years of age were randomized into two groups. The first group (A, n=28) performed at home, 20 minutes exercises program, two times daily, consisted of non-weight-bearing isometric and concentric exercises that focused on strengthening the quadriceps and hip flexors muscles for 8 weeks. The other group (B, n=28) performed 20 minutes training program, two times daily, of superimposed (electrically evoked and voluntary activation) isometric knee extensions in supine position with the knee in full extension. During stimulation, participants were informed to maximally contract their knee extensors taking into account their pain threshold. Biphasic, rectangular symmetrical pulses by an electrostimulator were used to provoke muscle activation. We evaluated the pain with the Visual Analog Scale (VAS) during ascending stairs, descending stairs and standing up from a sitting position and the Kujala patellofemoral score before and after the practice of a 8 weeks program. Additionally we evaluated the compliance of the patients with these programmes.

RESULTS A significant ($p<0.05$) reduction of pain and improvement of the Kujala score was observed in group B, but not in patients of group A. The patients of group B referred a much better compliance with this program. When we

isolated the group A patients, who had low compliance in program with exercises, there was found significant reduction of pain and improvement of the Kujala score in group A patients ($p < 0.05$).

DISCUSSION & CONCLUSION The combination of non-weight-bearing knee extensor isometric and concentric exercises with neuromuscular electrical stimulation reduces the pain and improves the functionality of patients with PFPS. The patients refer better compliance with this treatment protocol.

KEY WORDS Patellofemoral pain syndrome, exercise, electrostimulation

Lumbar intervertebral disc findings in elite track and field female Greek athletes

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OBJECTIVE The majority of orthopaedic problems experienced by competitive track and field athletes are related to pain in the lower legs esp. thigh and ankle region. Low back pain is a less common reason of complaints. There has been no previous research into lumbar disk "degeneration" in elite track and field athletes. Our hypothesis was that excessive physical loading accelerates lumbar disk "degeneration" in elite track and field athletes.

METHODS Study participants were 46 (18 to 29 year-old) elite track and field female athletes and 30 age and sex matched non athletic individuals. Lumbar intervertebral discs were evaluated using T2-weighted magnetic resonance imaging in the axial and sagittal plane. Based on our MRI exams we estimated and compared the prevalence of abnormal disk findings ("degeneration") and their disk level in the study groups and we further investigated the potential relationship among their event category (throwers, jumpers, sprinters, runners and decathlon athletes) and disk findings.

RESULTS Thirty five out of 46 elite track and field athletes and 15 out of 30 controls had abnormal MRI findings regarding lumbar intervertebral discs at various disk levels and the prevalence was significantly greater in the elite athletes group ($P=0.004$). Lumbar MRI reported the presence of: 1) disc herniation in 13 athletes and 8 controls 2) disc degeneration in 12 athletes and 6 controls 3) disc bulging in 10 athletes and 6 controls and 4) High Intensity Zone (HIZ) in three athletes. L5-S1 level was significantly more frequently degenerated in both groups. Disc herniation was the most common finding in both groups, but the prevalence was significantly greater in the elite track and field athletes. In addition disc herniation was more common in throwers, degenerated disc was most commonly seen in female jumpers and throwers and disc bulging was more often reported in jumpers.

DISCUSSION & CONCLUSION In conclusion, excessive physical loading accelerates lumbar intervertebral disk "degeneration", especially in the L5-S1 intervertebral segment.

KEY WORDS Lumbar MRI, Track And Field, Female

Risk of shortening in postural lateral trunk flexion muscles in shooters

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OBJECTIVE It is a common experience that the shooters feel discomfort and sometimes pain in their backs. The effect of static prolonged trainings is the muscle fatigue. This leads to changes in muscle length and to loss of force. THE PURPOSE OF THIS STUDY is to assess the changes in length and static endurance of m.quadratus lumborum in shooters.

METHODS There were assessed 15 athletes fired a sport and an air small-calibre rifle and pistol during the period March – June 2009. All of them were students (6 female and 9 male) at the National Sports Academy "Vassil Levsky", Sofia, Bulgaria at average age of 20.7 years. The tests of shortening and static – strength endurance for m.quadratus lumborum were applied.

RESULTS The asymmetric shortening of m.quadratus lumborum was observed at all of the examined shooters. The average difference between both sides was 1.87 cm. The rate of the differences in the static – strength endurance was 12 (80%) per 15 shooters, with almost 8 (66, 7%) showing the lower results in the shortened side. On 3 (20%) athletes the results of both sides were similar.

DISCUSSION & CONCLUSION The sustained static efforts in shooters lead to asymmetric changes in the length of m. quadratus lumborum and to decreasing of the static – strength endurance of the shortening muscle. The adequate physiotherapy provides the correct diagnostic of the muscle imbalance. These findings should be considered to restore the muscle balance and to improve the shooting posture. Key words: endurance, m. quadratus lumborum, shooters, shortening

Theory and clinical approaches to chronic back pain by synchronism and entrainment

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Vibrations and rhythms, as a result of organs and single cells, are well known in the field of clinical medicine. Also their changes until a total stop (death) have been described for decades. In cardiology and sports medicine it is well established to use time patterns (cell vibrations as a result of cell activity) for diagnostics. Using time patterns (electrical, magnetical, mechanical, gravitational) specifically for therapy is new and opens the new field of vibrational and regenerative medicine. Biophysics of today gives the idea how biological structures are the result of physico-chemical processes, that are driven by body intrinsic and / or body external rhythms. Such bio-informative fields interact the whole span of life and stabilize dynamically. In the early 90th we already showed in high resolution videomicroscopes cellular oscillations depending from the biophysical environment. More and more we recognized, that geometry can be seen as the informational link between time- and space-pattern and that by “entrainment” body-rhythms and physicochemical processes are locked into phase. Next step was to find out how far “basic evolutionary time patterns”, regarded as natural conductor-frequencies are disturbed in diseases like chronic back pain and how far such attractors can be systematically and continuously restored beginning from microscopic cellular level and brought back to a synchronous cooperation on macroscopic level. Skeletal muscle clearly shows “bifurcation like” behaviour during contraction. The muscle turns either into quivering (rescue) mode or cramping, hardening (injury) mode. This injury mode is clinically seen in low back pain patients. Following this dynamic approach the Matrix-Rhythm-Therapy, a “Rhythmic Micro-Extension-Technique”, was developed, that turns the injury mode into rescue mode by entrainment. For the first time the so far neglected time-structure (time-pattern) of the organism is directly used as order parameter for the treatment. This innovation got the PCT and US patent and is used in present day modern medicine. Clinically evaluated studies have been done in governmental rehabilitation-clinics of the RVA, FaberCastell, Rodenstock and at Daimler, Stuttgart.

The use of tecartherapy in the treatment of hematoma. Case study

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OBJECTIVE Tecartherapy is a new therapeutic method. It radiates low frequency radio waves (0,485 Mhz) and transfers electric charges, by the form of ions, increasing the metabolism of the cells and allowing the rehabilitation of the tissues. Aim: The evaluation of the effectiveness of Tecartherapy, when it is used as the only form of therapy in the treatment of a hematoma in the area of the foot.

METHODS Female athlete of Tae Kwon Do, 27 years old, during practice stroke the basis of her second metatarsal against the elbow of her partner. A large hematoma was formed in the area of the foot and ankle. The patient reported severe pain and difficulty in walking. Method: The patient was treated exclusively with Tecartherapy once a day for four consecutive days. The detumescence was evaluated by measuring the diameter of the foot. On the first day the diameter at the exact point of the hit was 25 cm, while at the right foot it was 22 cm. No medication was received.

RESULTS After the period of four days the hematoma was substantially reduced. The diameter was 22 cm and there was no pain during walking. The athlete gradually returned to practice without any particular problems.

DISCUSSION & CONCLUSION The use of Tecartherapy can be very effective for treating a hematoma. Further research is required to show if the combination of Tecar with other forms of therapy has better results in similar situations.

KEYWORDS Tecartherapy, hematoma, physiotherapy

Transdermal permeation of Hialsorb Sport®

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OBJECTIVE The aim of this study was to determine the transdermal permeation of HIALSORB SPORT®, which is a

fluid emulsion for joint massage that contains 0.25% of Hyaluronic Acid and 0.25% of other mucopolysaccharides.

METHODS The transdermal permeation of the mucopolysaccharides present in HIALSORB SPORT® was studied in vitro with human skin from the abdomen of healthy woman who underwent cosmetic surgery (0.4 mm thick). Skin samples from 6 donors were used and barrier integrity of skin samples was characterized by transepidermal water loss (Tewl) measurements. We used Franz-type vertical diffusion cells with an effective permeation area of 2.54 cm² and a receptor compartment volume of approximately 13 ml. The formulation studied (0.3 g) was placed in the donor compartment and the receptor chamber was filled with PBS (phosphate-buffered saline, pH 7.4) and kept at 37±0.5 °C. Samples of 400 µl were withdrawn from the receptor compartment during 24 hours. The determination of the glycosaminoglycans was determined by means of a spectrophotometric assay using dimethyl-methylene blue (Farndale et al, 1982).

RESULTS The study shows that the degree of permeation of Hyaluronic Acid and other mucopolysaccharides (expressed as total glycosaminoglycans) through the human skin of 6 different donors and from the emulsion called HIALSORB SPORT® at 24 hours was circa 17%.

DISCUSSION & CONCLUSION We found that the transdermal permeation of glycosaminoglycans from the emulsion was circa 17%, ensuring perfect lubrication and good joint function. The degree of absorption is shown to be 2 to 5 times higher than topical Sodium Diclofenac.

KEY WORDS transdermal permeation hyaluronic mucopolysaccharides lubrication joint

The benefices of associating set in the treatment of sport related injuries

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The objective of the study was to asses the efficiency of associating enzyme therapy to the specific, classic forms of drug treatment in injured athletes: systemic, local and physiotherapy. It was aimed to see if administration of enzyme therapy to other non-invasive treatment can improve the recovery, in time and regarding the sequelar pathology. Fifty-eight high level athletes, was used and was followed-up for 7 months. They practiced different types of sport and there was an even gender distribution. The injuries were classified in following groups: contusions, fibrilary lesions, lombalgic syndrome, enthesitis/ tendinitis, myositis, ssacroileitis. Twenty nine person were treated with specific treatment, both local and systemic and physiotherapy and the other 29 person were given Phlogenzym besides this forms of treatment, in the dosage of 5 tablets two times a day, for 3 weeks. The results showed that the administration of Phlogenzym shortened the period of recovery with 3 to 5 days (considering the first day that the athlete was able to start training after injury), eased the symptomatology (pain, discomfort, functional impotence measured by a scale from 1 to 5), and there was less sequelar pathology in about 70% and a good compliance and practically no side effects (pacient declaration on how they felt about the medication taking two times a day, between meals and side effects – only one complain of mild digestive transit acceleration, normalised after stoping the treatement). As a conclusion, we may say associating Phlogenzym to the classical treatment of traumatic sport related injuries shortens the duration of recovery and limits the onset of potential sequelar pathology.

Tendoactive®: A novel nutraceutical formulation for the prophylaxis and treatment of tendon injuries in athletes

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OBJECTIVE Tendinopathies are common tendon disorders associated with inflammation, microtears in the extracellular matrix and decreased tensile strength of the affected tendons. There is an acute need for developing new therapeutic strategies due to the current lack of effective treatments. Therefore the aim of this study was to evaluate the prophylactic effectiveness of Tendoactive® on the repair and regeneration of tendon injuries modelled using human tenocytes in vitro.

METHODS Primary human tenocytes in monolayer cultures were either stimulated with interleukin-1β (IL-1β), stimulated with IL-1β and Tendoactive® or pre-stimulated with Tendoactive® followed by co-treatment with Tendoactive® and IL-1β. Tendoactive® is a novel nutraceutical formulation that includes mucopolysaccharides. Cell

adhesion, proliferation, vitality and production of extracellular matrix (ECM) were evaluated with light microscopy and transmission electron microscopy (TEM). Expression of the extracellular matrix protein type I collagen and the signal transduction and adhesion molecule β 1-integrin were studied with immunofluorescence. Immunoblotting was performed to evaluate expression of metalloprotease-1 (MMP-1), cyclooxygenase-2 (Cox-2) and Caspase-3.

RESULTS Tendoactive® had a strong stimulatory effect on human tenocyte proliferation and ECM production and was able to counteract the IL-1 β -induced catabolic, apoptotic and inflammatory effects in human tenocytes. Furthermore, treatment with Tendoactive® reversed the adverse effects of IL-1 β resulting in the down-regulation of IL-1 β -induced expression of MMP-1, Cox-2 and caspase-3 and upregulated type I collagen and β 1-integrin synthesis.

DISCUSSION & CONCLUSION These results suggest that Tendoactive® may be used effectively in the prophylaxis and treatment of tendinopathies for the healing, regeneration and repair of tendons.

KEY WORDS tendon tendinopathies tendonitis mucopolysaccharides tenocytes

Early rehabilitation program for anterior cross ligament using hydrodynamic flume channel

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OBJECTIVE Today, ACL breaking is one of the most important professional sports injuries but also affects a big number of people. Different stabilized protocols set the recovery time between 4 to 8 months for professionals players and 8 to 12 for the rest of patients. This study presents a new Early Rehabilitation Program for ACL injuries after surgery into an early phase using some of the main working areas for a Physiotherapist today. The goals are pointed to get the early recovery of the plastia and to reduce the time to return to full activity after surgery, paying attention and respecting during the process the Natural injury Evolution and patient conditions. Since around 85% of human movements are based in accelerate and non-accelerate forces this program is trying to introduce these principles to get the general and specific

METHODS The patient selected to perform this study is 35 years-old man with an ACL breaking injury right knee and no other relevant clinical history details for this study. Early Rehabilitation Program designed. The surgery technique selected was a 12 cm plastia from semitendinosus muscle and internal rectus muscle from the right leg. This technic avoid the main risk factor like the inmunitary problems from the use of external plastia. To apply the Kinesitapping during the surgery, we use a passive mobilization of the knee after the doctor close the skin tissue. When the patient came to our treatment room the first day after surgery, he informed to us that no bad sensation was feeling on the skin tissue and the resistance of the tape was 100%. In the first joint examination, the right knee flexion reach 55° in sagittal plane and the extension movement was perfect from the first moment. The inflammation for quadriceps muscle is presented in a very low scale and the edema is minimum, as well. It was located at the popliteus area. We applied the second Kinesiotapping technique, using the muscle internal vastus and external vastus of the quadriceps, looking for the muscle contraction reactivation. For the first 5 days of treatment Manual Therapy was applied including Leduq Linphatic Drainage method to avoid the edema and reduce the joint pain mobilization because the influence of sympathetic system. We mainly had use the “call technique” on the leg and the “re-absorption technique” for the knee joint. Then, we used the passive movements by TGO (osteopathy general treatment) for the entire leg starting from the feet until the hip joint. The rhythm is control by the patient capacity, gently and respecting the arc move limits. This phase also includes an starting active muscle contractions and movements, using an eccentric exercises to allow us to increase the joint balance and muscle reactivation, working in a close chain contraction (CCC) to protect the young plastia and to reduce miofascial syndrome. In this phase, we tried to wake up the plastia receptors and fight against muscle trophy after the immobilization period. All these actions follow the rule NO PAIN, so the low intensity and rhythm are the key of this early rehabilitation. The plastia is not ready to work properly and during the first 5-6 treatments we focussed on the neurological concept to protect the plastia and stimulating the receptors. The Flume Channel technology orientated in two different ways. First, the most commonly use is to perform and improve a sports technique and develop training programs for swimming, canoeing, football and basketball, and in the other hand, we found different programs specialized in respiratory therapy, but also for some other musculoskeletal diseases. Since our main concern is to discover this fantastic tool to develop physical rehabilitation programs for we get this significant information: water speed, heart rate, lactic acid level production, amplitude and frequency of each movement.

RESULTS Although the short long of sessions, just 7, in this Early Rehabilitation Program of ACL, the results show to us an important and significant improve from the originals parameters. The passive flexion knee is 95° on sagittal plane and the active flexion knee is 90° without any painful reaction. The extension movement is 100% from the first day and the edema have been reduce as minimum. The walk now is correct and the patient is not using anymore a crutch after 7 sessions. The patient is not taking anti-inflammatory pills.

DISCUSSION & CONCLUSION We believe that this protocol could be use by all the people with the same injury and the results confirm that no previous physical conditions are need to perform this program.

We follow the Natural joint Evolution and respect the intensity of level exercise according with the water speed to get

the normal range of movements for the normal life activity. Unfortunately, there is not bibliography about the use of Flume Channel for ACL so we understand that this is only an approach and we must keep on trying to develop a systematic and controlling protocol. The Kinesiotaping effects after surgery and the real coordination with the Doctors means one of the most interesting advances for early recover, taking care of the scar tissue and reducing the edema for the immobilization period. This 7 days treatment conclude like a perfect departure point to attempt the second phase of rehabilitation and reduce the recovery time in a significant way. We should progress to investigate this techniques combination and go further in our goals.

KEY WORDS Hydrodynamic Flume Channel, Kinesiotaping, Manual Therapy, Anterior Cruciate Ligament

A retrospective survey of therapeutic ultrasound usage in sports medicine unit

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OBJECTIVE Contrary to wide use of US there is remarkable little evidence for benefit in the treatment of musculoskeletal conditions. The aim of the study was to analyze the use of US in managing commonly encountered sports injuries.

METHODS The study is one year retrospective survey of US usage in Sports Medicine Unit. Documentation from 116 (73 male, 43 female) athletes in average 26.2 (SD 10.4) years old were analyzed by pathology, involved tissue, body region, treatment frequency and use of US alone or in combination with other modalities.

RESULTS Out of 1814 athletes treated in sports medicine unit 574 were referred to physical therapy and 20.2 % received US therapy. Documentation for US application was insufficient regarding precise (physiotherapeutic) diagnoses, dosage (intensity, duration, frequency, mode, treatment intervals) and effectiveness. 9.5 % of diagnosis were nonspecific. US was used for treatment of soft tissue inflammations in 39.7 %, distensions of muscles, tendons and ligaments in 29.3 %, ruptures of muscles, tendons and ligaments in 16.4%, and pain treatment in 14.7 % of cases. The most frequently treated tissues were muscles (41.4 %). Majority of the US treatments were done on lower limb (63.8 %). The number of consequent treatments in average were 11 (SD 3) ranging from 3 to 30. Only in 12.1 % of the cases the US was applied as single therapy. In combination with one additional modality US was used in 42.2 % and with two 43.1 % of cases.

DISCUSSION & CONCLUSION The use of US in Sports Medicine Unit in general is in concordance with literature. Referring physicians are deciding for polypragmatic approach, which may express uncertainty regarding the therapeutic effects of US.

KEY WORDS therapeutic ultrasound, sports injuries

Rotator Cuff Tear: To operate, or not, that is the question

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OBJECTIVE The aim of this presentation was to portray a case of a 27-year-old male Olympic waterpolo player who suffered a partial rupture of his left distal supraspinatus tendon of his non-dominant arm while he was trying to save a strong outside shot. Intense shoulder pain accompanied with a limited abduction ability was the chief complaint. MRI completed the initial assessment. The player was given a medical advice not to play the imperative game, but he decided to compete against the medical advice, risking a more serious injury. Later on he was voted the best Montenegrin national athlete in 2008. After the Olympics he decided to temporarily withdraw from waterpolo because of his injury. The crucial question was whether he should be managed surgically or through more conservative treatment which would include intensive physiotherapy and rest. Various opinions were given and there was a strong international disagreement among sport physicians what would constitute an optimal treatment. However the athlete himself opted for a conservative treatment

METHODS Intervention included application of low frequency magnetic field, isometric exercises and interferential current therapy.

RESULTS This case had the complete resolution of the pain and impairment after 3 months of conservative treatment which included intensive physiotherapy. At 6-months follow-up, the athlete remains asymptomatic and the isokinetic test provided almost complete recovery of the strength of his supraspinatus muscle.

DISCUSSION & CONCLUSION Conservative treatment proved effective with complete recovery of the injury.

KEY WORDS rotator cuff tear

Distal biceps brachii tendon repair-single incision suture anchor technique

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OBJECTIVE Complete rupture of the distal biceps insertion is an infrequent injury. 96% of biceps tendon injuries involve the long head, 1% the short head, and 3% the distal insertion. The injury does appear to be most commonly caused by an unintentional eccentric load to a flexed elbow with a shortened and contracted muscle forcing the joint into extension. We report three athletes with rupture of the distal biceps tendon, repaired with a single incision suture anchor technique.

METHODS The athletes were one gymnast, one wrestler and one rower. The gymnast and the wrestler were injured during competition, while the rower was injured during strength training. In all athletes the injury sustained in the process of resisting a heavy load with a flexed elbow.

RESULTS Clinical examination and MRI of the elbow confirmed the diagnosis of distal biceps brachii tendon rupture. The patient underwent surgery where a complete distal tendon tear was repaired, using two Super Anchor 2.9 mm (Mitek) through a single anterior incision. At last follow-up, there was no neurovascular deficit.

DISCUSSION & CONCLUSION In the present study we describe step by step the anterior approach and the suture anchor technique. We believe that operative repair of distal biceps tendon rupture, using a single anterior incision and suture anchors is a safe and effective method of treating this injury.

KEY WORDS Sports injuries, tendon ruptures, surgical management, biceps brachii muscle, distal insertion

Manubriosternal dislocation: Review of principles of management

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OBJECTIVE Manubriosternal dislocation is an unusual injury mainly occurring in young patients. It is caused by direct or indirect trauma and is classified as type I (posterior displacement of sternum) or type II (anterior displacement of sternum). Direct traumas are frequently caused by road accident and sport. But the dislocation can be caused by indirect flexion-compression injury of the thorax. Due to few cases in the literature, the correct management of this injury is not widespread.

METHODS We report the case of a 44 years-old patient with type I dislocation due to blunt chest trauma. He presented with pain at breathing. To avoid surgery, we tried to treat him with kind chest physiotherapy and pain killers. The dislocation spontaneously reduced when the patient coughed. The injury was afterwards treated surgically to stabilize the reduction with plate and screws because the pain at breathing was still present. We reviewed the literature to define the guidelines of management.

RESULTS The X-ray which gives the diagnostic and the electrocardiogram are the first step in the management. The chest tomodensitometry is mandatory to check the impact on the great vessels and the trachea. The conservative treatment including painkillers, local application of ice, rest and plaster bandage gives bad long term results, especially in the type I dislocations. Chronic pain, risk of subluxation and relapse of dislocation are the more frequent complications.

DISCUSSION & CONCLUSION In emergency, the manubriosternal dislocation must be treated with pain killers and soft chest physiotherapy to achieve the reduction. If the dislocation is Type I and the patient has compression symptoms on the trachea or major vessels, surgical treatment by plating with screws is the best treatment. In Type II dislocations, the conservative management consisting of closed reduction and elastoplast strapping can be attempted but close follow-up is necessary to exclude the occurrence of the suspected complications. If needed, secondarily, the conservative option must be converted in surgical treatment.

KEY WORDS Manubriosternal dislocation, management, chest physiotherapy

The heart failure's carvedilol beta-blockade and exercise training's sympathetic blockade in healthy athletes: Who blocks what in a heart rate dynamic analysis during an exercise test?

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OBJECTIVE In recent years, beta-blocker therapy has become a primary pharmacologic intervention in patients with heart failure by blocking the sympathetic activity.

AIM: To compare the exercise training's sympathetic blockade in healthy subjects (athletes) and the carvedilol's sympathetic blockade in sedentary heart failure patients by the evaluation of the heart rate dynamic during an exercise test.

Methods A total of 75 sedentary heart failure patients (26 optimized and 49 non-optimized) in a stable condition (for, at least, 3 months), 15 healthy soccer players (athletes) and 17 sedentary healthy subjects were recruited to perform a cardiopulmonary exercise test. The heart rate dynamic (rest, reserve, peak and the peak heart rate in relation to the maximum predicted for age) was analyzed and compared between the four groups.

RESULTS The heart rate reserve was the same between optimized (48 ± 15) and non-optimized (49 ± 18) heart failure patients ($p < 0.0001$). The athletes (188 ± 9) showed a larger heart rate reserve compared to sedentary healthy subjects (92 ± 10 , $p < 0.0001$). Athletes and healthy sedentary reached the maximum heart rate predicted for their age, but none of the heart failure patients did.

DISCUSSION & CONCLUSION The carvedilol's sympathetic blockade occurred during the rest and during the peak effort in the same proportion, but the exercise training's sympathetic blockade in healthy subjects occurred mainly in the rest.

KEY WORDS Heart failure, heart rate, carvedilol, exercise.

Different kinds of sports: Effects on bone and cardiovascular risk factors

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OBJECTIVE Sports can positively influence bone mineralization and exert positive cardiac and vascular effects. Aim of the study: To evaluate the effects of different sports on bone health and mineralization, lipid profile, insulin sensitivity, endothelial function and intima-media thickness.

METHODS We evaluated 46 athletes practicing rugby (#6), downhill skiing (#19) and ice-hockey (#21). Mean age (years) was 13.3 ± 0.36 , 12.7 ± 0.9 and 11.2 ± 0.8 respectively. Bone mineralization was evaluated by DEXA and bone health [SOS (speed-of-sound)- and BTT (bone-transmission-time)-SDS] by bone ultrasound. We also evaluated the lipid profile and insulin sensitivity [HOMAr (Homeostasis- Model- Assessment- for- insulin -resistance) and QUICKI (quantitative-insulin-sensitivity-check-index)]. Endothelial function was evaluated by flow mediated dilation of the brachial artery (FMD) and the intima-media thickness (IMT) by B-mode ultrasound at the level of the common carotid artery.

RESULTS Rugby players are heavier than skiers and ice-hockey players [Body-Mass-Index standard-deviation-score (BMI-SDS) 0.57 ± 0.58 , -0.08 ± 0.71 and -0.44 ± 0.68 respectively]. Lipid profile is not very different between the three groups, only rugby players show higher triglyceride values. Skiers have increased bone mineralization and higher bone quality than ice-hockey players. We find a positive correlation between BMD-SDS and BMI-SDS, SOS-SDS, BTT-SDS and weekly exercise time. There is also a correlation between BMI-SDS, HOMAr, QUICKI and serum insulin values.

DISCUSSION & CONCLUSION The results are preliminary and further values need to be analyzed. Thus far we see that different kinds of sports affect bone mineralization and bone quality in different ways, skiing induces the most positive changes. There is no evidence of a different influence on the vascular risk factors.

KEY WORDS different sports - cardiovascular risk factors - bone health

A search about risk factors of coronary arter disease on elite level wrestlers

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Coronary artery disease comes among causes of sudden death in the athletes. This research was scheduled to identify coronary artery disease risk factors for elite-level wrestlers. Descriptive cross-sectional study was done at Karamanoğlu Mehmet Bey University between January and March. 10 elite level wrestlers at Physical Education and Sport Academy constituted search group. Research covered 10% of the wrestlers' has expressed that it is heart disease. Average age of

the athletes participating in Research is $22:43 \pm 1.67$ with %30 girl, %70 boy. Group stated that %7 still smoke, %80 don't do sport aside from training, %70 take nourishment overly on meat and meat products, %90 skip daily course, %80 eat fast-food generally. The blood pressure and blood sugar starvation values of Sportsman values; in girls; systolic 116.28 ± 13.74 mmHg, 66.32 ± 11.64 mmHg diastolic, average of hunger for blood glucose values as 92.24 ± 14.72 mg / dl were identified, and the average blood pressure values in men; mmHg systolic 121.34 ± 9.32 , $10:42 \pm 74.83$ mmHg diastolic, average of hunger for blood glucose values as 92.24 ± 14.72 mg / dl were identified as $88.76 \pm 16:07$. As a result, 20% of total cholesterol, 10% systolic, 20% diastolic blood pressure, and 10% above the normal value blood sugar were found. In the search group, smoking, not doing sport, irregular nutrition levels, which are in between KAH risk factors, are high. KAH risk is seen more widely in the 30 years and over, As that group that we are studying at is average age of the young, we can talk that it will occur KAH risk factor in the future years

KEY WORDS Wrestlers, Coroner Arter Disease

Gender-related autonomic cardiac modulation in young elite athletes

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OBJECTIVE Physical exercise induces beneficial effects on cardiac autonomic activity with higher parasympathetic tone. Studies of gender-related differences in autonomic cardiac regulation indicate higher vagal activity in young women compared to men. The purpose of this study was to evaluate gender-related autonomic cardiac modulation in young elite athletes by using heart rate variability (HRV) analysis.

METHODS The ECG recordings were performed supine at rest in 40 healthy young subjects divided in 24 elite athletes (12 females, mean age 20.2 ± 2.0 , and 12 males, mean age 19.9 ± 1.7), matched according to the sports disciplines and age, and 16 untrained controls (5 females, mean age 22.1 ± 0.6 , and 11 males, mean age 25.5 ± 3.7). For the HRV analysis FFT spectra were evaluated from the tachograms. Low frequency (LF: 0.04 - 0.15 Hz) and high frequency (HF: 0.15 - 0.80 Hz) spectral bands were calculated and the LF/HF ratio was derived.

RESULTS In the athletes, no significant differences between females and males were observed in the mean heart rate (HR) (54.3 ± 11.5 vs 57.6 ± 7.1 , $p = \text{ns}$), LF and HF spectral components (2387.6 ± 3214.3 vs 921.6 ± 933.9 , $p = \text{ns}$ and 4312.6 ± 5970.0 vs 1846 ± 2253.0 , $p = \text{ns}$, respectively) and in LF/HF ratio (0.6 ± 0.3 vs 0.7 ± 0.5 , $p = \text{ns}$). In the controls, there was no significant difference between females and males in the mean HR (65.8 ± 2.3 vs 67.3 ± 5.2 , $p = \text{ns}$); the LF and HF spectral components (ms²) were significantly higher in males (452.0 ± 318.2 vs 0.05 , respectively), <0.05 and 760.4 ± 621.2 vs 376.4 ± 283.8 , $p < 153.9 \pm 61.6$, p whereas LF/HF ratio was significantly lower in females (0.5 ± 0.3 vs 1.2 ± 0.7 , 0.05). Comparing athletes to controls, male athletes presented lower mean HR $< p$ and LF/HF ratio, while female athletes had lower mean HR but similar LF/HF ratio. Both groups of athletes had higher LF and HF spectral components (ms²).

DISCUSSION & CONCLUSION Despite the sex-linked differences in autonomic cardiac nervous control observed by some authors our results suggest no gender-related differences in autonomic nervous activity in athletes. In comparison to untrained subjects male athletes showed higher vagal activity.

KEY WORDS autonomic nervous system, athletes, gender

ECG alterations in amateurs cyclists after stress test

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OBJECTIVE The electrocardiogram (ECG) of rest and the ergometry monitored they constitute two diagnostic actions of highly sensibility and specificity in the sports population to detect pathologies of incompatible risk with the sports activity. Nevertheless, the duration of the tests of effort can be very important for the apparition of ECG alterations. Therefore, the purpose of this work is to determine if the duration of the test of effort influences on the apparition of ECG alterations in amateurs cyclists.

Methods 17 amateurs cyclists from 21 to 56 years of age (with a 39.11-year-old average), all they practicing habitual with, at least, 3 years of training. DIMEQ 503 Electrocardiogram. ELITE Digital MAG utilizing the bicycle of personal highway of each cyclist. They were submitted to three tests of effort. The first one consisted of an incremental test beginning to 50 w and enlarging other 50 w every 2 m

inutes. The second, carried out to the 7- 10 days, they were 60' to a 60% of the maximum load reached in the first test and the third test, carried out to the 10- 15 days, of the second, and they were 20 km to the 100% of their possibilities. In the end of each test an ECG in supine position and in rest was carried out

RESULTS We believe it is necessary to conduct more extensive testing effort to detect electrocardiographic abnormalities that could encourage the athletes\'s sudden death.

DISCUSSION & CONCLUSION Rest incremental 1 hour 20 km. Normal 17 17 17 3 subepicardic ischemia 0 1 0 4 preexcitation s. 0 1 0 2 post ischemia 0 0 0 2 transwall ischemia 0 0 0 1 conduction alts 0 2 0 5 After a test of 20 Km of I pedal maximum alterations are presented more ECGraphics that after an incremental test or an hour of I pedal to the 60%.

KEYWORDS Electrocardiogram, ergometry, cycling, sudden death.

Effects of physical training on the ventricular fibrillation recurrence after application of energy shocks with defibrillator and on the energy level to revert this arrhythmia. An experimental study

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OBJECTIVE It has been published that physical training could protect against cardiac sudden death, which is produced in most cases by ventricular fibrillation (VF), and it has been proposed as an antiarrhythmic intervention. VF instauration and maintenance are related with the complexity of this arrhythmia and with electrophysiological heterogeneity of the myocardium. Moreover it has also been reported that physical training decreases electrophysiological heterogeneity of myocardium. We hypothesized that physical exercise could reduce the necessary energy to revert VF and decrease recurrence of this arrhythmia after the defibrillation.

METHODS Five NZW rabbits were submitted to a six-week endurance exercise training program, and six controls were not trained. When the exercise program was finished, rabbits were anaesthetized (ketamine, 10 mg/kg i.v.), killed and the hearts excised, isolated and perfused in a Langendorff system. A pacing electrode and a plaque with 256 recording electrodes were positioned on the left ventricle. Without interrupting the perfusion of the isolated heart, VF was induced at increasing frequencies and recordings were performed. We have used a defibrillatory technique based on a bipolar wave method. Immediately after VF triggering, the attempts to defibrillate were applied using increasing levels of energy until VF reversion; a second VF was induced again and several energy levels were also applied three minutes after VF triggering. We have determined: a) the total recurrence of VF after its cessation; and b) the energy to defibrillate after three minutes of VF start, when this second VF was produced. To compare the recurrence of VF between control and trained group a "chi-square" test was applied. To compare the energy to defibrillate between the two groups an unpaired Student t test was used. Differences were significant when $p < 0.05$.

RESULTS VF recurred in four hearts from control group whereas no heart recurrence was observed in the trained group ($p < 0.05$). Mean energy to defibrillate in control group was higher than in trained group (0.24 ± 0.19 ; $n=6$, vs. 0.10 ± 0.04 ; $n=5$). Values of energy to defibrillate were given in joules.

DISCUSSION & CONCLUSION The results seem to be in accordance with the findings previously reported about the increase on ventricular electrical homogeneity and stability of ventricular myocardium by training (Hajnal et al., 2005, Such et al., 2008). Indeed, as the mentioned properties are maintained, VF complexity will be less and will also be easier to interrupt the arrhythmia. In conclusion, physical training decreases VF fibrillation recurrence and the energy to revert this arrhythmia.

Menstrual dysfunctions, their connection with body composition and the level of physical activity burden in the sample of elite Bosnian sportswomen

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OBJECTIVE Low energy availability (with or without eating disorder), amenorrhea and osteoporosis, alone or coupled as a Female Athlete Triad pose a significant health risk for sportswomen and physically active women (1). Many studies explored the connection between physical activity and menstrual dysfunctions, a condition also known as "functional hypothalamic amenorrhea". Intensive physical strain, low energy consumption, early training commencement age, low body mass index (BMI) or low percentage of body fat (% BF) are seen as possible causes. The objectives of the research were as follows: 1) determine the prevalence of menstrual disturbances in the sample of sportswomen (N=84) and the control group (N=27), 2) examine the influence of body composition (BMI, % BF) and the intensity of training on the menstrual cycle.

METHODS The groups of sportswomen were comprised of 34 ball game players (basketball and handball state champions), 27 athletics players (17 national team short and long race runners) and 23 dancers, aged between 14 and 25. The control group was comprised of female students of the Medical Faculty, uninvolved in any sports, and of the same age. A detailed questionnaire was used to determine the menstrual profile. The definitions of menstrual dysfunctions (primary amenorrhea, secondary amenorrhea, oligomenorrhea) were in line with the ACSM Position Stand; The Female Athlete Triad 2007 (1). The % BF was determined via the bio-impedance method and the BMI standard equation. The intensity of the training is represented by the weekly hour number of trainings and competitions.

RESULTS The primary amenorrhea, secondary amenorrhea and oligomenorrhea prevalence was significantly higher in the sportswomen group (12/84), (9/84), (11/84) in comparison to the control group (0/27). Statistically highest prevalence of menstrual disturbances was in the group of athletics players, the primary amenorrhea (9/27), oligomenorrhea (8/27). The value of the % BF was statistically significantly lower ($p < 0,05$) in oligomenorrheic sportswomen (11,64%) in comparison to the eumenorrheic ones (16,60%). The BMI was not statistically connected to menstrual dysfunctions. The highest intensity of training was in the group of athletics sportswomen (13,98 h/week) which was found to have the most menstrual dysfunctions

DISCUSSION & CONCLUSION Menstrual dysfunctions were more frequent in the group of sportswomen than in the group of those who were not involved in sports. The lower % BF was related to oligomenorrhea. Weekly physical activity burden is linked to the frequency of menstrual dysfunctions.

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KEY WORDS Menstrual dysfunctions, sportswomen, body mass index, percentage of body fat

The search of psychognosis and physiological aspects of menopausal women athletes in Shahreza

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OBJECTIVE The Purpose of this project is the search of psychologic and physiologic aspects in menopausal women athletes and the effect of some variables in the menopausal symptom's rate such as: Current age of women, their menopausal age, single or married status, education level, occupation, menstruation's status, the rate of bloodshed in one year before menopause and finally, the mental, psychic and physical status in women one year before menopause. In this project Social statistic of research contains all women athletes in Shahreza.

METHODS Statistical symbol is about 80 menopausal women athletes in Shahreza whom have been chosen randomly . The tools for information collection is the questionnaire of survey in menopausal women that examined two aspects of psychognosis and physiologic of menopause. After completion, all information have been given to SPSS software and interpreted by using unilateral an analysis of Variance , Spearmen Rank- Order Correlation and pearson Rank- Order Correlation.

RESULTS There is no meaningful relation between the age of menopause women athletes and their symptoms of menopause. The rate of menopausal symptoms athletes in terms of the women single – married status is not different.

DISCUSSION & CONCLUSION The rate of menopausal symptoms athletes in terms of their education level ,occupation, their menstruation status is not different. There is a meaningful relation between the rate of menopausal symptoms athletes and bloodshed in one year before menopause. There is a meaningful relation between the rate of menopausal symptoms athletes and psychic- psychological status in one year before menopause.

KEYWORDS menopause, athletes, women, physiologic, psychognosis

The effect of mode of exercise on cardiopulmonary responses during the menstrual cycle of women

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OBJECTIVE It has been reported that kinetics are faster in walking than in cycling. It is possible there is some feedback from the muscles to accelerate the response of the cardiovascular system. The feedback may have a central effect, and stimulate cardiovascular kinetics, but the results are inconsistent. Cycling is easier than running because of the special physical position the body has on a bicycle. The purpose of this study is to evaluate the effects of mode of exercise on the cardiopulmonary index during the early follicular and luteal phases of moderately active women.

METHODS Twenty healthy moderately active women who had taken part in (3-4) sessions physical activity each week. The participants were randomly classified in two equal groups and performed an incremental exercise on Treadmill and Cycle Ergometer during their early follicular and luteal phases until they were exhausted. The luteal phase was determined by the level of Progesterone and Gnadotropic hormones in blood samples. The pulmonary gas analyzer was used to measure the, oxygen pulse, VO_2 max, HRmax in two phases.

RESULTS Paired samples T-tests were performed to detect baseline differences across two menstrual phases in two modes of exercise. The results indicated no significant difference of oxygen pulse in the luteal and early follicular phases of moderately active women in none of the two modes of exercise.

DISCUSSION & CONCLUSION It seems that because of the physical depression during menstrual cycle, which is due to the moderately active women, the replacement of running with cycling, with the aim of making physical activity simpler and encouraging female to continue their activity during this time, is recommendable.

KEY WORDS early follicular phase, luteal phase, oxygen pulse, incremental exercise

A survey of the impact of intensive exercises on reducing of employees low back pain

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OBJECTIVE This research aimed to study about impact of intensive exercises on reducing of employees low back pain in 1387. Subjects of this research is Azarbaijan regional electrical company personnel who worked 1387 in the following departments: training, financial affairs, public relations, procurement and dispatching. Two hundred of the mentioned employees who had low back pain were selected by accessible sampling, and their specifications were collected using questionnaire. After collecting and analyzing low back pain reasons and preliminary analyzing of data, they divided to two one hundred members.

METHODS Two questionnaires which had been designed by researcher, were used in order to collect data. The First questionnaire included 36 closed questions. 6 weeks later, after doing 29 intensive practices upon low back about 20 minutes every morning & afternoon, the second questionnaire including 14 closed questions were presented.

RESULTS The correlation coefficient test showed strong and positive relationship between intensive low back practices and low back pain decrease ($r=79\%$). On the other hand, the weight loss occurred due to 6 weeks exercising. 80 members of experimental group lost 1.37 kg weight on average after 6 weeks intensive low back practices.

DISCUSSION & CONCLUSION low back pain has been occurred after moving heavy things and sitting for a long time on work place chair.

KEY WORDS low back pain, sleep style, sitting, studying and things movement

Anthropometric characteristics of tennis performance players between the ages of 8 and 12 years old

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OBJECTIVE The purpose of this study was to investigate anthropometric characteristics of tennis performance players between the ages 8-12 years old.

METHODS The subjects of the study consisted of 50 female tennis players with mean age of 10.60 ± 0.07 years old,

height of 147.47 ± 04.83 cm, weight of 41.39 ± 06.36 kg, 43 male players with mean age of 10.70 ± 01.44 years, height of 146.82 ± 06.82 cm, weight of 39.99 ± 06.82 kg and 60 childrens for the control group (30 females and 30 males) who were in the same of age group and have not participated regularly in any sport's activity or training exercises. The control group was selected randomly. Female players have been playing tennis for 3.91 ± 1.40 years and the their starting age of tennis is 6.72 ± 1.05 years. Male players have been playing tennis for 4.18 ± 1.38 years and their starting age of tennis is 6.56 ± 0.94 years. All of the 153 subjects joined the study voluntarily. Tennis players ($n=93$) were players for the domestic teams that participated in the Turkiye Tennis Championship. Standard anthropometric methods were used to determine body mass, body height and all of skinfold and circumference measurements. All of the anthropometric measures were taken from right and left sides of the body based on Anthropometric Standardization Reference Manuel procuders. Body composition was determined by bioelectrical impedance analysis (BIA).

RESULTS According to the results of comparison of anthropometric measures; there were significant differences in skinfold thickness ($p<0.001$), circumference measurements of biceps, forarm and wrist ($p<0.001$) between right and left sides of female players, whereas there were no significant differences in length measurements ($p>0.05$) and circumference measurements of thigh, calf and ankle ($p>0.05$) between right and left sides of female players. There were significant differences in skinfold thickness ($p<0.001$), circumference measurements of calf, biceps, forarm and wrist ($p<0.001$) between right and left sides of male players, whereas there were no significant differences in length measurements ($p>0.05$) and circumference measurements of thigh and ankle ($p>0.001$) between right and left sides of male players.

DISCUSSION & CONCLUSION Tennis causes significant changes in the measurements of left and right sides of the tennis players between the ages of 8 and 12 years old that have been playing tennis for average of 6 years.

KEY WORDS tennis player, body composition, anthropometry, training

Daily physical activity related to risk factors for cardiovascular disease in children

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OBJECTIVE This study evaluated if accelerometer measured physical activity predicts clustering of risk factors for cardiovascular disease (CVD) in children aged 8 to 11 years.

METHODS Cross-sectional study of 156 (81 boys and 75 girls) children aged 8-11 years, recruited from an urban population-based cohort. Total body fat mass (TBF) and abdominal fat mass (AFM) were measured by Dual-energy x-ray absorptiometry. Body fatness was expressed as TBF percentage of total body mass (BF%). Body fat distribution was calculated as AFM/TBF. Maximal oxygen uptake (VO_2PEAK) was assessed by indirect calorimetry during a maximal exercise test and indexed for body mass (ml/min/kg). Blood was sampled and analysed for lipoprotein (LDL, HDL and total cholesterol) and triglycerid (TG) concentrations. Resting heart rate (HR), systolic and diastolic blood pressures (SBP and DBP) were measured. Pulse pressure (PP) and Mean artery pressure (MAP) were calculated. Daily physical activity was assessed by accelerometers for four days and daily accumulation of moderate and vigorous physical activity (MVPA) were calculated (defined as above 3500 counts/min with the Actigraph accelerometer). Maturity was evaluated according to Tanner. Skewed values were normalised by natural logarithm (\ln). Z-scores (Value for the individual-mean value for group)/SD were calculated. Sum of z-scores for BF%, AFM, AFM/TBF, SBP, DBP, PP, MAP, HR, LDL, -HDL, LDL/HDL quotient, total cholesterol, TG, and $-\text{VO}_2\text{PEAK}$ were calculated in boys and girls, separately, and used as an indices of clustered risk.

RESULTS Boys performed significantly more minutes of MVPA per day compared to girls (46 ± 21 vs. 35 ± 13 , $P<0.001$). Pearson correlation between MVPA versus indices of clustered risk was for boys (-0.16 , NS) and for girls (-0.38 , $P<0.05$). Boys and girls were divided according to tertiles of MVPA. One-way ANOVA analysis indicated significant differences in sum of z-scores between tertiles of MVPA in girls ($P=0.003$), whereas no significance difference could be observed in boys ($P=0.54$, NS).

DISCUSSION & CONCLUSION In this population-based cohort of children aged 8 to 11 years accelerometer measured minutes of moderate and vigorous physical activity per day predicted clustering of risk factors for CVD in girls aged 8-11 years, no such pattern could be observed in boys, which could be attributed to a higher physical activity level.

KEY WORDS Children, Physical activity, Accelerometers, CVD risk factors

Associations among the physical activity regime, the attitude towards alimentation and the nutrition condition in Romanian adolescents,

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OBJECTIVE Although physical activity level of adolescents is generally higher than adults, the decrement in their fitness level (in the conditions of inadequate diet) represents a reduced protection against metabolic and cardio-vascular diseases of the future adults.

METHODS The aim of this study was to determine the relations between the alimentation type, the nutritional status and the physical activity regime in Romanian adolescents. We realized a transversal study by using questionnaires for the physical activity regime (Physical Activity Index, PAI) and the attitude towards nutrition (Eating Attitude Test, EAT), both modified and standardized on Romania's population. We also evaluated anthropometrical data: weight, weight excess, height and body mass index (BMI) on two groups of Romanian adolescents: 50 boys (average age 16.1 years) and 50 girls (average age 16.3 years). "T test" and the effect size test (Cohen's d) for independent groups were performed to determine the differences between boys and girls.

RESULTS The boys' data suggests in average a good nutritional status (medium BMI 21.8; medium weight deficit 0.8 kg) and a very good physical activity regime (medium PAI 71.5) in the context of a good attitude towards alimentation (medium EAT score 5.1). The girls' data distinguishes by a slight weight excess (medium BMI 22.3; medium weight excess 1.4 kg), a more reduced physical activity regime as compared to boys' group (medium PAI 56.8), in the condition of a good attitude towards alimentation (medium EAT score 5.5).

We obtained a statistical significance of the differences between groups' means for all parameters: for BMI $p < 0.05$, $d = 0.63$; for weight excess $p < 0.05$, $d = 0.85$; for PAI $p < 0.001$, $d = 1.13$; for EAT $p < 0.03$, $d = 0.34$.

DISCUSSION & CONCLUSION In adolescents, gender is related with the nutritional status level in the context of a certain type of physical activity regime and attitude towards alimentation. Among Romanian adolescents the differences between boys and girls refer to the physical activity regime and the nutritional status and less to the alimentation habits (type of diet). The differences in observed patterns can be explained by the physiological (hormonally induced) and psychological (behavioral) differences between the two genders. In addition, the interval of the variability of the normal morpho-functional development can be altered by the energetic unbalances between the food share and the physical activity expenses, especially in the adolescence critical age.

KEYWORDS physical activity, nutrition condition, adolescents

Relationship between cardiovascular fitness and adiposity in boys and girls aged 9-16 years

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OBJECTIVE Obesity in children and adolescents is increasing rapidly worldwide and may be related with decreased health related fitness. The purpose of the present study was to examine the relationship between adiposity and aerobic fitness in a large sample of young healthy boys and girls.

METHODS A total of 8023 healthy and physically active individuals (5307 boys and 2716 girls) participated in this study. Body composition was measured by bioelectrical impedance using a leg-to-leg analyser at least 3 h after the last meal and cardiovascular fitness was measured using the shuttle run test to exhaustion from which maximal oxygen uptake values ($\text{VO}_{2\text{max}}$) were calculated according to the level accomplished. Participants were divided into eight age groups (9,10,11,12,13,14,15,16 years) and means were compared using a two way ANOVA for independent samples. Relationships between variables were assessed using the Pearson product moment correlation coefficient (r).

RESULTS There was no significant difference between boys and girls in height and weight until the age of 13 years, while the percent body fat was higher in girls in every age group, with the difference increasing after the age of 11 years. $\text{VO}_{2\text{max}}$ relative to body weight in boys remained relatively stable from 9 to 13 years and showed a small increase thereafter. However $\text{VO}_{2\text{max}}$ relative to body weight in girls decreased significantly with age, especially after the age of 13 years. This could not be accounted for by the small increase in body fat. The correlation coefficients between $\text{VO}_{2\text{max}}$ relative to body weight and percent body fat were significant and negative for both boys and girls (from -0.40 to -0.59 $p < 0.001$ in boys and from -0.32 to -0.47 $p < 0.001$ in girls). These correlations were always higher in boys compared to girls. Moreover, percent body fat was positively correlated with $\text{VO}_{2\text{max}}$ expresses in absolute terms (l/min), suggesting that cardiopulmonary capacity is increased in overweight individuals, but the excess fat results in a

load that decreases performance.

DISCUSSION & CONCLUSION The results of this study showed that increased adiposity results in decreased aerobic fitness relative to body weight in all age groups. Since low aerobic fitness is related to inactivity during childhood and adolescence, it is suggested that maintenance of normal body composition is important for promoting an active life style.

KEY WORDS children, adolescents, obesity, aerobic fitness

Longitudinal study of physical fitness, health and the influence of socio-economics factors, obesity and sedentary behaviours on children of primary school of Fundão

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OBJECTIVE The present study intends to analyse physical fitness level of children of the Primary School of Fundão. It's a longitudinal study carried out in three years (1999/2000; 2000/2001 and 2001/2002) within three moments of observation. The main goals are: (i) to describe and interpret the evolution of anthropometric variables and body composition (obesity), as well as, the physical fitness levels regarding health of children of both sexes with ages between 7 (at the beginning of the study) and 10/11 years old (at the end of the study), belonging to classes from the primary school of Fundão; (ii) to verify the relationship between the socio-economic factors and the sedentary behaviours on the evolution of the physical fitness levels; (iii) to interpret the variability that occurs inside each one and between sexes in the three moments of observation.

METHODS The sample was constituted by 135 students, 71 males and 64 females with ages between 7 and 10/11 years old. In the evaluation of physical fitness, the adaptable Battery tests of AAHPERD (1988) was used. In the evaluation of body composition (obesity) the Body Mass Index was used and in the determination of socio-economic factors we turned to a questionnaire. The statistical procedures were One-Way Anova. To estimate the parents influence, the Pearson and Spearman correlations were used to the categorical variables.

RESULTS The main results obtained in this research were: - The medium values of height, weight and body mass index translate a significant growth as a result of the age; - The average differences showed us the distinction between boys and girls; - Boys were slightly taller, heavier and reported a higher body mass index; - The overweight and obesity values were 35.9% in females and 43.6% in males; -The obesese were older, heavier and taller; -Boys from a lower socio-economic status in terms of their parents' job showed better results in resistance trial compared to boys from a higher socio-economic status ; -Boys from a higher socio-economic status in terms of their parents' schooling present better results than those from lower socio-economic status at the following trials: resistance and strength; - In females there is no significant correlation between the socio-economic status and the physical fitness variables.

DISCUSSION & CONCLUSION A relationship between the socio-economic factors and the sedentary behaviours on the evolution of the physical fitness levels was found. Furthermore, variability occurs inside each one and between sexes during the evaluations.

KEY WORDS Physical fitness, anthropometric fitness, obesity, body mass index, socio-economics

Functional body mass index in school children

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OBJECTIVE A profile of the Body Mass Index of students in primary and secondary in urban and rural Andalusia was assessed.

METHODS 1166 subjects (539 boys and 624 girls); students of 5th and 6th grade, 1st, 2nd, 3rd and 4th year at secondary and 1st and 2nd year in high school participated. Participants were municipalities of urban were from the major capitals of Granada and Almeria whereas participants of rural were from Adelaide and Olula del Rio of Almeria, Noalejo (Jaén) and Estepona (Málaga). Body weight, height and Body Mass Index (Weigh Tanita TBF-300 and a standard height of straight branches) of participants were determined.

RESULTS The measures of underweight, overweight and obesity in children from rural areas are higher compared to that of urban areas. Percentile of urban to rural are: p <5 Thinness 1.56 (+/- sd 0.33) 2.59 (0.49) <0.05 5-84 Normal 76.35 (8,78) 68.06 (7.91) <0.05 85- 94 Overweight 14.67 (4.01) 16.06 (4.98) <0.05 >95 Obesity 7.43 (2.85) 13.29 (3.76) <0.05 This aspect is considered normal to have a big difference in socioeconomic level, in lifestyle and eating

habits. There is a minimal difference in measures of underweight and overweight among urban and rural areas. Obesity showed a big difference in boys and girls from rural areas with regard to urban locations.

DISCUSSION & CONCLUSION The results which are presented below represent the differences comparisons underweight, overweight and obesity, among different groups (urban and rural areas).

KEYWORDS Body Mass Index, overweight, obesity, children.

Body Composition and Somatotype in 10-18 year old male soccer players and their relation with athletic performance and soccer injuries

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OBJECTIVE Although there are some studies examining the somatotype and body composition in soccer players, their effects on athletic performance aren't clear. The aim of this study was to determine the body composition and somatotype profiles of young soccer players belonging to a Turkish soccer team participating in super league and to examine the relationship of somatotype and body composition to athletic performance and injury rates.

METHODS The sample consists of 122 male soccer players aged 10-18 years. The players were divided into 3 groups according to their ages: 1. 10-12 years 2. 13-15 years 3. 16-18 years. Somatotypes were estimated with the Heath-Carter anthropometric somatotype method and body compositions have been assessed using Tanita TBF 300 M. Participants performed a field running test starting with 8 km/h running speed, the speed increased by 2 km/h every 3 minutes until exhaustion and blood lactate concentrations were measured for each running speed. The running velocities corresponding to 4mmol.L⁻¹ blood lactate concentration were determined. The injuries of all players were recorded through one year. SPSS version 15.0 was used for statistical analysis.

RESULTS The somatotype of 122 soccer players was 2.23 ± 0.62 – 4.14 ± 0.86 – 3.24 ± 0.86 (ectomorphic mesomorph). The somatotypes of 3 age groups were respectively : (2.13 ± 0.82 – 4.10 ± 0.97 – 3.42 ± 0.98), (2.11 ± 0.56 – 4.09 ± 0.97 – 3.44 ± 0.86) and (2.38 ± 0.51 – 4.22 ± 0.87 – 2.96 ± 0.72). There was a statistically significant difference in ectomorphy component between 2. and 3. groups ($p < 0.05$). The body composition characteristics were fat % 9.69 ± 3.80 , fat mass 5.12 ± 2.24 kg and fat free mass 48.86 ± 13.05 kg. The reduction in fat percentage was significantly correlated with increase in age between 1. and 2. groups ($p < 0.01$) and between 1. and 3. groups ($p < 0.001$). The mean running velocity was 11.79 ± 1.37 km/h. There wasn't any statistically significant relation between somatotype, body composition and running velocity. The injury percentage was 21.3%. There was no significant difference in somatotype between injured and noninjured players.

DISCUSSION & CONCLUSION The players in our study were more mesomorphic than the Turkish young soccer players in previous studies but less mesomorphic than their international counterparts. The low values of mean running velocities can be explained by the differences in training intensity and frequency, in addition to low mesomorphy ratings as well as the differences in method. There was no negative relationship between somatotype and injury rates. Training plans directed towards improving muscularity can be suggested for young soccer players.

KEYWORDS Somatotype, Body composition, Athletic performance, Sports injury, Soccer.

The physiological effect of football in prepubescent children

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OBJECTIVE Football as an invasive field game is characterized by intermittent activity profiles with a very important aerobic demands. VO₂max and the Ventilatory Anaerobic Threshold (VAT) have traditionally been considered as the “gold standards” for evaluation of endurance performance. Most of the researchers in this matters says that the former is an indicator of greater fidelity in the characterization of aerobic power of an individual, as well as their level of fitness while the latter provides a better index of aerobic performance (1,2,3,4). However, when we talk about children they are very different from the adults. This study intends to know the physiological effect of a sport such as football in the prepubescent child from the same school and city.

METHODS Participants: 8 football players (FP - age: 11.73 ± 0.46 ; weight: $41.83 \text{ kg} \pm 9.35$; BMI: 17.35 ± 2.07) and 10 non football players (NFP - age: 11.42 ± 0.46 ; weight: $43.20 \text{ kg} \pm 4.70$; BMI: 19.10 ± 1.91) participated in this study. The entire sample was randomly assessed from the same city (Rio Maior, Portugal) and the same school. A maximal, progressive and incremental test using ergo-spirometry procedures (Cosmed® b2) were selected to test in laboratorial context. Heart rate was measured with the Polar S610. The comparison and descriptive data was analyzed between the

groups (SPSS, ver.15.0).

RESULTS Significant differences were observed for the $\text{VO}_2\text{max/kg}$ and VAT parameters between the groups. However there were no differences found in the percentage of the LAV from the $\text{VO}_2\text{max/kg}$. We also identified some differences in the recovery phase.

DISCUSSION & CONCLUSION When we talk about children who attend regular practice of football, we can say that this sport promote an adaptation on physiological characteristics very slightly in children as seen in the graphic analysis. So, the results suggested that there is an aerobic adaptation due to the practice of this sport in these children.

KEY WORDS Football, Prepubescent Children, Cardiorespiratory Fitness

Effect of a short time physical activity program on the lipid profile of primary school students

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OBJECTIVE Lipid profile (LP) is an important predictor of morbidity and mortality, and some studies showed that it can be optimized by means of at least two months programs. The aim of this study was to analyze if LP could be optimized after performing 13 lessons of moderate-vigorous physical activity of 45 minutes twice a week in primary school students

METHODS Thirty subjects (14 boys and 16 girls) in 5th level of Primary School of Granada (Spain) aged 10-11 years participated in the study. The sample was divided into two groups: Intervention Group (IG) and a Control Group (CG), composed by 15 subjects each. The intervention program was carried out in 13 lessons of moderate to vigorous PA ($82 \pm 2\%$ of Maximal Heart rate -HR-) in 2 weekly lessons of 45 minutes. Intensity was controlled by means of HR monitors (Polar RS800cx). Anthropometrical variables, as well as arterial pressure and blood biochemical composition were measured in all subjects.

RESULTS Statistical analysis (SPSS 15.0) revealed no differences for gender. The T test for related samples was used to examine possible differences between IG and CG as well as between pretest and posttest after the intervention. Results showed that IG reduced significantly ($p < 0.05$) systolic (100.8 ± 8.2 Vs 97 ± 7.1) and diastolic arterial pressure (59 ± 6.5 Vs 54.3 ± 4.3), while CG did not. Also IG showed a significant reduction ($p < 0.01$) in Total Cholesterol (156.1 ± 23.4 Vs 140.5 ± 15.8) and cLDL (93.5 ± 21 Vs 73.3 ± 13.4) and an increase in cHDL (49.2 ± 9.4 Vs 54.3 ± 7.9) which are statistically close to significance. In CG no differences were observed between pretest and posttest conditions for any of these variables. Glucaemia was reduced in both groups, although the difference was greater in IG. So, LP was improved clearly in IG comparing to CG.

DISCUSSION & CONCLUSION A program of 13 lessons of moderate-vigorous PA twice a week during 45 minutes each can improve LP of 10-11 years old primary school students, so cardiovascular risk related to LP can be minimized in a relatively short period of time.

KEY WORDS Physical activity, children, lipid profile, health

Aerobic capacity can be improved by means of a 13 lesson program of physical activity in primary school students

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OBJECTIVE Aerobic capacity is an important predictor of morbidity and mortality because of cardiovascular factors as well as other causes. Some studies showed that this condition can be optimized by means of at least two months programs. The aim of this study was to analyze if differences could be produced in Maximal Oxygen Uptake (VO_2max) when performing 13 lessons of moderate to vigorous physical activity of 45 minutes twice a week in primary school students.

Methods Sixty six students (35 boys and 31 girls) in 5th level of Primary School of Granada (Spain) aged 10-11 years

participated in the study. The sample was divided into two groups: Intervention Group (IG) composed by 18 subjects, and a Control Group (CG) composed by 48 subjects. The intervention program was carried out in 13 lessons of moderate to vigorous PA ($82 \pm 2\%$ of Maximal Heart rate -HR-) in 2 weekly lessons of 45 minutes. Intensity was controlled by means of HR monitors (Polar RS800cx). To evaluate maximal aerobic capacity the 20m shuttle test was carried out using the equation of Ruiz et al. (2008).

RESULTS Statistical analyses (SPSS 15.0) revealed no differences for gender. The T test for related samples was used to examine possible differences between IG and CG as well as between pretest and posttest after the intervention. Results showed no differences between IG and CG in the pretest (42.95 ± 2.99 Vs 43.48 ± 2.56), as well as the CG showed no changes from pretest to posttest (42.95 ± 2.99 Vs 43.25 ± 3.29) as this group did not perform any intervention. On the other hand, IG showed a significant improvement compared to CG ($p < 0.05$) in the posttest (43.25 ± 3.29 Vs 45.95 ± 4.26), as well as IG improved significantly ($p < 0.01$) from pretest to posttest (43.48 ± 2.56 Vs 45.95 ± 4.26).

DISCUSSION & CONCLUSION A program of 13 lessons of moderate to vigorous PA, twice in a week for 45 minutes can improve VO_2max of 10-11 years old primary school students, so cardiovascular risks related to reduced aerobic capacity can be minimized in a relatively short period of time.

KEY WORDS Physical activity, children, aerobic capacity, health

Continuous versus intermittent aerobic exercise intermittent in the treatment of obesity

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OBJECTIVE Our study proposes to compare the effects of continuous aerobic exercise versus intermittent aerobic exercise on subjects with obesity. This sample is part of a research project about the effects of physical exercises in the prevention and treatment of metabolic syndrome.

METHODS The study, has been developed during 16 weeks and included 40 male patients with obesity, with ages between 17-20 years, which have been separated into two groups: group I (n=20), who has undertaken 45 minutes of continuous aerobic exercise/day, 5 sessions/week, at submaximal intensity (70-75% of VO_2max), and group II (n=20) who has undertaken same type of exercise but daily session was divided in three events of 15 minutes at minimum 3 hours interval. General indications regarding the diet were set for each patient at moderate caloric consume.

RESULTS The anthropometrics parameters before and after 16 weeks of physical exercises at group II comparative with group I : weight (kg) decreased 8.9 ± 2.5 versus 6.1 ± 1.3 ; waist circumference (cm): 10.0 ± 4.3 versus 6.0 ± 2.5 ; BMI: 5.0 ± 1.5 versus 3.5 ± 1.4 ; %Body Fat: 6.7 ± 1.5 versus 5.1 ± 2.5 .

DISCUSSION & CONCLUSION For treatment of obesity, the using of intermittent aerobic exercise has better results comparative with the continuous aerobic exercise. Additionally, we recommend the insertion of a minimum 3 hours rest between physical exercises sessions for a greater caloric expenditure after intermittent exercise.

KEY WORDS Obesity, continuous aerobic exercise, intermittent exercise.

Both the aerobic and strength training decreased serum chemerin concentrations in prediabetic middle-aged men

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OBJECTIVE The elevated production of various adipokines, including chemerin, interleukin 6 (IL-6), leptin, retinol binding protein-4 (RBP-4) and tumor necrosis factor alpha (TNF- α) and decreased production of adiponectin are considered to have important role in development of diseases like metabolic syndrome and type 2 diabetes. Chemerin, a novel recently discovered adipokine that regulates adipocyte differentiation, has been found to associate inflammation markers and components of metabolic syndrome as BMI, HDL-C, hypertension and triglycerides [1]. In this study, the effects of 12 weeks exercise intervention on the serum adipokines of the obese pre-diabetic men were investigated.

METHODS Prediabetic obese men (n = 144) aged 40–65 years were studied at baseline and at 12 weeks in a randomized controlled multi-centre intervention study. Their BMI varied from 25.1 to 34.9. Volunteers were randomized to one of three groups: (1) control group (C, n = 47) that had no supervised exercise during intervention period, (2) Nordic walking group (NW, n = 48) that trained aerobically 60 minutes with Nordic walking exercises three times per week, or (3) resistance training group (RT, n = 49) that trained 60 minutes with strength and power type exercises three times per week. The intervention period did not consist of dietary counseling. Adiponectin, IL-6 and TNF- α were measured from the plasma samples using BioRad Bio-Plex 200 System and chemerin and RBP-4 from the serum samples using Thermo Multiskan.

RESULTS Both types of exercise decreased significantly serum chemerin concentrations compared to control group. In addition, plasma leptin concentration decreased statistically only in the NW group. There were no changes in the circulating adiponectin, IL-6, RBP-4 and TNF- α concentrations.

DISCUSSION & CONCLUSION Progressively structured both aerobic and strength & power training decreased significantly serum chemerin concentrations after 12 weeks intervention program in pre-diabetic middle-aged men. Six months metformin treatment, anti-diabetic drug, decreased also significantly serum chemerin concentrations in women with POCS [2]. It seems that both type of exercise have similar regulatory effects of circulating chemerin than metformin treatment.

KEYWORDS Chemerin, exercise intervention, leptin,

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Study regarding muscular parameters changes at young obese after an individualized physical training programme

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OBJECTIVE The purposes of our study were: testing and monitoring the physical effort at young obese subjects, reducing their body weight, increasing their muscular parameters in order to improve their physical appearance consecutive to lowering body weight.

METHODS The study group was formed by 35 students of our university, 27 females and 8 males. The including criteria were: age between 18 and 25 years ($19,3 \pm 2,1$ years), body mass index over 30 ($32,5 \pm 2,1$ kg/sqm) and absence of any pathology that prohibits the physical effort. The evaluation protocol consist in: somatometric examination, ergospirometric and nutritional analysis, quality of life evaluation (with MOS SF-12 scale); we established the particularities of an individualized physical training programme therefore the physical effort was done mostly in the corresponding area for maximum consumption of lipids; also, the subjects benefits of a nutrition counseling. The proper physical training programme (made for 3–4 times on a week for 35–40 minutes) consist in endurance effort on treadmill, stepper, elliptical bicycle, ergometric bicycle; the re-evaluation was made after 8 months. The muscular force was assessed with a Chatillon MSC dynamometer on the main muscular groups of the body.

RESULTS After 8 months, we obtained an increase of muscular force of the majority of monitored groups, but a significant increase just of trunk and lower limbs muscles with $p < 0.05$, because the accent was made mostly on these groups. We also obtained the decrease of body weight with a mean of 10,4 kg, decrease of BMI with a mean of 5,2 kg/sqm, decrease of fatt mass with 11,1%, increase of life quality, for Physical Component Summary (PCS) with a mean of 10.1 points and with 19.1 points for Mental Component Summary (MCS), all with $p < 0.05$. The increase of muscular force was not correlated with the decrease of body weight, changes of fatt or lean mass or fitness score ($r < 0.2$), so we can conclude that the increase of muscular force was related directly with the participation to the training programme.

DISCUSSION & CONCLUSION The goal of this study – the improvement of physical appearance and muscular force, the reduction and maintenance of the selected subjects' body weight at levels closer to the optimum, the improvement of the eating and physical activity and the increase of the life quality was reached till this point of the study. Acknowledgement This paper work was supported by a CNCSIS project, Projects-Ideas, nr. 909/2009.

KEY WORDS individualized training programme, muscular force, obese

Regular exercise reduced homocysteinemia in adults with metabolic syndrome

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OBJECTIVE It is widely accepted individuals with metabolic syndrome presented an increased risk of cardiovascular disease. However the precise mechanisms underlying this association are not completely understood. Hyperhomocysteinemia has been described as a significant and independent risk factor for cardiovascular disease. The present study was designed to determine the influence of regular exercise on homocysteinemia in adults with metabolic syndrome.

METHODS Sixty young male adults with metabolic syndrome according to the criteria reported by the National Cholesterol Education Program Adult Treatment Panel III volunteered for this study. Forty-five were randomly included in experimental group to perform a 12-week aerobic training program, 3 days/week, consisting of warm up (10 min), main part (35-50 min [increasing 5 minutes each three weeks]) at a work intensity of 60-75% of peak heart rate (increasing 5% each three weeks) and cool-down (10 min). Control group included 15 age, sex and BMI-matched adults with metabolic syndrome that did not perform any training program. Written informed consent was obtained. Further our protocol was approved by an institutional ethic committee. An enzymatic assay was used to determine plasmatic homocysteinemia (Catch Inc, Seattle). It was assessed twice: 72-hours before starting the program (pre-test) and after its ending (post-test).

DISCUSSION & CONCLUSION When compared to baseline, plasmatic homocysteinemia was decreased significantly after being exercised (11.6 ± 0.5 vs 9.7 ± 0.4 $\mu\text{mol/l}$ homocysteine; $p < 0.05$). On the contrary no changes were reported in controls. Regular exercise may reduce homocysteinemia in adults with metabolic syndrome. Further long-term follow-up studies are required to determine whether correction of homocysteinemia improves clinical outcomes of individuals with metabolic syndrome.

Falls in elderly: Physical fitness, balance and mobility and fear of falling in elderly practitioners and no exercise practitioners

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OBJECTIVE The decline in physical fitness (PF), balance and mobility together with fear of falling increase the risk of falls in elderly people. The main goal of this study was to compare in elderly subjects with and without regular practice of physical exercise (PE) the occurrence of falls, PF, balance and mobility and the fear of falling.

Methods The sample was composed by 30 elderly subjects, aged between 67 and 93 years old, equally divided in two groups in function of being practitioners (P) or non-practitioners (NP) of regular PE. The occurrence of falls in the past year before the study was self-reported. To evaluate PF three tests of the Senior Battery Fitness Test (SFT), of Rikli and Jones were used. Balance and mobility were assessed by the Scale of Balance and Mobility of Tinetti and, the Falls Efficacy Scale International (FES-I) was used to evaluate the fear of falling.

RESULTS Subjects on group P presented higher values of PF and balance and mobility and smaller values on the fear of falling, being the differences to group NP statistically significant ($p < 0.05$). The correlations between the performance in the tests of PF and the indexes of balance and mobility and the fear of falling were significant. The frequency of falls reported by P and NP were similar, however, the results of logistics regression indicated that NP group had a risk 1,5 times higher of falling relatively to group P (Odds Ratio = 1,5).

DISCUSSION & CONCLUSION We concluded that the practice of regular exercise has a positive effect in PF, in the balance and mobility and on the fear of falling. These facts didn't led to differences in the number of falls reported, but they suggest a trend in the diminution of the risk of falls compared to elderly institutionalised NP.

KEY WORDS Elderly; falls; physical exercise; physical fitness; balance and mobility; fear of falling.

Physical inactivity during leisure time. A comparative study between rural and urban young people

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OBJECTIVE The physical activity of young people is an important and interesting research topic. It is well documented that there is an association between lower levels of physical activity routines and health problems issues. Thus, the purpose of this study was to investigate the routines of physical activity and its association with the urban and rural context in young female people.

METHODS The sample consisted of 214 girls (13-16 years old) from rural and urban context. Physical fitness was measured by AAHPERD (1988) battery tests, and Pacer test, from Prudencial FITNESSGRAM (1994). Physical activity was measured by the diary of the physical activity and accelerometer CSA. Urban and Rural classification was based on INE (1996). Comparisons between rural and urban girls were conducted using independent t-tests. The significance level was set at $p < 0.05$.

RESULTS The results suggest that girls from the urban context are taller and heavier, but no significant differences were found. Sit-ups and sit-and-reach values were better in urban than in rural girls. Rural girls presented a better performance in Pacer test and mile test. Girls from rural context appeared to be more active, mainly in high categories of intensity (13-14 years old). Urban girls are more sedentary during week. On the other hand urban girls appeared to be more active on weekends (15-16 years old).

DISCUSSION & CONCLUSION Our results suggest that urban-rural context influences physical activity. Furthermore, weekend days appeared to increase physical activity in urban girls.

KEY WORDS Physical activity, urban context, rural context, urban-rural contrast.

Sport related physical activity is related to measures of cardiorespiratory fitness, cardiac autonomic health and serum BDNF concentration in man

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OBJECTIVE We sought to examine relationships between the differing components of physical activity (work, sport and leisure), cardiorespiratory fitness and cardiac autonomic health in normal men ($n=28$) and women ($n=16$).

METHODS The average age was 33.0 ± 10.3 years, height 1.78 ± 0.06 m, body mass 77.2 ± 10.8 kg for men; corresponding values for women were: age 36.6 ± 11.9 years, height 1.69 ± 0.06 m, body mass 64.8 ± 7.4 kg. Cardiorespiratory fitness ($\dot{V}O_{2\max}$ L/min) was estimated from heart rate and work rate (Åstrand-Rhyming cycle ergometer test); seated heart rate and blood pressure were measured after 5 minutes stabilization using an automated sphygmomanometer (Dinamap PRO 400 V2). Cardiac autonomic health was assessed from supine measures of heart rate variability (HRV) as the R-R interval (RRI, milliseconds), using standard telemetry techniques (Polar S810i, Kempele, Finland) and methods of analysis ($n=21$). Physical activity was assessed by questionnaire (Baecke *et al.* 1982 *Am. J. Clin. Nutr.* **36**: 936-942) ($n=43$) and resting serum BDNF (brain-derived neurotrophic factor) measured using an ELISA kit (enzyme-linked immunosorbant assay; Clinicom) ($n=44$). **RESULTS** There was no significant difference in estimated $\dot{V}O_{2\max}$ values for men (3.75 ± 0.84) compared with women (3.43 ± 0.72 L/min) ($P=0.206$). There was no difference in seated heart rate 63 ± 12 vs. 61 ± 10 b/min ($P=0.718$), blood pressure: systolic 129 ± 11 vs. 124 ± 9 ($P=0.181$) and diastolic 70 ± 10 vs. 72 ± 8 mmHg or serum BDNF concentrations 7.33 ± 3.02 vs. 6.90 ± 2.01 ng/mL ($P=0.611$), men versus women respectively. Similarly there was no significant difference in Baecke scores work (2.43 ± 0.54 vs. 2.24 ± 0.72 , $P=0.336$), sport (4.67 ± 1.69 vs. 4.42 ± 1.65 , $P=0.645$) and leisure (3.57 ± 0.60 vs. 3.41 ± 0.58 , $P=0.372$) for men versus women respectively; nor indeed for total Baecke score (10.67 ± 2.25 vs. 10.07 ± 1.91 , $P=0.376$).

The Baecke sport score was correlated with the supine RRI, $r=0.539$ ($P=0.012$, $n=21$); seated heart rate, $r=-0.438$ ($P=0.003$, $n=43$); cardiorespiratory fitness, $r=0.536$ ($P=0.000$, $n=43$), and serum BDNF concentration $r=-0.428$ ($P=0.004$, $n=43$).

DISCUSSION & CONCLUSION The results show that sport activity, rather than work or leisure physical activity is associated with conventional indices of cardiorespiratory fitness, cardiac autonomic health and serum BDNF concentration.

KEY WORDS Sport-related physical activity; Cardiorespiratory fitness; HRV; BDNF; Baecke

ACE I/D genotype in Bulgarian Athletes

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OBJECTIVE The aim of this study was to analyze ACE I/D gene polymorphism among 70 professional athletes, divided into three groups according to a power-time model of performance (Anaerobic Power – AnaP, Anaerobic Capacity – AnaC and Anaerobic Aerobic - AnaA), and 44 controls from Bulgarian population.

METHODS Genotyping for the ACE I/D variant was performed by Polymerase Chain Reaction (PCR). PCR primers were forward 5'- CTGGAGACCACTCCCATCCTTTCT-3' and reverse 5'- GATGTGGCCATCACATTCGTCAGAT – 3'. Ventilation and CO₂ output were continuously measured breath- by-breath during the Wingate test.

RESULTS ACE II genotype and I-allele frequency in our sample are one of the lowest in comparison with other studies with Caucasian populations. In AnaA group, the frequency of D-allele was significantly higher than in AnaC group (66% vs 50%, $p=0,02$), contrary to the prevailing data showing association of endurance with I-allele. We found that ACE ID and II genotypes significantly correlate with Peak Power Output ($p=0,00004$; $p=0.01$) and Relative Power Output ($p=0,0002$; $p=0,03$) between athletes and controls. Although DD has the highest Peak and Relative Power Output, there was no significant difference. In those athletes who had Relative Power Output above 10 Watts/kg there was a tendency of higher distribution of D-allele in comparison with those below 9 Watts/kg, although not statistically different. DD genotype athletes had higher Lean Body Mass in comparison with II genotype athletes ($p=0,02$). ACE ID AnaA group of athletes had significantly higher CO₂ exhalation, compared with ID genotype AnaP athletes (3779 vs 3110 ml, $p=0,04$). Similar observations was found also between ID genotype AnaC and AnaA athletes and controls ($p=0,04$ and $p=0,0001$), but not with AnaP group. **DISCUSSION & CONCLUSION** High D-allele frequency in AnaA group could be connected with the fact that the vast majority of the sports are with mixed anaerobic-aerobic character. Such sport activities require relatively high speed and strength demands. Furthermore, the presence of D-allele in ACE heterozygous persons also indicates favorable conditions for speed and strength capacities development.

KEY WORDS ACE gene, Athletes, Wingate test

Skeletal muscle gene ACTN3 and physical performance: genotype-phenotype relation

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OBJECTIVE ACTN3 gene is responsible from the production of alpha-actinin-3 protein, which has force-generating capacity of muscle fibers, and which is restricted to fast fibers. Recent studies show that elite sprint athletes had a higher frequency of the RR genotype. The purpose of the study was to investigate ACTN3 gene variations and their probable phenotypic reflection by using physiological methods, and to show ACTN3 polymorphism in Turkish soccer players ($n=44$).

Methods After determining the genotypes by analyzing the blood samples, three groups (XX, RR, RX) were formed. The groups were existing R577X variant in both ACTN3 genes (XX, $n=4$), not existing R577X variant in both ACTN3 genes (RR, $n=22$), or existing R577X variant only one of the two ACTN3 genes (RX, $n=11$), respectively. To determine aerobic performance, Bruce protocol was applied on treadmill and maximal oxygen consumption (VO₂max) was measured by metabolic analyzer. On a separate day, anaerobic performance was evaluated by Wingate test. Student's t-test or analysis of variance (ANOVA) was used for comparisons.

RESULTS Nine % of the soccer players had homozygotism for R577XX codon. The VO₂max and maximal ventilation levels in XX group were increased compared to RR group ($p<0.05$) and RX groups ($p<0.05$). Oxygen utilization in ventilatory threshold in XX group was increased compared to the other groups ($p<0.05-0.01$). VO₂/HR (pulse oxygen) levels were not different between groups. XX group performed increased values in the shuttle run tests. Peak power values, pointing out the anaerobic performance, were increased in XX and RX groups ($p<0.05$).

DISCUSSION & CONCLUSION Our findings evaluated the effect of genotypic variations on sprint and endurance performance of athletes contributing the understanding of genotype-phenotype relation. The results shows that ACTN3 gene mutations increases aerobic and anaerobic performance. This study was supported by Marmara University research foundation (BAPKO).

KEY WORDS ACTN-3, VO₂max, peak power, soccer players

The type V collagen gene is associated with performance of ironman triathletes

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OBJECTIVE Various genetic loci and markers have been related to physical performance or health-related phenotypes. Other genetic sequence variants, including a polymorphism within the gene which codes for type V collagen, the COL5A1 BstUI Restriction Fragment Length Polymorphism (RFLP), have also been associated with increased risk of chronic Achilles tendinopathy. Type V collagen is a quantitatively minor fibrillar collagen, which is believed to regulate lateral fibril growth within tendons. The primary aim of this study was therefore to determine if the COL5A1 BstUI RFLP is associated with ultra-endurance performance

METHODS Three hundred and thirteen Caucasian male participants of the 2006 and 2007 226km South African Ironman triathlons participated in this study. All participants were genotyped for the COL5A1 BstUI RFLP. A one-way anova co-varied for age was used to determine genotype effects on physiological characteristics and performance in either the 2006 or 2007 South African Ironman triathlons. A Tukey's post-hoc analysis was used to identify specific differences between genotype groups.

RESULTS Participants with a TT genotype of the COL5A1BstUI RFLP (n=114) completed the 180km cycle stage (P=0.043), the 42.2km run stage (P=0.025), as well as the overall 226km race (P=0.036) significantly faster than individuals with a CC genotype (n=57). There were no genotype effects on time to complete the 3.8km swim stage or any other physiological characteristic.

DISCUSSION & CONCLUSION This is the first study to identify the COL5A1 BstUI RFLP as a marker for physical performance. The exact mechanism by which this genetic variant is associated with performance is unknown.

KEYWORDS Endurance, Genetics, tendon,

Effects of leisure-time physical activity on health related quality of life, body composition, and physical fitness of male faculty members

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OBJECTIVE In public health and medicine, the concept of health-related quality of life refers to a person or groups perceived physical and mental health over time. Physicians have often used health-related quality of life to measure the effects of chronic illness in their patients to better understand how an illness interferes with a persons day-to-day life. The purpose of this research was clarifying the effects of leisure-time physical activity on the health related quality of life (HRQOL), body composition (BC) and physical fitness of male faculty members of Birjand University, Iran..

METHODS 40 males were selected randomly and divided equally into physically active and non-active in leisure-time by a questionnaire. The dependent variables including HRQOL, body fat percent, flexibility, strength, and maximal oxygen uptake(VO₂max) were measured by SF-36 questionnaire, caliper, flex board, dynamometer, and Monark's work bicycle(839 model) respectively. We applied MANOVA test for analysis of data and statistical significance was considered if P<0.05.

RESULTS Results indicate that physically active participants in leisure-time had higher HRQOL with regard to limitation of physical function, bodily pain, general health, and social function compared to non-active group(P<0.05). Although BC, strength, and flexibility were not significantly different (P>0.05) between groups, the mean VO₂max of physically active participants was significantly higher (P<0.05) than that of the non-active group.

DISCUSSION & CONCLUSION Generally, physically active faculty members in leisure-time had better HRQOL and VO₂max, and are more likely to have an improved BC, strength, and flexibility provided that they increase their weekly physical activity.

KEY WORDS Quality of life, Physical Fitness, Physical Activity.

Physical activity as a buffer for life-stress

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OBJECTIVE The stress buffering capacity of physical exercise is well documented. Habitually active individuals are expected to experience less stress than their inactive counterparts. However, to date in real life settings this hypothesis has received little attention. The aim of this work was to examine the hypothesis among 52 first year university students facing the novel challenge of university life.

METHODS Participants listed their experienced life-stress on a 26-item questionnaire. Based on the answers a low- and high-stress group was formed. Self-reports about the amount of exercise per week, average hours of sleep per day, and time spent with studying were also collected.

RESULTS Data were analyzed with a 2 (stress category) by 2 (gender) by 3 (amount of exercise, sleep, and study) multivariate analysis of variance (MANOVA) followed up with univariate tests. The results revealed that the high-stress group, independent of gender, has reported statistically significantly more hours of exercise per week (12.9 (6.5) versus 9.1 (4.2), $p < .02$), and less hours of sleep (6.7 (1.0) versus 7.4 (0.7), $p < .008$) than the low-stress group.

DISCUSSION & CONCLUSION These findings show that in spite of less sleep (which could be a sign of stress in itself) students who experienced more stress also performed more exercise. Such results are in contrast with the “more exercise – less stress” notion in the literature. Indeed the current findings suggest that habitually active students who experience increased stress in their lives try to cope by increasing the amount of exercise.

KEY WORDS Exercise, Physical activity, Sleep, Stress, Student,

Considering lifestyle and comparison between athletics employees and non athletics employees with focus of (sport and preventing of stress)on 2008 year

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OBJECTIVE The aim of this studying was, to considering lifestyle and comparison between athletics employees and non athletics employees on 2008 year.

Methods Cross-sectional method was used on 60 person of those employees that chosen by random chance.

RESULTS The result of this studying, entirely shown that %48/8 of their lifestyle is undesirable. Undesirable lifestyle of employees athletic and non athletics employees in arrangement is 68/5 and 31/5 percentage. There were significant relationship between activity and preventing of stress and also, between preventing of stress, age average, parents' education, financially and different kind of sports. Between lifestyle's variables such as nourishment and preventing of stress, activity and preventing of stress were seen significant relationship. Whatever, if nourishment and activity have more developing, preventing of stress is more desirable, and vice versa. For helping people, to change their lifestyle and preventing of stress and approach desirable, we should encourage them to exercise, eat healthy food and pass over the stress, avoid smoking and drug, alcohol and dangerous things.

DISCUSSION & CONCLUSION We can also see significant relation between lifestyle of athletics and non athletics employees, that exactly is like the studying in Michigan State but in the research of Mohammadizade, it wasn't seen. Therefore, significant changes were seen in educationally of their parents. That means, if their parents have high educational degree, their lifestyle is more undesirable. The researches of the Taft and Who universities show such a relationship in component of lifestyle.

KEY WORDS Lifestyle, stress, physical activity, nourishment, athletic.

Serious sport injury, motivation & burnout: Can self- determined motivation predict burnout in injury elite handball players?

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OBJECTIVE The purpose of this study is to predict the burn out according to the self-determined motivation of

Iranian injury elite handball players.

METHODS The subjects were 28 injured elite handball players that they didn't participate in competition for 4 weeks due to injuring. Participants completed the SMS and ABQ questionnaires at the start of competitive season and injured situation.

RESULTS The results demonstrated that the significant negative correlation between intrinsic motivation ($r = -0.87$, $p = 0.000$) and extrinsic motivation ($r = -0.70$, $p = 0.000$) with burnout. Besides, there was a significant positive correlation between amotivation and burnout ($r = 0.87$, $P = 0.000$). Moreover, multiple regressions revealed that there was a linear correlation between motivation's subscales and burnout (motivation: $r^2 = 0.81$, intrinsic.m: $r^2 = 0.75$, extrinsic.m: $r^2 = 0.49$, amotivation: $r^2 = 0.77$) ($p < 0.05$).

DISCUSSION & CONCLUSION Results revealed that there was a relationship between subscales motivation and burnout after sport injuries and this means that it is possible to predict the athlete's burnout by the motivation subscales. Therefore, attention to the role of important of motivation in the recovery period and return to sport will be very critical and attention to the athlete's behaviors and attitudes may be useful for their rehabilitation.

KEY WORDS Sport injury, Motivation, Burnout, Self-determination, Elite handball players.

Improving football player's performance using counseling for decreasing competitive anxiety

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OBJECTIVE The performance of football players are influenced by a large numbers of psychological factors including: personality, emotion and cognition of the individuals. The empirical data from sport psychology research proved that high level of competitive anxiety decreased the performance of the athletes. The hypothesis of the research was that applying a cognitive behavioral programme for decreasing competitive anxiety will improve the football player's performance.

METHODS It was designed a quasi experimental design with control and experimental group. The subjects included in the study were 26 young football players, 15-16 years old. The competitive anxiety was measured using Martens CSAI2 (Competitive State Anxiety Inventory). The performance of football players was identified using behavioral data observed during competitions, such us numbers of errors and correct interventions. The counseling programme was formed by 18 weekly sessions intended to reduce the three components of anxiety: arousal, cognitive and self-esteem.

RESULTS Using a one-way analysis of variance (ANOVA) it was found that reducing anxiety by counseling positively influenced the quality of the football players game ($F = 2.569$ $p < 0.05$) and decreased the number of player game errors ($F = 2.231$ $p < 0.05$).

DISCUSSION & CONCLUSION The claim of our research that reducing anxiety will increase athlete performance is sustained by a large number of empirical data from sport and cognitive psychology. The novelty of our approach was the mixture of techniques from clinical psychology and the sport and coaching field which was used to improve player's performance.

KEY WORDS sport psychology, football players performance, competitive anxiety

Study of Relationship Between Perfectionism in Sport with Cognitive and Somatic Anxiety in Team and Individual athletes

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OBJECTIVE The purpose of this study was investigation of relationship between perfectionism in sport with cognitive and somatic anxiety in team and individual athletes.

METHODS 400 team and individual athletes that were selected voluntary and completed the Sport Multidimensional Perfectionism(Dunn et al, 2005) and competitive anxiety (Martens et al, 1990) (items of two sub-scales of this scale: cognitive and somatic state anxiety) scales.

RESULTS Results of Pierson correlation was indicated a positive correlation between personal standards, concern over mistakes, perceived coach pressure and perfectionism with cognitive and somatic anxiety in team and individual athletes. But there was not any correlation between perceived parental pressure with cognitive and somatic anxiety in

team and individual athletes.

DISCUSSION & CONCLUSION It can be concluded that, dimensions of perfectionism was increasing the competitive anxiety in team and individual athletes.

KEY WORDS perfectionism, competitive anxiety, team athletes, team athletes

Dissociation of performance parameters at the individual anaerobic threshold require specific exercise recommendations for depressed patients

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OBJECTIVE Aerobic exercise training is considered an adequate complementary treatment strategy for major depressive disorder (MDD). However, there is a need for comparative methodological investigations to determine the appropriate exercise intensity for these patients.

METHODS The study compared submaximal exercise intensity determination with those derived from maximal parameters such as percentages of heart rate reserve (HRR), maximal heart rate (HRmax) and peak oxygen uptake (VO₂peak) of patients and controls. An exhaustive incremental bicycle exercise test was completed by 15 female MDD patients and matched controls. The individual anaerobic lactate threshold (IAT) as a gold standard to determine individual aerobic exercise intensity was assessed according to Stegmann and coworkers. Exercise intensities at 70 and 85% of HRmax, 70 and 85% of HRR and 50 to 80% of VO₂peak were compared to the IAT.

RESULTS Patients suffering from MDD switched earlier to anaerobic metabolism than matched healthy controls ($F=6.31$; $p<0.01$). But interestingly, the level of self-rated perceived exertion, concentration of lactate, respiratory exchange ratio and heart rate at the IAT level revealed no significant difference between both groups. Additionally, MDD patients achieve higher %IAT values from 50 to 80% of VO₂ peak ($F=42.35$; $p<0.001$) and at 70% and 85% of HRR ($F=3.77$; $p<0.01$) as well as HRmax ($F=3.84$; $p<0.01$).

DISCUSSION & CONCLUSION Due to a growing number of clinical aerobic exercise treatments in depressive disorders exercise intensities >70% of (a) HRmax, (b) HRR, (c) VO₂peak should be amended by IAT and Borg-scale measurements to avoid over challenging anaerobic demands.

KEYWORDS aerobic exercise training, peak oxygen consumption, heart rate reserve, maximal heart rate, individual anaerobic threshold, exercise treatment, exercise testing, exercise intensity determination,

The relationship between aerobic performance, muscular strength and body mass index with mood status profile of female students

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OBJECTIVE This study aims to find the relations between aerobic performance, muscular strength and body mass index with mood status profile in female students.

METHODS This research is applied from the point of practical view and is based on correlational designs. The statistical population consists of single non- athletic female young students (19-26 years old) of Azad University (Roudehen) summing up to 161 on the basis of stratified random sampling regarded as a sample. The aerobics functioning of students was tested with the aid of 12-minute Cooper Field test. Their superior muscular strength was tested with maximal shoulder muscle strength test, and inferior muscular strength tested with the Squat test. BMI was calculated from weight and height scaling. To create the mood status profile, the researchers have used the POMS test consisting of 65 items (McNair, Lorr, & Droppleman, 1992).

RESULTS Considering the fact that POMS is consisted of 6 subscales, we have used multivariate repeated measure ANOVA for data analysis. The results showed that aerobic performance had a significant relationship with the subscales of POMS. Meanwhile the relationships between superior and inferior muscular strength possessed no significant relationship with mood status profile. In addition to the fact that POMS concludes a total score, the analysis of multiple regression results indicated that there exists an overall significant relationships between the mentioned variables with mood status. Among the predictors, the superior muscular strength and the BMI possessed the highest significant slopes in the regression equation and have the greatest effect on the subjects' mood status.

KEY WORDS Aerobic Performance, Muscular Performance, BMI, Mood Status Profile

Mental imagery in sport – EMG pattern analysis

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OBJECTIVE The present study is a contribute to the knowledge of the mechanisms underlying mental imagery. The aim of the present study is to gain more insight into the mechanisms underlying mental imagery. While there is ample evidence that motor performance and mental imagery share common central neural mechanisms, the question whether MI is accompanied by subliminal electromyographic (EMG) activity remained unsolved, as well as the qualitative pattern of this activity.

METHODS In this study, thirty height (38) right-handed subjects were randomly divided into two (2) groups, experimental and control. Experimental group was submitted to a mental training program with three months duration. Bouth groups were evaluated before and after the mental training period. Subjects from experimental group and control group were asked to throw and to imagine throwing a dart in to a concentric target. Performance and EMG activity from 2 muscles of the dominant arm (agonist and antagonist) was monitored. For EMG signals acquisition, we used bipolar electrodes, with a gain of 350 (at 1000Hz). The electromyographic signals were captured on a analog-digital 16-bit plate (MP100 - Biopac System) with a sampling rate of 2000Hz per channel.

DISCUSSION & CONCLUSION A significant increased pattern of EMG activity was recorded in all muscles during mental practice, when compared to the rest condition, while there is no visible movement. Although being subliminal, the magnitude of this activation was found to be correlated to the effort required to really throw a dart. This correlation and performance results, increase significantly after a period of 4 weeks (14 sessions) of mental practice in experimental group. Control group had no changes. Results seem to indicate that it is more plausible to explain the learning effects of mental practice in terms of a top-down mechanism based on the activation of a central representation of the movement than in terms of a peripheral bottomup mechanism. However a facilitating action seems to be present based on muscles activation.

KEY WORDS Imagery. EMG

Biofeedback as a psychological training tool

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OBJECTIVE This study aimed to examine the impact of implementing a psychological training program, composed by relaxation techniques, mental imagery and biofeedback (based on electromyography signals) on the recovery of the mobility of the upper limb of a subject (athlete) after stroke. We defined as specific aims of the study the decrease of muscular tension caused by musculo-skeletal spasticity; examine the efficacy of mental training in enhancing the functionality of the hand motor; promote mental health and personal well being by examining the state of your mood.

METHODS Subject was submitted to a mental training program with a three months duration and was evaluated by Profile of Mood States (POMS - McNair, Lorr e Droppleman, 1971), Imagery Capacity Questioner (Bump, 1989) and the Reaching Performance Scale (RPS- Levin, Desrosiers, Beauchemin, Bergeron & Rochette, 2004). The program was divided into four phases, each with specific OBJECTIVES. Phase 1 – start the relaxation program, Phase 2 – relaxation and mental imagery; Phase 3 - Introduction to the work with electromyography (EMG), Phase 4 - Integration of all techniques. For EMG signals acquisition, we used bipolar electrodes, with a gain of 350 (at 1000Hz). The electromyographic signals were captured on a plate analog-digital 16-bit (MP100 - Biopac System) with a sampling rate of 1000Hz per channel.

DISCUSSION & CONCLUSION Results showed that there was a significant reduction in the spastic effect that increased the level of EMG signals on Common Flexor of Fingers. The Common Extender fingers showed a greater capacity for work and individual control that is reflected in the ability to control the movement of individual fingers. Globally, after intervention, EMG pattern show a much coordinated System than before the intervention. For the state of humor in the final phase of the program, the subject showed a pattern similar to profile iceberg. Previous studies in this field showed that subjects with hemi paresis underwent mental training improved the ability to reach objects as well as isolated movements of the hand and fingers (Dijkeman, Wood & Hewer, 2005) also in our study subject obtained improvements at both, motor and psychological level. Malouin et al. (2004) claim that mental practice has become an additional technique for neurological rehabilitation, as improvements were found in functional recovery of upper limb after stroke in patients who undergo in this type of rehabilitation.

KEY WORDS Biofeedback, EMG, Imagery

Cognitive disorders among boxers which moved mild traumatic brain injury

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OBJECTIVE Identify the nature and degree of cognitive disorders among boxers which moved mild traumatic brain injury.

METHODS We examined 32 amateur boxers, duration ranged from 5 to 14 years (champions and winners of championships of Ukraine among adults). The age range varied from 18 to 26 years. Surveyed the boxers were in the preparatory period. The number of boxing matches ranged from 51 to 176, the total number of traumatic brain injury in the form of knock-down which moved during the sports career ranged from 2 to 15. Control group consisted of 30 men aged 18 to 25 years who did not have a history of deferred traumatic brain injury. To assess cognitive function using standard clinical scale: Mini-mental State Examination (MMSE), Frontal Assessment Battery (FAB), clock drawing test.

DISCUSSION & CONCLUSION Mild cognitive disorders occurred in 14 boxers that had a history of one or more mild traumatic brain injuries. Most often, this group of patients complained about the deterioration of memory and bad sleep. Mild cognitive disorders showed a decrease of concentration, short-term memory disorders. There have been increased fatigue, and slow pace of work as it completes the tests. In the control group cognitive disorders had not been detected. Conclusions. Mild cognitive disorders that may cause concern about the patient and decrease the quality of life found in amateur boxers middle-level skills in 43,8% of cases. Their objective will require the use of new sensitive neuropsychological techniques.

KEY WORDS cognitive disorders, boxing, mild traumatic brain injury

Does overweight lead to different perceptions of basic psychological needs satisfaction?

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OBJECTIVE The systematic alterations of lifestyles lead to a reduction of physical activity levels and to increased weight. This issue can be linked with the people motivation to exercise, and according to Self-Determination Theory (SDT) people motivation is a function of three “*fundamental nutriments*”: the basic psychological needs of autonomy, competence, and relatedness. The purpose was to study the relation between body mass index (BMI) and basic psychological needs (BPN), and look at the differences between groups with normal weight and overweight.

METHODS 371 exercisers from private fitness centers (252 females, 119 males) with 32.4±11.7 years of age and different levels of exercise experience participated in this study. The Portuguese version of the Basic Psychological Needs in Exercise Scale (BPNES) and Body Mass Index (BMI) as an international classification (mild thinness and normal weight: 17-24.99; pre-obese and obese class I: 25-34.99) was used.

DISCUSSION & CONCLUSION Results showed low correlation between BMI-Competence ($r=-0.039$; $p=0.451$), BMI-Autonomy ($r=-0.054$; $p=0.297$) and BMI-Relatedness ($r=-0.035$; $p=0.496$). Results also indicated no significant difference between Group 1 (mild thinness and normal weight) and Group 2 (pre-obese and obese class I) in perceptions of: Competence ($t=0.887$; $p=0.376$), Autonomy ($t=1.087$; $p=0.278$), Relatedness ($t=1.282$; $p=0.201$). Apparently, these findings revealed that people with normal weight and overweight have the same perception about the satisfaction of their basic psychological needs. Both groups revealed high levels of competence (Group 1: $M=3.94\pm0.46$; Group 2: $M=3.89\pm0.47$), autonomy (Group 1: $M=4.03\pm0.56$; Group 2: $M=3.98\pm0.56$) and relatedness (Group 1: $M=4.01\pm0.55$; Group 2: $M=3.93\pm0.57$).

KEY WORDS Exercise Psychology, Self-Determination Theory, Basic Psychological Needs, Body Mass Index

Body mass index and behavioral regulation- an overweight person is or is not less self-determinate than normal weight person

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OBJECTIVE According to Self-Determination Theory (SDT) more internalized regulated types of behaviour lead to feelings of self-determination, and consequently more maintenance on the chosen activity. In others words, most people engage in exercise for extrinsic reasons, but if they do not enjoy the activity or discover inherent satisfactions they are

unlikely to persist at it. Therefore, the purpose of this work was to study the relation between body mass index (BMI) and relative autonomy index (RAI), and look at the differences between groups with normal weight and overweight.

METHODS 115 exercisers in private fitness centers (75 females, 40 males), with 30.4 ± 9.8 years of mean age and different levels of exercise experience participated in this study. To assess exercisers motivation Behavioural Regulation in Exercise Questionnaire-2 (BREQ-2) was used. Also the Portuguese version (BPNEsp) and relative autonomy index (RAI) and Body Mass Index (BMI) as an international classification (normal weight: 18.5-24.99; pre-obese: 25-29.99) was used. Exercisers were randomly approached by researchers before exercise session.

RESULTS Results showed that there was no significant correlation between BMI and RAI ($r = -0.109$; $p = 0.245$). Results also showed that there was no significant difference between Group 1 (normal weight: $M = 14.37 \pm 2.5$) and Group 2 (pre-obese: $M = 13.88 \pm 3.5$) in self regulation behavior ($t = 0.817$; $p = 0.415$).

DISCUSSION & CONCLUSION Apparently, these findings revealed that both groups regulate their behavior to autonomous forms (intrinsic motivation), and experience more feelings of self-determination. These results are not consistent with previous study which revealed that exercisers with higher IMC were more external regulated than the lower IMC exercisers.

KEY WORDS Exercise Psychology, Self-Determination Theory, Behavioral Regulation, Body Mass Index

Mental training in a psychomotor task performance

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OBJECTIVE Imagery is considered to be one of the most popular performance enhancement techniques or psychological skills because of its versatility in effecting several different outcomes. Aim of the present study was to investigate whether individualized imagery interventions had an effect on motor task performance. Output measures were velocity (time) and mistake frequency in a computer car race game.

METHODS Forty-four undergraduate students ($M\text{-age} = 21.7 \pm 2.69$ yrs) volunteered for the present study. Participants were randomly assigned to one of three groups: Experimental Group 1 (Exp1) was submitted to a motor training process (completed 10 sessions of 5 game trials); Experimental Group 2 (Exp2) to a motor and mental practice program (after 5 imagery sessions, they practiced 5 sessions of 5 game with mental imagery training after the completion of each trial followed by a 3 min interval) and Control Group did not have any activity between initial and final evaluation. An imagery script was created for imagery practice. This included the following images: image the movements and feelings during race preparation, mental race practice and arriving at the end of the race.

RESULTS We found significant differences in time between Pre and Post Test in both Experimental Groups, ($p = 0.00$) with smaller times in post test. Control Group had no significant differences ($p = 0.06$). We also found significant differences between pre and post test in Group Exp2 - Mistake I -(bumping one time) evaluation ($p < 0.05$). We didn't found significant differences between group Exp1 and Exp2 ($p > 0.05$).

DISCUSSION & CONCLUSION Considering that Group Exp2 had half of motor practice time, this supports the hypothesis that imagery facilitated performance in this particular task. This study provides evidence for practitioners who wish to use imagery interventions to enhance performance.

KEY WORDS Imagery, Performance, Training

Effects of maternal walking, voluntary running and forced swimming during pregnancy on anxiety reaction in rat offspring

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OBJECTIVE The beneficial effects of physical activity and exercise on brain functions and psychological behavior such as control of depression and anxiety are well documented. In this study the effects of maternal walking, voluntary running (WVR) and forced swimming (FS) during pregnancy on anxiety reaction in offspring was evaluated.

METHODS The pregnant female Wistar rats ($n = 30$, 10 for each group) were randomly assigned into three groups: the sedentary control group, WVE group and the FS group. Each of the WVR rat was given access to a running wheel which was freely rotated against a resistance of 100g, for during pregnancy. Also the swimming pool was filled with water at 32°C and the rats in the swimming group were forced to swim for 10 min once a day for 5 days. After delivery of mothers and pups reach to 2 month age, Elevated plus Maze (EPM) test was used to study the anxiety reaction by measure of time spent and number of entrances to open arms.

RESULTS Analysis of data indicated that WVR of mother during pregnancy decreased anxiety like behavior in offspring and also FS during pregnancy increased anxiety reaction in offspring significantly ($p < 0.05$).

DISCUSSION & CONCLUSION Finding above showed that WVR and FS during pregnancy have modulated anxiety behavior in offspring that for clear of mechanisms need to further researches.

KEY WORDS Voluntary exercise, Anxiety, Swimming, Pregnancy, Rat

Effects of peripheral and central beta-adrenergic receptors blockade on exercise induced enhancement of learning and memory in rat

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OBJECTIVE The beneficial effects of physical activity and exercise on brain functions such as improvement in learning and memory are well documented. The aim of this study was to examine the role of peripheral and central beta-adrenergic receptors in voluntary-exercise induced enhancement of learning and memory in rat.

METHODS In order to block the peripheral and central beta-adrenergic receptors, the animals were given the beta-antagonist propranolol (10 mg/kg), or the peripherally acting beta-antagonist nadolol (20 mg/kg) before each night of five consecutive nights of exercise, respectively. Then their learning and memory were tested on the Morris water maze (MWM) task using a two-trial-per-day for five consecutive days. A probe trial was performed two days after the last training day.

RESULTS Our results showed that propranolol, but not nadolol reversed the exercise-induced improvement in learning and memory in rat ($p < 0.05$).

DISCUSSION & CONCLUSION These findings indicate that central, but not peripheral beta-adrenergic receptors may mediate the effects of exercise on learning and memory.

KEYWORDS Exercise, Beta-adrenergic receptor, Learning, Memory

Evaluation the effects of walking, voluntary running and forced swimming on acquisition and retrieval of spatial memory in Rat

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OBJECTIVE The beneficial effects of physical activity and exercise on brain functions such as improvement in learning and memory are well documented. In this study the effects of walking, voluntary running (WVR) and forced swimming (FS) on acquisition and retention of spatial memory has been evaluated.

METHODS Male Wistar rats ($n=30$, 10 for each group) were randomly assigned into three groups: the sedentary control group, WVE group and the FS group. Each of the WVR rat was given access to a running wheel which was freely rotated against a resistance of 100g, for 5 days. Also the swimming pool was filled with water at 32°C and the rats in the swimming group were forced to swim for 10 min once a day for 5 days. Morris water maze (MWM) test was used to study the learning and memory.

RESULTS Analysis of data indicated that a stringent two-trial-per-day, 5-day MWM training protocol and a probe trial two days after the last MWM training day revealed that performing of swimming or WVR significantly increased both acquisition and retention phases of spatial memory ($p < 0.05$).

DISCUSSION & CONCLUSION Findings above showed that voluntary exercise and swimming have beneficial effects on learning and memory.

KEY WORDS Voluntary exercise, Swimming, Learning and memory, Rat

Effects of short-term and long-term of 3 types of exercise training on lactate dehydrogenase, creatine kinase, and malondialdehyde in rats

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OBJECTIVE The purpose of this study was to determine the effect of short-term (1 session) and long-term (36 sessions) of various exercise training (endurance, sprint and combined) on serum indexes of muscle's damages (Lactate Dehydrogenase, Creatine Kinase, and Malondialdehyde).

METHODS For this reason, 40 young rats (3 month old) randomly divided in to 4 groups including Control (n=10), Endurance (n=10), Sprint (n=10) and Combined group (n=10) (combining endurance and sprint training). The training protocols were designed based on oxygen cost, so that the intensity of the endurance training program was set at 70-80% VO₂max, while the intensity for the sprint training group was set to 100% VO₂max. Following 1st and 36th sessions of exercise training, blood samples were taken.

RESULTS Analyze of data using Two Way Repeated ANOVA showed: 24hr Following 1 session of exercise training, there were significant increase in activity of CK and LDH enzymes (p<0.05) (but not MDA, p>0.05) in training groups vs. control group. This situation was followed more severely after 36 sessions of training.

DISCUSSION & CONCLUSION In all, results of this investigation indicated that both short – term and long – terms exercise training lead to muscle's damages, and this injury are more intensive in combined group in comparison with others. Also, considering that MDA index didn't change among groups in more of evaluation phase, although indexes of muscle's damages existed, it can be said that probable mechanism of initiating muscle injury is not lipid peroxidation.

KEY WORDS Endurance, Sprint, and Combined exercise training; creatine kinase, lactate dehydrogenase, malondialdehyde

Lumbar intervertebral disc findings in elite track and field male Greek athletes

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OBJECTIVE The majority of orthopaedic problems experienced by competitive track and field athletes are related to pain in the lower legs esp. thigh and ankle region. Low back pain is a less common reason of complaints. There has been no previous research into lumbar disk “degeneration” in elite track and field athletes. Our hypothesis was that excessive physical loading accelerates lumbar disk “degeneration” in elite track and field athletes.

METHODS Study participants were 45 (18 to 28 year-old) elite track and field male athletes and 30 age and sex matched non athletic individuals. Lumbar intervertebral discs were evaluated using T2-weighted magnetic resonance imaging in the axial and sagittal plane. Based on our MRI exams we estimated and compared the prevalence of abnormal disk findings (“degeneration”) and their disk level in the study groups and we further investigated the potential relationship among their event category (throwers, jumpers, sprinters, runners and decathlon athletes) and disk findings.

RESULTS 36 out of 45 elite track and field athletes and 14 out of 30 controls had abnormal MRI findings regarding lumbar intervertebral discs at various disk levels and the prevalence was significantly greater in the elite athletes group (P=0.001). Lumbar MRI reported the presence of: 1) disc herniation in 12 athletes and 7 controls 2) disc degeneration in 12 athletes and 5 controls 3) disc bulging in 9 athletes and 4 controls and 4) High Intensity Zone (HIZ) in eight athletes. L5-S1 level was significantly more frequently degenerated in the athletes group (P=0.04). Disc herniation and degeneration were the most common findings in both groups but the prevalence was significantly greater in the elite track and field athletes. In addition disc herniation was more common in jumpers and sprinters, degenerated disc was most commonly seen in male sprinters and disc bulging was more often reported in jumpers.

DISCUSSION & CONCLUSION In conclusion, excessive physical loading accelerates lumbar intervertebral disk “degeneration”, especially in the L5-S1 intervertebral segment.

KEY WORDS Lumbar mri, track and field, male

Effects of menstrual phase on metabolic capacity in healthy active and inactive women

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OBJECTIVE Despite the evidence for an effect of the female sex steroids on exercise substrate metabolism, data on the effects of the normal menstrual cycle on glucose kinetics and carbohydrate oxidation are conflicting. Some studies report that glucose rates of appearance and disappearance are significantly decreased in the luteal vs. follicular phase of the menstrual cycle coincident with a decrease in whole body carbohydrate oxidation. Our purpose was to compare the metabolic capacity during the early follicular and luteal phases in healthy active and inactive women.

METHODS Twenty healthy active and inactive women, 19-25 yr of age, with no known history of cardiopulmonary, metabolic or musculoskeletal disease participated in this study. The participants performed an incremental exercise test on cycle ergometer during their early follicular and luteal phases until they were exhausted. The luteal phase was determined by the level of Progesterone, Prolactin, FSH and LH hormones in blood samples. The pulmonary gas analyzer (K4B2) was applied to measure the respiratory exchange ratio (RER), VO_2 , VCO_2 in two phases. Paired samples T-tests were performed to detect baseline differences across two phases ($p < 0.05$).

RESULTS The results indicated no significant difference of RER, VO_2 , VCO_2 in the luteal and early follicular phases of active and inactive women ($p > 0.05$).

DISCUSSION & CONCLUSION Findings may have important implications for metabolic research and in interpreting results of studies examining relative substrate utilization in response to various stimuli and suggested that timing of the menstrual phase may not be very critical when designing future exercise ventilation studies.

Effect of a selected endurance training program on plasma interleukins and immune cells in active females after one bout of exhaustive exercise

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OBJECTIVE Exercise is the strongest stress to which the body is ever exposed. The body response to this stress through a set of physiological changes in its metabolic, hormonal and immunological systems. The purpose of the study was to examine the effect of eight weeks endurance training program on plasma IL1, IL6, $\text{TNF}\alpha$, CD4 and CD8, in active females after one bout of exhaustive exercise.

METHODS Twenty recreationally active women participated in the study. Subjects were assigned in one of the two groups: training ($n=10$; age 21.6 ± 1.71 years, height 161.45 ± 2.71 cm, weight 57.25 ± 6.99 kg, $\text{VO}_{2\text{max}} 34.18 \pm 2$ ml.kg⁻¹.min⁻¹) and non-training ($n=10$; age 24.25 ± 4.30 years, height 159.81 ± 4.86 cm, weight 54.69 ± 3.82 kg, $\text{VO}_{2\text{max}} 36.1 \pm 3.79$ ml.kg⁻¹.min⁻¹). Blood sampling were obtained before and after an exhaustive bout of exercise (Bruce protocol). Training group participated in an 8-week incremental endurance training program. After 8 week, subjects repeated the protocol and, blood samples were obtained before and after the exercise. Data was analyzed using ANOVA test.

RESULTS There were no significant change in IL1, IL6, $\text{TNF}\alpha$ concentrations but, CD4 and CD4/CD8 decreased and CD8 increased significantly ($P \leq 0.05$).

DISCUSSION & CONCLUSION Endurance training may induce changes in lymphocyte subsets but not in suppression of immune function after an exhaustive bout of exercise. Recent studies show that, several cytokines can be detected in plasma during and after strenuous exercise. However, in this study, cytokines did not change because the selected endurance training was not very strenuous and did not affect increasing or suppressing of interleukin function or proliferation. Endurance training induced adaptation in immune cells and decreasing CD4 was lower and increasing CD8 was higher in experimental group.

KEY WORDS $\text{TNF}\alpha$, CD8, CD4, interleukin

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The effect of exhaustive exercise on IgA and TNF α

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OBJECTIVE In vivo depletion of lymphocyte subsets allows investigation of the role of specific subsets in protective immunity. Immune cells are potent intracellular that regulate inflammation and immune response. The others have shown that exercise causes changes in specific types of immune components. These changes depend on duration and intensity of exercise. This study examined the effect of exhausting exercise on the IgA and TNF α .

METHODS 20 recreationally active healthy women with no positive clinical finding volunteered for this study. They were measured in height (162.81 ± 3.982 cm), weight (56.11 ± 5.79 kg), BMI (21.74 ± 1.99 kg/m²) and body fat ($23.12 \pm .57\%$). Later, subjects performed an exhaustive exercise. Exercise protocol was an incremental treadmill exercise (Bruce protocol). Blood sampling were obtained before and after exercise and were drawn from an anticubital vein with subjects in the seated position. Paired t-tests were used to determine before versus after exercise differences, was set at 0.05. Data are presented as mean \pm ME of the mean.

RESULTS The concentration of IgA increased and were significant, but TNF α concentration not changed ($P \leq 0.05$).

DISCUSSION & CONCLUSION The effect of exhaustive exercise on subjects was significant. This effect may be transient and related with intensity and duration. The results suggest that the exhaustive exercise induced changes in lymphocyte subsets but may not induced suppression immune function.

KEY WORDS exhaustive exercise, IgA, TNF α .

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Effect of Vitamin-C supplementation on the immune system of active females

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OBJECTIVE Free oxygen radicals released by the elevated number of neutrophils and monocytes may influence the function of lymphocytes and contribute to the impaired function of the later cells. Thus, nutritional supplementation (with glutamine, carbohydrate, antioxidants, etc) may, in principal, influence exercise associated immune function. There is limited evidence of the role of exogenous antioxidants (vitamin C, vitamin E) in modulating immune function in exercise and virtually no evidence on endogenous antioxidants. The purpose of this paper is to present relevant information for assessing the effect of the usefulness of vitamin C in the cytokines IL1, IL6, TNF α , CD4, CD8, and IgA.

METHODS With the use of a double blind placebo design, the effect of vitamin C on the active females was studied. 20 active women (age 21.6 ± 1.71 years, height 161.45 ± 2.71 cm, weight 57.25 ± 6.99 kg, and VO_{2max} 34.18 ± 2.7 ml.kg⁻¹.min⁻¹) participated in the study. Blood sampling were obtained before and after the exercise period. The subjects participated in a 8-week incremental endurance training program. Supplementation began before and after the period of exercise. Granulated buffered vitamin C in water at a dosage of 0.6-1.0 g/day was ingested. Data was analyzed by t test.

RESULTS There were no significant changes in IL1, IL6, TNF α , CD4, CD8 and IgA concentration ($P \leq 0.05$).

DISCUSSION & CONCLUSION Vitamin C supplementation may be beneficial for some of the subjects doing heavy exercise and experiencing frequent upper respiratory tract infections. The efficacy of vitamin C supplements in reducing the incidence of post race symptoms cannot be fully explained at this stage. It was concluded that, supplementation may induce changes in lymphocyte subsets, and immune cell function may result in significant alteration in T lymphocyte number, but their actual significance for immunity is seen controversially.

KEY WORDS supplementation, cytokines, immune cells

Effects of static stretching on quadriceps peak torque and hip range of motion in professional football player

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OBJECTIVE Traditionally, static passive stretching has been used by coaches and athletes as a warm-up technique in an attempt to promote better performances.

However, the results of recent research have shown that passive muscle stretching can diminish the peak force output of subsequent maximal concentric contractions of the quadriceps. The purpose of study was to investigate the effects of static stretching on concentric, isokinetic leg extension peak torque (PT) at 60 and 300°·s⁻¹ and hip range of motion (ROM) in professional football player.

METHODS Fifteen professional football player were volunteered this study. All participants performed three static stretching protocols, in nonconsecutive training session. The stretching protocol consist of 30 seconds of three active and one passive static stretching session. Range of motion (ROM) was determined during knee flexion, using a goniometer. The peak torque of the dominant leg extensors was measured on a Biodex system 4 dynamometer at angular velocities of 60, 300°·s⁻¹.

Results There was no significant differences pre (237.2±8 Nm at 60°·s⁻¹, 142.1±4.5Nm at 300°·s⁻¹) and post stretching PT (234.4±8.2Nm at 60°·s⁻¹, 141.5±4.4Nm at 300°·s⁻¹) both isokinetic velocity. However it was hip ROM increased (p<0.05) post stretching (22.8±1.3) compare with pre stretching (21.6±1.3).

DISCUSSION & CONCLUSION In conclusion static stretching did not significantly affect quadriceps peak torque, but it can increase hip ROM

KEY WORDS Football player, Isokinetic, Peak torque, Static stretching, ROM

Psychological stress induced gingival reactions with increased NO and FGF-b levels in handball players

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OBJECTIVE Sports competitions are associated with high anxiety levels which may result in accelerated periodontal destruction. Gingival crevicular fluid (GCF) is an important biological material for biochemical analysis since it is at close proximity to where periodontal disease begins. The increase in nitric oxide (NO) synthesis in saliva and periodontal tissue has been reported in inflammatory periodontal disease. Fibroblast growth factors (FGFs) are thought to play important roles in modulating the proliferation of structural cells in the periodontium and NO was shown to modulate growth factor release. Thus, our aim was to determine GCF NO and basic FGF (FGF-b) levels and the possible association with pre-competition stress induced periodontal reaction in elite competitive athletes.

METHODS 18 elite male handball players aged between 18-29 years participated in this study. Anxiety level of handball players during the half season break and just before the league championship match was determined by *Competitive State Anxiety Inventory-2 (CSAI-2)*. Periodontal clinical measurements and GCF samples were also obtained during the half season break and just before the league championship match. NO and FGF-b levels were analysed in GCF samples.

RESULTS According to CSAI-2, statistically significant differences between the two periods were found. GCF analysis yielded a significant increase both in NO and FGF-b levels just before the championship match compared to the levels obtained in half season break. Both periodontal (PI) and gingival indices (GI) were found to be increased at the evaluation just before the championship match. GI difference was statistically significant.

DISCUSSION & CONCLUSION The results of the present study indicated that competitive stress of athletes prior to a championship match may lead to gingival/periodontal disturbance accompanied by an increase in NO and FGF-b levels in GCF. Thus, stress management may be an important component of sports health and periodontal disease therapy.

The acute effect of static, ballistic, and proprioceptive neuromuscular facilitation stretching on sprint performance

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OBJECTIVE The results of previous research have shown that muscle stretching prior to activity can diminish the peak force output of isometric contractions, explosive power and sprint performance. The purpose of this study was to compare the acute effects of different modes of stretching on sprint performance.

METHODS Twelve male taekwondo players (age, 15 ± 0.5 years) completed 4 different procedures in a randomized order, on different days, interspersed by a minimum of 72 hours of rest. Each session consisted of a standard 5-minute jog warm-up, accompanied by one of the subsequent conditions: (a) control, (b) proprioceptive neuromuscular facilitation (PNF) stretching (c) static stretching, and (d) ballistic stretching. The subjects performed 3 trials 10m and 20m prior to stretching and poststretching at 5, 15 and 20 minutes. Interactions between stretch interventions were analyzed using a repeated-measures analysis of variance. Post-hoc analysis was carried out using Bonferroni. Statistical analysis was carried out using SPSS, version 15 for Windows (SPSS, Inc., Chicago, IL). Significance was set at an alpha level of $p < 0.05$.

RESULTS Sprint performance time decreased after static and PNF stretching $\Delta t = 0.05$ s and there was a smaller decrease after ballistic stretching $\Delta t = 0.02$ s. However, sprint performance had fully recovered 15 minutes after static stretching. Additionally, while 20m performance returned to normal levels 15 minutes, the 10m performance had fully recovered 20 minutes after PNF stretching conditions.

DISCUSSION & CONCLUSION In conclusion, sprint performance is diminished for 15-20 minutes if performed after static or PNF stretching, whereas ballistic stretching has little effect on sprint performance. Consequently, PNF or static stretching should not be performed immediately prior to an explosive athletic movement.

KEY WORDS Flexibility, sprinting, stretching, static, ballistic, PNF, warm-up

Comparison of the effect of sit-up exercises on different surfaces (Swiss ball and conventional floor) on abdominal muscle strength, balance and running economy in nonathlete women

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OBJECTIVE Usage of movable surfaces especially “swiss balls”, because of its unstable nature and increase in muscle activation, recently takes the attention of athletes, trainers and sport researchers. Swiss ball training improves physical and motor abilities and also it gives variety and attraction to ordinary training. The main purpose of this study was to compare the effect of sit-up exercises on different surfaces (swiss ball and conventional floor) on abdominal muscle strength, balance and running economy in nonathlete women.

METHODS The subjects were 22 nonathlete females (age: 21.59 ± 1.33 y, weight: 58.00 ± 7.27 kg and height: 163.14 ± 6.18 cm), who volunteered to take part in this research. They were all healthy and had no experience of swiss ball training. The tests were lifting the trunk and Double Straight Leg Lowering (D.S.L.L) to determine the strength of upper and lower portion of abdominal muscles respectively, EMG recordings of upper and lower portion of rectus abdominus and external oblique, evaluating static and dynamic balance thorough standing stroke and Star Excursion Balance Test (SEBT) and finally measurement of oxygen intake during modified Bruce test (by gas analyser) for determining the running economy. The experimental group 1 ($n=7$) performed conventional sit-up exercise on floor, the experimental group 2 ($n=7$) performed same exercise on swiss ball and the control group ($n=8$) continued their already lifestyle. The training schedule included 3 sessions per week for 10 weeks for both experimental groups. A two way repeated measures ANOVA with LSD post hoc test were used to analyze the data.

RESULTS Results show that the strength of upper and lower portion of abdominal muscles increased in both experimental groups with no significant difference between them. The significant rise was observed in activation (EMG recordings) of abdominal muscles in experimental group 1 and 2, also it was much more significant in experimental 2. There was no significant change in static balance, but the dynamic balance showed a significant rise in both experimental groups with no significant difference among them. At last the running economy just improved in experimental group 2.

DISCUSSION & CONCLUSION These findings revealed that swiss ball training may challenge the balance and control system. Also performing exercise on swiss ball may lead to improved recruitment of the core musculature and increased movement economy. Finally these findings suggest replacing swiss ball with conventional ones in sit-up exercise.

KEY WORDS swiss ball, abdominal strength, balance, EMG, running economy

The effects of regular aerobic training on blood paraoxonase and arylesterase activities and blood lipid and lipoprotein levels in women and the role of pon1-192 polymorphism on these effects

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OBJECTIVE Regular aerobic training has positive effects on high density lipoprotein (HDL), of which antioxidant, antiatherogenic and protective effects for coronary heart disease (CHD) are well known. However, the effects of regular aerobic training on more recent risk factors of CHD such as blood paraoxonase (PON1) and arylesterase (AREST) that are associated with and responsible for the antioxidant potential of HDL, and the role of PON1-192 polymorphism on these potential effects in women are yet to be determined. The objective of this study was to determine the effects of regular aerobic training on blood PON1, AREST enzyme activities and lipid and lipoprotein profiles in premenopausal women and whether potential effects depended on the PON1-192 phenotype.

METHODS Subjects included 91 middle-aged, healthy, non-menopausal females who regularly performed aerobic exercise at least three times a week for a long period of time (EG, n=50) and those who did not do any exercise, to serve as controls (CG, n=41). Groups were analyzed for anthropometrical (body weight, height, body mass index, body fat ratio) and physiological (resting heart rate, blood pressure, maximal oxygen consumption) parameters. Activities of PON1, salt-stimulated paraoxonase (TSPON1), AREST and AREST activities of HDL and subgroups were determined in fasting venous blood by kinetic methods. Classical risk factors of CHD, including fasting serum triglyceride, total cholesterol (TC), HDL cholesterol (HDL-K) and its subgroups (HDL2-K, HDL3-K) levels were determined by standard enzymatic-colorimetric methods. Phenotyping of subjects for PON1-192 polymorphism were carried out based on TSPON1/AREST ratio. Subjects of aerobic exercise and control groups were classified as QQ with low activity, QR heterozygote, RR with high activity and R carriers [(RT)=(QR+RR)].

RESULTS No significant differences in serum PON1 and AREST activities and HDL and subgroups' AREST activities were found between EG and CG groups ($p>0.05$). However, with regard to PON1-192 polymorphism, PON1 ($p<0.01$) activity was significantly and HDL3-AREST activity (23%, $p>0.05$) was non-significantly higher in QQ phenotype in the exercise group, compared to the CG group. No significant differences in the serum total AREST activity were noted between the three phenotype groups. EG group's serum HDL-K ($p<0.05$), HDL3-K ($p<0.05$), TC ($p<0.001$), and LDL-K ($p<0.01$) measurements were significantly higher than the CG. Further, regarding PON1-192 polymorphism, TC ($p<0.01$) and LDL-K ($p<0.05$) levels in the exercise QQ group and TC ($p<0.05$) and HDL-K ($p<0.05$) parameters in the exercise RT (QR+RR) group were significantly higher in comparison to those of the CG. No significant differences in classical risk factors of CHD were found between the control phenotype groups ($p>0.05$).

DISCUSSION & CONCLUSION Significant beneficial effects of long-term aerobic exercise on serum lipids and lipoproteins and PON1 enzyme activity were demonstrated in middle-aged premenopausal women. However, these effects depend on the PON1-192 phenotype.

KEYWORDS Aerobic training, paraoxonase, arylesterase, PON1-192 polymorphism, HDL and subgroups' cholesterol and arylesterase values, middle aged premenopausal women

Doping and professional road cycling: Perspective of cyclists versus team managers

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OBJECTIVE Doping has been a big problem in Sport in the last decades and especially in Cycling. Scandals related to doping have decreased the status and credibility of cycling for the spectators and fans. In the last decade national and international institutions have spent a lot of resources on fighting against doping, while press has been also really interested in informing about doping cases. But while the cyclist is seen as the only guilty in this issue, there is no information about what cyclists think in the matter comparing it with coaches' perspective.

METHODS A total of 55 subjects (20 Spanish Professional road Cyclists -PC- and 35 coaches or team managers -TM-) participated in this study. All of them were voluntarily and anonymously interviewed and recorded following a close protocol focused on their opinions about doping. All the records were written and analyzed by means of AQUAD Five software (Analyses of Qualitative Data) to obtain the different categories and importance.

RESULTS The categories were divided by group: for PC the main responsible agents that evoke doping were 1) Team Managers, 2) Doctors, and 3) the cyclists, while for the TM the responsible were the 1) pressure of sponsors, 2) cyclists, 3) team managers, and 4) doctors. Both groups pointed out that media was not impartial treating all the sports, and cycling was worse treated than specially football, swimming or athletics. Also, both groups suggested that at the beginning the business was around pro-doping, and nowadays they feel it is in anti-doping. While for PC the most important way to change this tendency is to educate from the early ages, for TM it is to make a bigger effort in anti-doping control and tests. For both groups the way cyclists have been controlled is inhuman and much harder than in other sports. Both groups recognize doping has a large tradition in cycling, although both think that nowadays this issue is more controlled than ever before.

DISCUSSION & CONCLUSION Both PC and TM think similarly about doping issue in cycling. The main difference is that cyclists think that TM are more responsible than PC, and the opposite do TM. Also, both groups think that cycling has been badly treated by anti-doping agencies and media. To treat this problem PC believe in education from earliest ages, and TM believe in more repression and control. It can be argued that intervention programs are needed to educate the youngest cyclists, parents and their social environment, coaches and team managers, or doctors, at the same time control tests need to be increased but also humanized.

KEY WORDS doping, cycling, opinion, coaches, cyclists

Treatments for osteochondral lesions of the ankle: A long term follow up and retrospective clinical and radiographic evaluation of pre and postoperative factors influencing prognosis

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OBJECTIVE Osteochondral lesions of the ankle result from rotational injuries of the ankle in athletes. The purpose of this study is to evaluate the results of arthroscopic treatment of ankle osteochondral lesions and to define the clinical and arthroscopic factors influencing prognosis.

METHODS From 1993 to 2002 a total of 108 patients underwent 132 arthroscopic procedures for diagnosis and treatment of osteochondral lesions of the ankle. The evaluations included a pre and postoperative clinical scoring, radiographic evaluation including pre and postoperative anterior- posterior, lateral and mortise view of the ankle, as well as CT and MRI of the ankle. Operative techniques included: microfractures technique (81 patients), fixation of the lesions using polylactic acid "Biofix" rods (17 patients), diagnostic arthroscopy followed by cartilage lesions shaving (16 patients), retrograde drilling of the lesion to the subchondral bone (12 patients), bone graft filling of subchondral cysts (4 patients), osteochondral autografts (OATS, 2 patients).

RESULTS Traumatic etiology of the lesions was found to be associated with postero-medial talar lesions ($p<0.012$). Significant clinical and radiographic improvements comparing pre and post operative CT scoring ($p<0.005$), plane radiographs ($p<0.01$) and clinical score ($p<0.003$). No correlation was found between the x-ray CT findings and arthroscopic grading. Clinical improvements were found to correlate directly with CT grading ($p<0.05$). Fixation technique with "Biofix" was found to be associated with postoperative subchondral cyst formation detected on plane radiographs and on CT ($p<0.0001$). Tibial and talar "kissing lesions" correlated with poor pre operative clinical score ($p<0.05$). Lesions with sclerosis and or cyst on x-ray or CT before operation, appeared to have less clinical improvement with surgery ($p<0.05$).

DISCUSSION & CONCLUSION Ankle x-rays and CT plays a limited role in planning the intra-operative procedure. Findings like sclerosis and subchondral cyst carry less favorable prognosis, which is not reflected in the current classifications. Arthroscopy is a valuable tool for evaluation and treatment of ankle osteochondral lesions. The operative technique should be selected according to arthroscopic findings and the surgeon should be prepared to tailor the different types of treatment to each lesion.

KEY WORDS cartilage, ankle, microfracture, arthroscopy

Blood pressure (BP), heart rate (HR) and rate pressure product (RPP) responses during recovery from resistance and endurance exercise.

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OBJECTIVE The purpose of this investigation was to examine BP responses, HR and RPP during recovery from endurance and resistance exercise in order to differentiate effects due to exercise type, duration and intensity.

METHODS Twenty normotensive healthy young males participated in the present study. All participants engaged in regular physical activity <2 h per week. Participants were randomly divided into endurance and resistance exercise groups of 10 participants each. At the beginning of the study, participants of endurance group underwent a maximal cycle ergometer exercise test, with 30 W increments every 3 min until volitional exhaustion. Peak oxygen consumption (VO₂ peak) was recorded. 1RM test At least 10 days prior to the experiments, participants of resistance group underwent a 1RM test for the five dynamic constant external resistance exercises were performed using free weights or a universal weight machine station. Participants of resistance group underwent, in a random order, three experimental sessions: resistance exercise at LOW (RL) and HIGH intensity (RH), and LOW SHORT volume (RLS). Participations of endurance group performed, in a random order, three experimental sessions: endurance exercise at LOW (EL: 40% of VO₂ peak), and HIGH intensity (EH: 80% of VO₂peak), and LOW SHORT duration (ELS).

RESULTS During resting trial BP, HR and RPP did not change significantly. Baseline SBP and DBP were similar in all exercise trials. In EL, EH and ELS, SBP and DBP decreased similarly at all time points compared to the resting value. In RL, RH and RLS, when SBP values were compared to values at rest, post-exercise SBP values showed a significant decrease that lasted up to 60 min, whereas post-exercise DBP presented no change after RL, RH and RLS trials. MBP decreased similarly during recovery periods after exercise in the EL, EH and ELS exercise trials, and remained significantly below baseline values for 50 min after RL, RH and RLS exercise trials. HR changes were observed in all the exercise trials. Baseline HR was similar in all exercise trials. In comparison with the pre-exercise values, HR remained significantly above baseline values for 30 min after EL, RL and 60 min after EH and RH exercise trials, respectively. EL provoked a decreased in HR at 70-90 min, but this decrease was not statistically significant. Baseline RPP was similar in all exercise trials. In comparison with the pre-exercise values, RPP remained significantly above baseline for 30 min after EL, RL and 50 min after EH and RH exercise trials. EL provoked a decrease in RPP at 70-90 min, but this decrease was not statistically significant.

DISCUSSION & CONCLUSION The main findings of this study were: (a) a single bout of endurance and resistance exercise provoked PEH in young normotensive humans; however, decrease of SBP following resistance exercise were shorter in duration compared to endurance exercise, and DBP was significantly reduced only after endurance exercise; (b) intensity and duration of endurance exercise and intensity and volume of resistance exercise dose not plays a significant role in determining the occurrence or the magnitude and duration of PEH; (c) endurance exercise of low intensity (EL), decreased HR and RPP levels during the recovery period, although this decrease was not statistically significant. The absence of a BP fall during the non-exercise control trial shows that, in fact, the decreased BP levels after exercise are due to the exercise effect and not to the normal diurnal BP variations. Base of previous research, the effect of resistance exercise on recovery BP is not well understood. If this duration of response is achieved with the exercise indicated here, a regimen of mild exercise (especially endurance exercise) may be helpful for the management of hypertension.

KEYWORDS Hypertension; Resistance exercise; Endurance exercise; Cardiovascular responses

The effects of creatine supplementation on performance and hormonal response

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OBJECTIVE It is unknown through what mechanism of action creatine supplementation produces an ergogenic effect. Based on the fact that creatine supplementation results in a rapid increase in body mass and fat-free mass, it has been hypothesised that creatine induces hypertrophy through endocrine mechanisms. Hence, the purpose of this study was to determine the influence short-term creatine supplementation on performance and hormonal responses to short-term sprint running performance.

METHODS Twenty healthy young males amateur runners (mean age: 21 years) volunteered to participate in this study. Before to beginning the study, subjects randomly divided to creatine supplementation (CR) or a placebo (PL) group. The subjects had the following characteristics [(mean \pm SD)]: CR group: age 21.75 \pm 1.32 years; height 176.32 \pm 64.35; body mass 69.16 \pm 8.65 kg; percent body fat 16.12 \pm 4.12%. PLgroup: age 20.83 \pm 1.73 years; height 175.60 \pm 3.22; body mass 69.12 \pm 10.46 kg; percent body fat 16.92 \pm 5.25%. Testing (100 and 200 m sprint time) occurred before and at the end of 6 days of supplementation. After pre-testing (1 day later), subjects were provided with capsules containing either creatine monohydrate (Creatine Fuel®, Twin Laboratories, Inc., Hauppague, NY) or identical powdered cellulose placebo. Blood serum (testosterone, cortisol and GH samples) were obtained, pre and after 6 days of supplementation. The values of the various parameters studied were analyzed by means of the t test for unpaired and paired samples according to the case, with the level of significance set at $p < 0.05$ for all statistical procedures. Data are reported as mean \pm SEM.

RESULTS Although mean running times of CR group in the running performance were decreased (beforeperiod: 11.86 \pm 3.9 second, 22.82 \pm 4.9 second, after-period: 11.23 \pm 5.8 second, 22.67 \pm 9.4 second, in the 100 m and 200 m, respectively), but this decrease was statistically significant only in the 100 m sprint test ($p < 0.05$). CR group gained significantly more body mass (0.68 \pm 0.11 kg) and fat-free mass (0.55 \pm 0.05 kg) compared with the PL group. No significant changes were observed in GH, testosterone and cortisol from before to after-supplementation in both groups of CR and PL ($p < 0.05$).

DISCUSSION & CONCLUSION Our data suggest that under the experimental conditions used short-term creatine supplementation increase runners performance in amateur runners. However, the lack correlation among performance improvement and hormonal responses address it seems unlikely that performance improvements to creatine supplementation are hormonally mediated and systemic changes via hormonal alterations have been ruled out. However, some evidence suggests a role for human growth hormone. Therefore, this topic requires further investigation.

KEYWORDS Runners performance; Creatine supplementation; Anabolic hormones; Hormonal responses

Effect of pilates training on body composition and flexibility in healthy and sedentary women

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OBJECTIVE The purpose of this study is to investigate effects of pilates mat exercise during 8 weeks on body composition and flexibility of sedantary and healthy females.

METHODS The subjects were 30 women with the mean age of 28.45 \pm 01, mean height of 163.87 \pm 6.37 cm and mean weight of 58.83 \pm 04.71 kg and control group included randomly selected 30 women in the similar ages and have not participated regularly in any training exercises. The subjects participated in the study voluntarily and were new members for a pilates class. They performed modern pilates mat exercise 3 times a week during 8 weeks accompanied by a trainer, who had 3 years of certification in pilates. The control group (n=30) didn't participate in any training. The tests were done before and after 8 weeks. Body composition was determined(TBF-300 A Japan). Standard anthropometric methods were used for measurements (Anthropometric Standardization Reference Manuel procuders). Posterior body flexibility was determined by sit-and-reach test.

RESULTS After 8 weeks, no significant change occurred in body composition ($p > 0.05$) No significant differences were observed in all BIA's variables; fat mass ($p > 0.001$), total body water ($p > 0.001$), fat free mass ($p > 0.001$), body fat ratio ($p > 0.001$) and impedance ($p > 0.001$). There was significant change in posterior body flexibility ($p < 0.001$). No significant changes were found for the control group.

DISCUSSION & CONCLUSION Pilates mat exercises were found to be an effective training method that causes significant changes in posterior body flexibility in healthy and sedentary females. This study showed that no significant changes were observed in body composition.

KEYWORDS pilates, body composition, anthropometry, flexibility, women

The changes of body composition in professional soccer players during a competition half-season

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OBJECTIVE The aim of this study is to evaluate the changes of body composition in professional soccer players, measured by bioelectrical impedance, during a competition half-season.

METHODS We measured the body composition of 25 professional soccer players (age, 25.52 ± 4.11) three times by bioelectrical impedance (InBody 720), at the beginning of training process (phase of conditioning), before competitions (after the phase of conditioning) and at the end of the season (after the competitions) during a period of 6 months. We measured: BW (body weight), FFM (fat free mass), SLM (soft lean mass), TBW (total body water), ICW (intracellular water), ECW (extracellular water), protein, mineral, BFM (body fat mass), SMM (skeletal muscle mass), BMI (body mass index), WHR (waist-hip ratio), VFA (visceral fat area), BCM (body cell mass), BMC (bone mineral content), BMR (basal metabolic rate), AMC (arm muscle circumference), AC (arm circumference), FS (fitness score).

RESULTS There were increase in FFM, SLM, TBW, ICW, ECW, proteins, minerals, SMM, BCM, BMC, BMR, AMC, FS, and decrease in BW, BFM, BMI, PBF, FMA and AC, after the phase of conditioning, but only the decrease in PBF (12.94 to 10.38 %) was significant ($p < 0.05$). At the end of the season, the trend was inverse, without any significance.

DISCUSSION & CONCLUSION The results show that, conditioning phase of training process was improved by diet (increase in proteins, water, minerals and absolute muscle mass; decrease in absolute and relative fat mass) and training process (increased fitness score). New nutritional and training strategies during the phase of competitions are needed for these players.

KEYWORDS body composition, soccer players, bioelectrical impedance, nutrition, training process

Hand and grip dimensions in elite female junior tennis players

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OBJECTIVE The aims of this study were: a) to describe the parameters of the dominant hand size and handgrip of the racket, b) to test the correlations between hand size, handgrip and the measure of optimal theoretical handgrip to get the highest strength value proposed by Ruiz et al., and c) to test the differences between the values of the 12 top-ranking tennis players and the rest.

METHODS This study includes 62 elite female tennis players under 16 (U16) from 28 national teams. They were grouped according to their competing results; the first 12 tennis players and the rest ranked players. We obtained the transverse dimension of the hand. (The distance between the tip of the thumb and the little finger on extended hand). To known total handgrip dimension, the grip and the use of overgrip were taken into account.

RESULTS No correlations were observed between the transverse measure of the hand (19.97 ± 1.31) and the total value of the handgrip (11.15 ± 0.20). There was a slight correlation (0.097 ; $p < 0.05$) between the optimal theoretical grip for the dynamometry test (6.09 ± 0.33) and the values of the size of the handgrip (3.55 ± 0.06), the transversal measure of the hand and the base of the perimeter of the handgrip (10.92 ± 0.20) ($p = 0.091$). No differences were found for any variable between the groups.

DISCUSSION & CONCLUSION No relationships were found between the size of the handgrip and the dimension of the hand, and the studied variables and the theoretical optimum handgrip dimension for manual dynamometry test. No differences were found in any variable among the groups. It seems that U16 tennis players choose their handgrip without taking their hand dimensions into account.

KEYWORDS Hand, grip, tennis, young

Flexibility characteristics of tennis performance players

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OBJECTIVE The purpose of this study is to investigate the differences in the flexibility of right and left sides of the performance tennis players based on the measurements of quadriceps flexibility, hamstring flexibility, gastrocnemius flexibility and internal-external rotation of shoulders.

METHODS The subjects of the study consisted of 50 females with mean age of 10.60 ± 0.07 years old, height of 147.47 ± 0.83 cm, weight of 41.39 ± 0.36 kg and 43 male players with mean age of 10.70 ± 0.14 years old, height of 146.82 ± 0.82 cm, weight of 39.99 ± 0.82 kg. Female players have been playing tennis for 3.91 ± 1.40 years and the age that they started playing tennis is 6.72 ± 1.05 years old. Male players have been playing tennis for 4.18 ± 1.38 years and their age that they started playing tennis is 6.56 ± 0.94 years old. All of the 93 subjects joined the study voluntarily and were players for the domestic teams that participated in the Türkiye Tennis Championship. The control groups consisted of 60 juniors (30 females and 30 males) who were in the same of age group and have not participated regularly in any training exercises. The flexibility measurements consisted of sit and reach flexibility, quadriceps flexibility, hamstring flexibility, gastrocnemius flexibility, shoulder internal rotation and shoulder external rotation. Body composition was determined by bioelectrical impedance analysis (BIA). Standard anthropometric methods were used to determine body mass, body height and body weight measurements.

RESULTS According to the results of comparison of flexibility measures; there were no significant differences in quadriceps flexibility, hamstring flexibility and shoulder external rotation ($p > 0.05$) between right and left sides of female players, whereas there were significant differences in gastrocnemius flexibility ($p < 0.05$) and shoulder internal rotation ($p < 0.001$) between right and left sides of female players. There were no significant differences in quadriceps flexibility and hamstring flexibility ($p > 0.05$) between right and left sides of male players, whereas there were significant differences in gastrocnemius flexibility ($p < 0.05$), shoulder internal rotation ($p < 0.001$) and shoulder external rotation ($p < 0.05$) between right and left sides of male players.

DISCUSSION & CONCLUSION According to this study, tennis training causes significant differences between the right and left extremity in flexibility tests.

KEYWORDS tennis player, body composition, anthropometry, flexibility

Analysis of isokinetic knee extension / flexion strengths in Turkish super league soccer players

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OBJECTIVE Most soccer players have a favoured foot for kicking the ball, and it is believed that this preference may lead to an asymmetry in the strength of the lower extremities. This study was designed to determine whether asymmetry in strength is present in the legs of soccer players and to contribute a normative isokinetic strengths database of lower extremities by using Cybex Humac NORM isokinetic dynamometer for Turkish Super League soccer players.

METHODS One hundred fifty two professional soccer players (age 25.2 ± 4.1 years ; height 180.9 ± 6.2 cm; body weight 77.72 ± 6.81 kg) were studied. The isokinetic strength of knee flexors (hamstrings; H) and knee extensors (quadriceps; Q) was measured using an isokinetic dynamometer at angular velocities of 60, 180, 240 and 300 deg/s (Con/Con mode). The concentric strength ratio (H_{conc}/Q_{conc}) were computed.

RESULTS We compared right with the left leg and stronger with weaker leg. Significant differences to be founded in the comparison of stronger leg to weaker leg in Torque to Body Weight Ratios (% BW) extension 240 deg/sec , % BW flexion 240 deg/sec , % BW flexion 60 deg/sec , Peak Torque (PT) flexion 240 deg/sec , PT flexion 60 deg/sec ($p < 0.05$). On the other hand we have not found a significant differences between %BW extension 60 deg/sec, PT extension 60 deg/sec , PT extension 240 deg/sec . However no significant differences were found between the left and right leg values ($p > 0.05$).

DISCUSSION & CONCLUSION The strength characteristics in the lower extremities of these players revealed a difference between the stronger and weaker extremities. However musculoskeletal abnormality was defined as a contralateral strength imbalance greater than 10%. There was a statistical significance between stronger and weaker legs strength although this difference is in the range of 10 % and the results of Turkish players are similar to that reported previous research. On the other hand, 54 of 152 players (36%) were found to have at least one musculoskeletal abnormality which consisted of a contralateral strength imbalance of greater than 10% in one or more specific muscle groups.

It appears that soccer training produces a unique lateral dominance in these players. This type of information may be of value in preseason evaluations of other soccer players as well as in the rehabilitation of injured players. The Hconc/Qconc strength ratio varies from 69% to 74% depending upon the angular velocity of movement nevertheless limitation of this study was the absence of the dynamic control ratio (Hecc/Qconc).

KEYWORDS isokinetic dynamometer, soccer, hamstring, quadriceps, torque

A comparison of the sit-and-reach and the modified sit-and-reach tests as measures of hamstring extensibility in young adults.

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OBJECTIVE Several research papers have proposed the modified sit-and-reach test (MSR) as an alternative method of measuring hamstring muscle extensibility. The purpose of this study was to examine and to compare the hamstring criterion-related validity (concurrent validity) between the MSR and the sit-and-reach test (SR).

METHODS Seventeen and three males (mean age: 22.9 ± 3.4 years) and 78 females (mean age: 23.2 ± 3.9 years) were asked to perform two trials of MSR test, SR test, and straight leg raise test (left and right leg) (criterion measure of hamstring extensibility) in a randomized order. The SR and MSR scores were recorded with an SR box (ACUFLEX I Flexibility tester). Scores from each test were then correlated with the criterion measure. Pearson correlation coefficients were used to define the relationships between MSR and SR with respect to straight leg raise.

RESULTS Correlation values between the MSR and straight leg raise (left and right leg, respectively) were low for males ($r = 0.39-0.45$, $p < 0.01$) and moderate for females ($r = 0.62-0.63$, $p < 0.01$). The correlation values between the SR test and straight leg raise were slightly greater in both males ($r = 0.50-0.56$, $p < 0.01$) and females ($r = 0.72-0.75$, $p < 0.01$).

DISCUSSION & CONCLUSION The practitioners may employ the traditional SR over the MSR to measure hamstring extensibility, because the SR reaches better criterion-related validity as a measure of hamstring muscle extensibility in males and females, and the measurement protocol is easier.

KEYWORDS hamstring muscles, measurement, sit-and-reach tests, straight leg raise test.

Comparison of the forward reach score among several sit-and-reach tests.

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OBJECTIVE Several sit-and-reach tests are commonly used in health-related physical fitness to evaluate the hamstring extensibility. The purpose of the study was to compare the forward reach score among different sit-and-reach tests.

METHODS Seventy and seven males (mean age: 23.1 ± 3.9 years) and 71 females (mean age: 23.3 ± 4.2 years) were asked to perform two trials of back-saver sit-and-reach left (BSL) and right (BSR), sit-and-reach (SR), toe-touch (TT), and V sit-and-reach tests (VSR) in a randomized order. The forward reach score was measured with a sit-and-reach box (ACUFLEX I Flexibility tester). To standardize the measuring scale, a standard meter rule was placed with the reading of 0 cm in line with the heel position.

RESULTS The mean values of forward reach score were -0.95 ± 0.83 (BSL), -0.44 ± 0.86 (BSR), -0.59 ± 0.92 cm (SR), -3.74 ± 0.95 (TT), and -5.00 ± 1.01 (VSR) in males, and 6.25 ± 0.96 (BSL), 5.96 ± 1.01 (BSR), 6.29 ± 1.09 cm (SR), 4.23 ± 1.17 (TT), and 4.68 ± 1.32 (VSR) in females. The repeated measures ANOVA revealed significant differences in the main effects of forward reach score among the sit and reach tests in males and females ($p < 0.001$). Significant differences ($p < 0.001$) were found in forward reach score between several pairwise comparisons in males (SR-TT, SR-VSR, TT-BSR, TT-BSL, BSR-VSR, BSL-VSR). However, in females significant differences ($p < 0.001$) were only found between two pairwise comparisons (SR-TT, TT-BSL).

DISCUSSION & CONCLUSION Administration procedures of sit-and-reach tests (uni- or bilateral, sitting or standing, measuring with or without box, parallel or V position) influence the forward reach score in males, although the females showed more homogenous values.

KEYWORDS hamstring extensibility, fitness testing, sit-and-reach.

7 weeks of swimming training are sufficient to enhance sprint performance

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OBJECTIVE The preparation for a major competition is an important concern of coaches and athletes. In addition, it is not always clear the effects of training in the performance and how it affects different training components. Hence, the aim of this study was to evaluate the evolution in sprint performance during a training macro cycle in age-group swimmers.

METHODS The sample comprised twenty four age-group swimmers of the same swimming team. Their mean (standard deviation) age, body mass, height and 100 m freestyle personal best was 12.0 (0.72) years old, 41.43 (6.88) kg, 1.51 (0.09), 72.75 (7.49) s, respectively. The evaluations occurred during 9 weeks of swimming training in the first macro cycle. During this period the subjects performed 54 training units (6 units per week). The swimmers performed 208.6 km, corresponding to a mean value of 23.18 km per week and 3.86 km per training unit. In all weeks, the performance in two trials of a 25 m front crawl all out test, with 15 min of rest, was recorded. This evaluation occurred always at the same day of the week for each swimmer. The best performance was used to assess the effects of training. A repeated-measures analysis of variance with Bonferroni adjustment was used to analyze the differences between the mean values of each week performance. The significance level was set at $p < 0.05$.

RESULTS The sprint performance did not change during the first 6 weeks of preparation (week 1: 16.74 (2.04) s, week 2: 16.85 (2.23) s, week 3: 16.88 (2.38) s, week 4: 16.56 (2.14), week 5: 16.97 (2.40), week 6: 16.57 (2.05); $p > 0.05$). In the last 3 weeks the performance in the 25 m front crawl test was improved when compared with the first week (week 7: 16.41 (2.28) s, week 8: 16.41 (1.21) s, week 9: 16.18 (2.09) s; $p < 0.05$), although the major changes occurred at the last week of preparation.

DISCUSSION & CONCLUSION It seems that in age-group swimmers 7 weeks of specific swimming training enables improving swimmer's sprint performance. Although this protocol was only conducted in front crawl technique, these data could be used by coaches to program the training season and the evolution of the load components. However, it seems interesting to enlarge this study to other swimmers of different level and to analyse these data in other swimming techniques, rather than the front crawl stroke.

KEYWORDS Sprint, training control, age-group swimmers.

The relationship of anthropometrical characteristics and front crawl performance in male age-group swimmers

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OBJECTIVE Swimming performance is affected by several factors including the swimming technique, the swimmer's functional and metabolic characteristics and the level of training accomplishment. However, performance is also depending on the swimmer's anthropometrical characteristics. The body shape, body size and body composition can play an important role to achieve higher performances. Therefore, the aim of this study was to analyse the relationship between anthropometrical characteristics and the performance in front crawl events in male age-group swimmers.

METHODS The sample comprised sixteen male age-group swimmers of the same swimming team. Their mean (standard deviation) age, body mass and height was 12.50 (0.51) years old, 42.93 (7.73) kg, 1.52 (0.10) m, 72.75 (7.49) s, respectively. The following anthropometrical characteristics were evaluated: height, body mass, span, torso and waist circumferences, body mass index, fat mass (kg), fat mass (%), and lean mass (kg). The personal best of the swimmers in 100 m, 200 m, 400 m, 800 m and 1500 m short course front crawl events were related to the anthropometrical data. Pearson correlation coefficient was used to determine these relationships. The significance level was set at $p < 0.05$.

RESULTS A significant correlation ($p < 0.05$) was found between the 100 m performance and height ($r = 0.83$), span ($r = 0.75$), fat mass % ($r = 0.65$) and lean mass ($r = -0.71$). Moreover, a significant correlation was found between the 200 m performance and height ($r = -0.72$), span ($r = -0.70$), body mass ($r = -0.53$) and lean mass ($r = -0.69$). No significant correlations were found between 400 m, 800 m and 1500 m performance and the anthropometrical parameters. Moreover,

torso and waist circumferences and body mass index were not correlated to the freestyle performance in any of the analysed events.

DISCUSSION & CONCLUSION In male age-group swimmers the performance in short distance events (100 m and 200 m) seems to be dependent on anthropometrical characteristics. The same situation seems not to occur with middle distance events (400 m, 800 m and 1500 m). Hence, the swimmers who presented higher values of height, span, body mass and lean mass presented best times in 100 m and 200 m freestyle events. On the other hand, higher values of fat mass seemed not to be profitable for these events.

KEYWORDS Anthropometry, freestyle events, male, age-group swimmers.

The effect of pilates exercises on the lumbar hyperlordosis degree in 15-18 years old girl students

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OBJECTIVE It is believe that Pilates exercises are suitable for athletes, the general population, and people with medical conditions because of it can enhances strength and flexibility, improves postural status and peripheral mobility. However, there are few study to support these statements. The aim of this study is to investigate the effects of pilates exercises on the lumbar hyperlordosis in the student girls 15-18 yr.

METHODS To determine the normal range of lumbar lordosis, Spinal mouse was used to measure the lumbar lordosis of students age 15-18 years. The mean of lordosis was 39.05 degree and SD= 11.05, so in the present study, the normal range of lumbar lordosis to take into by 50.10 (M+SD) degree. 27 subjects were selected in which lumbar lordosis was more than 50.10 degree. After two months pilates exercises (eight weeks, three session per week and one hour per session), lumbar lordosis was measured again as a post test trial. Data were analyzed by the paired-sample T test using the SPSS software.

RESULTS It is observed a significant decreases in lumbar lordosis ($t=7.36$; $p\leq 0/05$) and significant increases in local endurance of abdominal muscles ($t = -8.18$; $p\leq 0/05$) and flexibility of back muscles ($t = -9.86$; $p\leq 0/05$) after pilates exercises.

DISCUSSION & CONCLUSION Pilates exercises significantly decrease the lumbar hyperlordosis in the 15 -18 yr. old girl students, and it is concluded that pilates exercises have a potential role to improve the student's postural abnormalities.

KEY WORDS Pilates Exercise, Postural Abnormality, Lumbar Hyperlordosis

Motor abilities in visually impaired adolescents with different level of physical activity

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OBJECTIVE The visually handicapped children are less physically active than their sighted peers. Vision as well the level of physical activity affect the motor performance. Participation in sports may provide an opportunity for children to improve their motor skills. The aim of this study was to examine the motor abilities of adolescents with visual impairments and to clear up their association with sports participation.

METHODS 51 adolescents (26 girls and 20 boys) with visual impairments, mean age 16.1 years (SD 1.24) were measured. They were divided in two groups – with low level of physical activity - participating only in two physical education lessons per week, and physically active - practicing extracurricular sports. Height and weight were measured. The following EUROFIT tests were used: handgrip strength, standing broad jump, flexed arm hang, sit-ups, plate tapping, sit-and-reach. The running speed was measured by 50-m distance run.

RESULTS There wasn't statistical difference in the anthropometrical parameters of the children from both groups. The results showed significantly higher ($p<0.05-0.01$) scores for physically active boys and girls from the tests for flexibility, speed of limb movement, trunk strength, muscular endurance and running speed. The difference between sedentary and physically active children was not significant ($p>0.05$) for handgrip strength. Explosive leg power of the practicing sports boys was statistically significant higher than those of sedentary, but the results of girls from both groups were no statistically different.

DISCUSSION & CONCLUSION Our results indicate that sports participation improves motor abilities of children with visual impairments, which could increase the likelihood of independence.

KEYWORDS motor abilities, visually impaired adolescents, Eurofit tests

Incremental exercise tests and mechanical work: Negligible interactions?

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BACKGROUND Endurance exercise tests considered a gold standard to determine submaximal and maximal endurance performance. Incremental tests are preferred to evaluate lactate thresholds and ramp tests are focused on maximal power output and oxygen uptake. Physical critiques using the RIEMANN-Integral to differentiate both test designs are lacking.

OBJECTIVE The area under the power-time-graph applies to $W=P \cdot dt$ and becomes a smooth curve for an infinite minimal time: An ideal ramp. With respect to this consideration, we hypothesize: The smaller the increment, the longer a subject might perform mechanical work for the same global increase of physical power.

METHODS 10 unspecific trained male students performed two randomized incremental exercise tests until maximal exhaustion. One test protocol increased 20W per minute and the other test 60W per 3 minutes. Recreational time between both tests was defined by one hour. The MANOVA with the grouping variable TEST was performed to evaluate statistical interaction between exercise time, maximal power and maximal oxygen uptake. Univariate analyses were additionally performed for each parameter.

RESULTS The MANOVA revealed a slight but not significant interaction ($F=2,8$; $p=0,2$). The univariate analysis also revealed no statistical difference between both tests for exercise time, maximal power and oxygen uptake. But in tendency, we observed a difference for VO_{2max} ($F=1,8$; $p=0,1$) due to our hypothesis.

DISCUSSION & CONCLUSION The differences of the increments between both tests of either 20W per minute or 60W per 3 minutes were too small to reveal statistical difference. Nevertheless, the question of mechanical work according to the test should be included beside physiological justifications.

The effects of 12, 18, 24 hours of sleep deprivation on simple, choice reaction time and anaerobic power of college students athletes

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OBJECTIVE The purpose of this study was to evaluate the effects of 12, 18, 24 hours of sleep deprivation on simple, choice reaction time and anaerobic power of college student athletes.

METHODS Eight healthy right-handed college student athletes with the mean age of 22.3 years voluntarily participated in the study following the approved of the local ethics committee. The subjects fully informed of the procedures. The pre-test included simple reaction time (SRT), choice reaction time (CRT) and anaerobic power (Wingate) test. The participants did not consume any stimuli such as coffee, tea, and cacao during the experiment.

RESULTS The results of data analysis showed no significant increase in simple reaction time (SRT) following 12, 18 hours of sleep deprivation, respectively. However, after 24 hours of sleep deprivation, SRT significantly increased. In addition, there was no significant increase in choice reaction time after 12 hours of sleep deprivation, but it did significantly increased after 18 and 24 hours of sleep deprivation, respectively. No significant decrease in anaerobic power was also found after 12, 18 hours of sleep deprivation, but it decreased significantly following 24, hours of sleep deprivation.

KEYWORDS Sleep Deprivation, Anaerobic Power, Simple Reaction Time (SRT), Choice Reaction Time (CRT).

Acute effect of vibration and PNF stretching technique on flexibility

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OBJECTIVE Flexibility is defined as the range of motion of a joint or series of joints. Local vibration and the hold-relax Proprioceptive Neuromuscular Facilitation (PNF) maneuver have been used as methods to increasing joint range of motion. The purpose of the present study was to examine the acute effect of local vibration and PNF on flexibility and to compare the two methods.

METHODS Ten female recreational athletes participated in this study (age: 25.4 ± 1.34 yrs). After a standardized warm-up participants performed the sit-and-reach test, which was used as an indicator of flexibility. The best of three trials was used as the test value. Then the subjects executed either the vibration (V) or the PNF maneuver (P) in a randomized and counterbalanced order. In condition V participants performed hamstrings stretching, one leg at a time, on a vibration platform for 30 sec with characteristics: frequency 30 Hz and amplitude 2 mm. In condition P participants lay supine and an experienced trainer passively stretched the hamstrings with the contract-relax technique until the subjects reported pain. The duration of each contraction was 10 sec separated by 10 sec of relaxing. Sit-and-reach test was performed immediately after condition V or P. Differences between the two conditions and before - after the intervention were examined using t-test. Results are presented as mean \pm SE.

RESULTS After the V and P condition the sit-and-reach score was significantly higher ($V = 29 \pm 1.89$ cm and $P = 27.7 \pm 2.18$ cm) compared with the sit-and-reach scores before the intervention ($V = 26.5 \pm 2.25$ cm vs $P = 24.8 \pm 2.42$ cm).

DISCUSSION & CONCLUSION According to the results either local vibration or PNF can be used as methods for increasing flexibility. The above mentioned increase could be attributed to: a) increase in pain threshold, b) increase in blood flow and temperature and c) induced relaxation of the stretched muscle.

KEYWORDS Vibration, PNF, Flexibility

What method do secondary physical education students prefer to develop aerobic capacity?

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OBJECTIVE In Physical Education lessons students have to be motivated to reach the recommended intensity to develop aerobic endurance. In this study we tested different methods to reach the requested intensity evaluating the motivation of the students and the subjective perception of their intensity.

METHODS Fifty secondary-school children (32 boys, 18 girls; mean age of 17 years) took part in the study. Subjects participated in an 8-week endurance training program (2-3 h/week at approx. 85% VO_2 max), using different methods of training (continuous constant running -CCR-, Fartlek -FTK-, Circuit Training -CT- and Interval Training -IT-). The study was conducted during the PE lessons. During the sessions, individual heart rate was continuously monitored (5s interval) using a heart rate monitor (Polar S810). Subjects were asked which method of training was their favourite one or was considered by them more motivational; also, they were asked about the intensity perceived according to the training method used (Borg's CR10 scale, from 0 -no intense- to 10 -extremely intense-).

RESULTS To develop aerobic endurance, first it was preferred CT method (35.4%), followed by IT (25.0%), CCR (16.7%), FTK (12.5%), and "all the methods equally" (10.4%). The training method that students perceived as more intense was FTK (7.27 ± 1.39), followed by "all the methods equally" (7.21 ± 1.10), CCR (6.92 ± 1.64), IT (6.77 ± 2.09), and CT (6.75 ± 1.97). While for the boys the less intense method was CCR, for the girls it was CT, although there were no significant differences with regard to the other methods. In general, the PE lessons focused on the improvement of the aerobic endurance are perceived as very intense (7 on CR10 scale).

DISCUSSION & CONCLUSION The training method to develop aerobic endurance during the PE lessons and considered more motivational by most of the students is CT, as well as it is perceived as the less intense. It seems that motivation plays an important role in the perception of effort. The use of heart rate monitors as an objective measure of exercise intensity in PE is effective and can be very useful to teach the students how to control their own physical activity intensity, and also to motivate them during PE classes.

KEYWORDS Aerobic Endurance, Training Method, Perceived Effort, Motivation, Physical Education.

The effect of LPG massage as a complement of aerobics in decreasing women's body sizes

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OBJECTIVE The increase in body weight which comes with the aggregation of lipids in body is considered as obesity. According to Baskerek; obesity occurs when the amount of fat cells in the body goes above the average level and it depends on the ingredient lipids in any of the fat cells and also the entire number of fat cells in the body. The methods

that nowadays are used to prevent obesity or to treat obesity are: nutritional diets, skin needling, drug prescription, behavioral treatment, liposuction and massage.

METHODS Using simple random sampling, 30 women were selected as the sample group. After measuring the weight and height of the participants, their Body Mass Indicator (BMI) was calculated and following this, the participants were split into two 15 member groups based on the BMI.

RESULTS There is a difference between the effect of aerobic activities and the aerobic activities plus massaging with LPG device in removal of the fats in waist, abdomen, hips and the thighs.

DISCUSSION & CONCLUSION There was a difference between the circumferences of body organs during the pre-test and post test periods. The results coming from this paper revealed that there was a conspicuous decrease in the circumferences of body organs in participants of the two groups caused by tedious exercises in which all of giant muscles were engaged in the activity. The conclusions made by Tark (2006), Lora and Mazikas (2003), Fern Strom (2006) and Oguri (2004) tend to approve our findings.

KEYWORDS LPG massage, limb circumferences, aerobics, women

Eccentric calf muscle training for the treatment of chronic achilles tendinosis

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OBJECTIVE Overuse injuries involving the Achilles tendon are common, especially among runners. The majority of Achilles tendon overuse injuries occur in men, and they occur at a higher rate in middle-aged athletes than do most other overuse injuries.

METHODS We prospectively studied the effect of eccentric calf muscle training in 18 athletes (men; mean age, 35.7 ± 6.2 years) who had the diagnosis of chronic Achilles tendinosis with a long duration of symptoms despite conventional nonsurgical treatment. Calf muscle strength and the amount of pain during activity were measured before onset of training and after 8 weeks of eccentric training. At week 0, all patients had Achilles tendon pain not allowing running activity, and there was significantly lower eccentric and concentric calf muscle strength on the injured compared with the noninjured side.

RESULTS After the 8-week training period, all 18 patients were back at their preinjury levels with full running activity. A comparison group of 15 recreational athletes with the same diagnosis and a long duration of symptoms had been treated conventionally, i.e., rest, changes of shoes or orthoses, physical therapy, and in all cases also with ordinary training programs. There was a significant decrease in pain during activity, and the calf muscle strength on the injured side had increased significantly and did not differ significantly from that of the noninjured side.

DISCUSSION & CONCLUSION Our treatment model with eccentric calf muscle training has a very good short-term effect on athletes in their early forties. A literature review indicated that there are no prospective studies on eccentric calf muscle training in patients with Achilles tendinopathies.

KEYWORDS Eccentric training, calf muscle, Achilles Tendinosis

Postural balance in elite volleyball players

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OBJECTIVE Ankle sprain is the most common acute injury in volleyball players. The ability of person to maintain the center of gravity (COG) can be an important predictor of ankle sprains. We aimed to evaluate the role of body height, body weight and age on overall stability index in males and females.

METHODS We have measured the overall stability index using Biodex Balance System in 271 professional volleyball players (112 males, 161 females). Linear regression model was used.

RESULTS The regression model was statistically significant in both sexes (in males $R^2=0.24$, $F=11.26$, $p<0.00001$; in females $R^2=0.51$, $F=55.14$, $p<0.000001$). Body mass was significant predictor of overall stability index in both sexes (for males $t=3.68$, $p<0.001$, for females $t=11.46$, $p<0.00001$). Increasing body mass is correlated with increasing overall stability index in both sexes. We have also noticed the stronger influence of body mass on overall stability index in females (Beta value females vs. males was 0.81 vs. 0.41). To further investigate the role of body weight on overall stability index, subjects were assigned to four weight status categories according to the WHO categorization (underweight, normal weight, overweight, obese) by using BMI. Univariate ANOVA with Bonferoni adjustment was used to evaluate the influence of different weight status categories on OSI. OSI was significantly different among subjects from different weight categories in both sexes (in males $F=3.04$, $p<0.05$; in females $F=31.44$, $p<0.000001$).

DISCUSSION & CONCLUSION The main finding of our study indicates that OSI is highly correlated with body mass in both sexes, and that the influence in females is more prominent. There is also significant increment in OSI from underweight to obese subjects, so different weight categories differ in OSI, and this effect was most characteristic for senior female players. Increase of OSI with body weight can probably be explained by the higher gravitational torque produced by the larger body mass. When strength of muscles is not compromised they will be able to cope with higher gravitational torque, but injured or weak muscles won't be able to do so, and this will result in loss of postural balance and possible fall.

KEYWORDS Stability index, OSI, BMI

The results of a novel technique of II generation ACI (autologous chondrocytes implantation) in the knee and ankle after sports injuries

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OBJECTIVE The purpose of the study is to evaluate the clinical results and MRI of a novel II generation autologous chondrocytes implant, for cartilage repair in knees and ankles after sports injuries.

METHODS We use a matrix-assisted, fibrin hyaluronic acid-based implant containing autologous chondrocytes propagated with a unique growth factor variant to maintain their chondrogenic potential. The scaffold is a porous open channel structure enabling a three dimensional distribution of the cells and full thickness repair. Twenty three patients aged 17-50, with cartilage lesions 20 in the knee and four in the ankle, diagnosed by MRI underwent arthroscopy and biopsy from the antero-lateral margin of the intercondylar notch and from the distal margin of the talus respectively. Two to three weeks later, it was implanted through a small 4-5cm longitudinal parapatellar incision or 3-4 cm of longitudinal antero-medial incision of the ankle. Deep lesions were treated with two layers. Rehabilitation included 3-6 weeks of non-weight bearing and CPM, followed by 3 weeks of partial weight. Full activities were resumed at 4-6 months and follow-up was 14-46 months.

RESULTS At diagnosis all patients scored under 4 points in the subjective ICRS questionnaire improving to over 6 post operation. The IKDC score for the patients who suffered from knee injuries improved from grades C and D before the operation to A or B post operation. Second look arthroscopy and biopsy on two knees due to pain and sensation of catching, showed excellent coverage, full integration and new hyaline-type cartilage. One year post operative MRI, showed good integration of the graft with signs of bone edema at the implantation site.

DISCUSSION & CONCLUSION This new method of autologous cartilage implantation is safe, effective and user-friendly both for the patient and the surgeon. The short time from biopsy to implantation and good to excellent clinical outcome further encourage the continued use of this technique and product. The use of this new method of ACI II generation in twenty three patients who treated in the knee and the ankle showed after follow-up of 14-46 months good and excellent results using the ICRS questionnaire and IKDC score. MRI showed good integration of the graft and two biopsies showed hyaline-type cartilage. This method is safe and effective.

KEYWORDS cartilage, sports injury, knee, ankle, arthroscopy

A vibrational therapy for chronic back pain: The relevance of synchronism and its mathematical modelling

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Cell vibrations and corresponding time patterns are well-established diagnostics for cell activity in cardiology and sports medicine. The microvibrations in skeletal muscle cells, being observed already years ago (Univ. Erlangen) with high resolution videomicroscopes also represent a body-specific time pattern or rhythm in specific "frequency windows" (8Hz -12Hz). The absence of these microvibrations in outer space missions as well as in degenerative tissue processes indicates their relevance for physiological transport processes (logistic) in the extracellular matrix space. In this contribution we introduce a new treatment approach, exemplarily at chronic back pain patients, showing, how cellular coherence is re-established by an external entrainment process, leading to a synchronous cooperation through all hierarchic levels of time, process and space. We explain the physiological background, introduce the medical device, patented at the Univ. of Erlangen, and report on recent simulation results from a mathematical model that lead to a better understanding of the underlying synchronism what is obviously a basic mechanism of life.

The effect of radial shock-wave therapy in professional soccer players with different types of insertionitis

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OBJECTIVE Insertionitis is a fairly common state diagnosed in professional soccer plyers, occurring due to enhanced volume and intensity of the training process, and increased number of tournaments and competitions. Although there are numerous modes of treatment for rapid resolution of insertionitis, it is often found to be quite persistent. The aim of the study is to evaluate the effect of radial shock-wave therapy on insertionitis in professional soccer players.

METHODS Thirty professional soccer players with different types of insertionitis (insertionitis of the hamstrings, insertionitis of the adductors, insertionitis of the quadriceps) were evaluated in this study. They underwent focused shock wave treatments of the concerning areas, with 2000 shocks of 2,5 Bar intensity and a frequency of 10Hz. Visual analogue scoring was done in three pain categories, at baseline, after 10 days and three months after treatment.

RESULTS The composite pain score decreased from 8.3 to 2.9. The results were excellent in 18, good in 6 and fair in 6 of the athletes. Fifteen of the athletes reported complete pain relief after 10 days and three months. The overall satisfaction rate was 67%. None of the patients developed neuro-vascular complication, one patient developed subcutaneous haematoma.

DISCUSSION & CONCLUSION Resulting in prompt pain relief and enabling complete regaining of locomotory function in professional soccer plyers, RSW can be considered a reasonable treatment for different types of insertionitis.

KEYWORDS athletes, insertionitis, radial schock wave, visual analogue scoring

The effect of radial shock wave therapy on trigger points in athletes with cervical and low back pain

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OBJECTIVE Cervical and low back pain is frequent symptom in athletes due to physical loads and impacts, may cause different types of sports injuries. The treatment is usually connected with different modalities of physical therapy according to the type of disorder, avoiding radial shock wave therapy (RSWT) as a contraindication using it over the spine. The aim of this study is to evaluate the effects of RSWT in athletes with cervical and low back pain.

METHODS We evaluated 36 athletes with cervical an low back pain as a result of different types of disorders . Group 1 underwent standard therapy protocols and in Group 2, we added focused shock wave treatments on the trigger points of the concerning areas. Visual analogue scoring was done in three pain categories, at baseline, after 10 days and three months after treatment, in both groups.

RESULTS The composite pain score decreased from 8.5 to 3.5 in group 1 and from 8.5 to 2,7 in group 2. The results were excellent in 10, good in 3 and fair in 5 of the athletes in group 1. In group 2, they were excellent in 12, good in 4 and fair in 2. Compete pain relief after 10 days and three months in 12 athletes in group 1(with overall satisfaction rate of 66%) and in 14 athletes in group 2 (with overall satisfaction rate of 78%).

DISCUSSION & CONCLUSION It seems that RSWT on trigger points in athletes with cervical and low back pain could be a reasonable additional therapy in standard therapy protocol.

KEYWORDS athletes, cervical pain, low back pain, radial shock wave, visual analogue scoring

Effect of warm water exercise training in cardiorespiratory capacity and peripheral and central chemoreceptor sensitivity in heart failure

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OBJECTIVE Heart Failure is characterized by increased ventilation during exercise, which is positively to increased peripheral and central chemoreceptor sensitivity. Exercise in warm water, as a rehabilitation program has been considered in heart failure with osteo-muscular system disorders and old patients. However, few data are available about benefits of water therapy in heart failure patients. We studied the effect of training in warm water to the physical capacity response and peripheral and central chemoreceptor sensitivity in heart failure patients.

METHODS Methods and Materials: 8 patients with compensated idiopathic heart failure, age 48 ± 10 years, ejection fraction $29 \pm 6\%$, and NYHA I-III were submitted pre and post training to maximal treadmill cardiopulmonary exercise test. The second day, patients were submitted pre and post training to treadmill 6-minute cardiopulmonary walking (6 WT) with isocapnic hypoxia $12\% O_2$ (ih) and hyperoxic hypercapnia $5\% CO_2$ (hh) sensitivity (controlled-temperature room $21-23^\circ C$). The training program included 12 weeks of warm water exercise ($31^\circ C$ swimming pool).

RESULTS The training program was well tolerated with no adverse events. The patients improved their peak VO_2 in $mlO_2/kg/min$ (from 19.4 ± 4.9 to 22.3 ± 2.8 , $p=0.01$); exercise time in minute (from 12 ± 3.5 to 16 ± 2.8 , $p<0.000$); O_2 pulse in mlO_2/bpm (from 11.7 ± 2.5 to 13.2 ± 2.5 , $p=0.02$). The heart rate and ventilatory response to exercise did not improve (pre 134 ± 24 and post 135 ± 20 bpm, $p=ns$; pre 57 ± 22 and post 63 ± 15 l/min, $p=ns$, respectively). The saturation of peripheral oxygen (SpO_2) pre and post training during 6 WT with isocapnic hypoxia $12\% O_2$ was pre $77 \pm 3\%$ and post $75 \pm 4\%$. Area under curve for heart rate (ih pre 767 ± 95 and post 741 ± 70 , hh pre 713 ± 79 and post 681 ± 48), ventilation (ih pre 157 ± 38 and post 154 ± 30 , hh pre 209 ± 51 and post 196 ± 49), and the distance of 6-minute walking (ih pre 0.14 ± 0.03 and post 0.16 ± 0.03 mph, hh pre 0.16 ± 0.04 and post 0.18 ± 0.04 mph) did not differ between pre and post training for isocapnic hypoxia and hyperoxic hypercapnia.

DISCUSSION & CONCLUSION Physical training in warm water improved exercise capacity in heart failure patients. However, exercise training in warm water did not decrease peripheral and central chemoreceptor sensitivity in these patients with heart failure.

KEYWORDS heart failure, water pool, exercise training

Physical fitness inflected white paralysis through a training complex of coach, kids and parents.

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OBJECTIVE Studies show that the poor movement in kids leads to paralysis which in turn affects their growth in general. Movement is an important element in the natural growth and development of human beings and the children who lack movement capabilities are deprived of this merit.

METHODS the sample consists of 37 teenagers (boys & girls) inflected with diplegia spastic. They were assigned to two groups based on thrombly CA test (1983), one experimental group and one control group. Different instruments were used in the study such as thrombly CA, an attitude questioner for the parents shtrass myrse and the dynamometer approach.

RESULTS the results showed that there is a significant difference between the control and experimental groups in the post tests. The findings demonstrate on the improvements achieved by the experimental group.

DISCUSSION & CONCLUSION through training the coach, the kids and the parents, one can improve the levels of skills among the given subjects. Also, the confidence level of the parents can be boosted. The results seen to be consistent with the findings reported in rehabilitation centers.

KEYWORDS Physical fitness, paralysis, parents

The comparison of anthropometric characteristics and physical performances of soccer teams that participate in under 14 age group with different success levels in Antalya region

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OBJECTIVE The purpose of this study is to compare anthropometric characteristics and physical performances of soccer teams that participate in under 14 age group with different success levels in Antalya region.

METHODS The subjects of the study consisted of volunteer 60 soccer players. Every team consisted of 15 soccer players. The football teams, which participated in this study, were divided into 2 groups by their ranking. There were 24 teams in the competition. The 1st and the 2nd ranking teams formed the 1st group (age mean; 13.57 ± 0.85 years, height mean; 164.39 ± 05.71 cm, weight mean; 53.19 ± 06.74 kg) and 23rd and the 24th teams formed the 2nd group (age mean; 13.89 ± 01.73 years, height mean; 163.34 ± 05.18 cm, weight mean; 54.67 ± 04.96 kg). Standard anthropometric methods were used to determine body mass, body height and all of skinfold and circumference measurements. All of the anthropometric measures were based on Anthropometric Standardization Reference Manual procedures. The following tests for physical performances were used; Hand strength test, leg and back strength test, audio-visual reaction time test, vertical jump test and 20m. sprint test. Hand strength was tested by the hand dynamometer, leg and back strength was tested by the leg and back dynamometer, audio-visual reaction time was tested by New Test 2000, vertical jump was tested by jumpmeter and 20m sprint test was tested by photocell.

RESULTS According to the results of comparison of anthropometric measures of 1st. and 2nd groups; there were significant differences in skinfold thickness and length measurements ($p < 0.001$), circumference measurements of calf and biceps ($p < 0.001$) between 1th. and 2nd. groups of soccer players, whereas there were no significant differences in circumference measurements of thigh, ankle, forearm and wrist ($p > 0.05$) between 1th. and 2nd. groups of soccer players. There were significant differences in all performance tests ($p < 0.001$) between 1th. and 2nd. groups of soccer players.

DISCUSSION & CONCLUSION Differences of anthropometric characteristics in soccer players of U-14 age group were effective on performances.

KEYWORDS soccer player, body composition, anthropometry, physical performance, soccer level

Anthropometric characteristics, body composition and somatotype of Spanish under 14 tennis players

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OBJECTIVE Because of an early specialisation in different competitive sports, it is important to know the anthropometric characteristics, body composition and somatotype of young athletes. Few studies have examined physical characteristics related to playing tennis in youth (Elliot et al., 1990, Australian J Sci Med Sport, 22, 87-92; Sánchez-Muñoz et al., 2007, British J Sports Med, 41, 793-799). The purposes of this study were (1) to describe the anthropometric characteristics, body composition and somatotype of Spanish under 14 (U14) tennis players, and (2) to compare the anthropometric data, body composition and somatotype of the first 8 classified players on the U14 ranking with the rest ranked players.

METHODS A total of 123 (60 males and 63 females) Spanish U14 tennis players participated in this study (who were competing at the U14 National Tennis Championship). According to gender, athletes were also divided into two groups, the first 8 ranked and the rest players. A total of 17 anthropometric variables were recorded for each subject. Somatotype was assessed using the Heath-Carter method, and body composition (% body fat, % muscle mass) was assessed using surface anthropometry.

RESULTS In girls, no significant difference was found in any variable. The first 8 male players showed significantly less fat than the rest subjects. Also, significant differences were found for triceps, biceps and thigh skinfolds ($p = 0.007$; $p = 0.037$; $p = 0.008$, respectively), and for % body fat ($p = 0.047$), between the first 8 and the lower ranked. The mean somatotype of male U14 tennis players could be defined as ectomesomorphic (2.3 (1.0), 4.6 (1.0), 3.9 (1.1)), and the mean somatotype of female U14 tennis players could be defined as endomesomorphic (4.3 (1.1), 4.4 (0.8), 2.6 (0.8)). Significant differences were found in the endomorphic component between the first 8 male and the lower ranked players ($p = 0.030$).

DISCUSSION & CONCLUSION When comparing the first 8 and the lower ranked U14 tennis players of both genders, no significant differences were observed in any measured item for the girls. On the other hand, significant differ-

ences were observed in skinfolds, % body fat, and endomorphic component between the first 8 and the lower ranked boys, whereby the first 8 were less fat than the lower ranked players. These differences could be due to time spent in training between the best tennis players ("more professionals") and the rest.

KEYWORDS anthropometric, body composition, somatotype, tennis, young

Investigating the effect of aquatic aerobic training on the speed of walking in high & low degree Multiple Sclerosis patients

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OBJECTIVE MS is a weakening and chronic illness of nerve system. In a research done by Kileff and Ashburn (2005) on 8 MS patients showed that a program of 8 week aquatic exercise could improve the speed of walking in low degree MS patients. Purpose of this study investigate and compare the rate of effect an aquatic exercise for 8 weeks, on speed walking (SOW) in female MS patients with high and low degree.

METHODS From 120 MS patients, 46 people on the basis of illness degree and age range were selected randomly. The average period of the disease was (41) and age rang was between (20-50) years. They were divided in two experimental groups with EDSS 1-4 (15 people) and EDSS 4.5-6.5 (11 people) and two control groups with high and low EDSS (10 people). The experimental group participated in the exercise for 8 weeks, each week three sessions with intensity of 40-50 percent of the maximum heart rate. Measure the SOW in experimental and controlled groups before and after exercise. The gathering data were analyzed by using descriptive statistic and dependent /independent t- test.

RESULTS According to the results of the study the effect of exercises in SOW of M.S patients with high & low degree was the same and significant difference was observe in their difference of means of their SOW ($p=0/001$) a significant difference was found between SOW variable in pre-test and post-test of experimental group with high EDSS (0.003) & low EDSS (0.044). There was no significant difference between SOW variable in pre-test of post test of control group with high degree (0.469) and low degree (0.087).

DISCUSSION & CONCLUSION Considering the results of this research, this has caused in an improvement in the SOW of MS patients, so it seems necessary to apply an aquatic exercise for such patients. Therefore, it is recommended these exercises to be used by specialists as a supplementary remedy beside medical treatments for MS patients.

KEYWORDS Multiple sclerosis - aquatic exercise - speed of walking

Muscle ergoreflex involved during exercise did not contribute to ventilatory response in heart failure with optimized treatment

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OBJECTIVE The muscle ergoreflex has been postulated as a link between muscle metabolic changes and the abnormal responses in hemodynamic, ventilation and autonomic tone in heart failure (HF). Beta-blocker (BB) improves hemodynamic and decrease ventilatory response, but had no effect on exercise capacity. However, no data are available about ergoreflex on exercise in HF under optimized BB therapy. We investigated the ergoreflex in the leg during treadmill 6-minute cardiopulmonary walking test (6W) in CHF with optimized treatment receiving BB compared with control group.

METHODS We compared ergoreflex between 17 pts with CHF, EF $29\pm7\%$, NYHA I-III, peak VO_2 20 ± 6 ml/kg/min and 7 healthy controls, peak VO_2 30 ± 3 ml/kg/min. The evaluation of ergoreflex activity included two cardiopulmonary 6W performed in random order: with and without regional circulatory occlusion (RCO). Recovery with RCO was compared to recovery no-RCO.

RESULTS There were significant differences in 6W distance between RCO and no-RCO (CHF 289 ± 125

to 306 ± 95 , $p=0.03$ and control 386 ± 97 to 418 ± 97 meters, $p=0.02$, respectively). Heart rate and VO_2 in the end 6W RCO and no-RCO did not show statistic differences (HF: HR, 93 ± 11 to 92 ± 10 bpm; VO_2 , 10.6 ± 3.5 to 10.4 ± 3 and control: HR, 90 ± 4 to 91 ± 5 bpm; VO_2 , 11.6 ± 2 to 12.7 ± 2).

DISCUSSION & CONCLUSION Respiratory response during 6W was increased in HF when compared with control. The ergoreflex activity in the leg and 6W exhibited a non-significant contribution to recovery period in both HF and control. Over activation of the ergoreflex seems not contribute to an excessive ventilation response during 6W, that reflect daily activity, in optimized BB HF.

KEYWORDS Exercise, heart failure, muscle ergoreflex

Interval exercise training benefit on body composition and physical fitness in young obese women

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OBJECTIVE Exercise training is one of the main interventions in overweight people in order to reduce and maintain the gained weight. We aiming to demonstrate that interval exercise training programs based on cardiopulmonary exercise test (CPX) recommendation of Training Zones increase physical fitness and improve body composition in young obese women.

METHODS 40 young obese women university students (average BMI of 30.7 kg/m^2) from 18 to 25 years old, were included the study. Physical fitness and aerobic capacity of subjects was determined performing a maximal CPX (Cortex Metalyzer 3B) on bicycle ergometer. We measured peak oxygen uptake (VO_2 peak) and oxygen uptake corresponding to anaerobic threshold (VO_2 AT). Multifrequency segmental bioimpedance device (InBody 720) was used to analyze body composition and recording PBF, visceral fat area (VFA) and waist to hip ratio (WHR). All subjects participated in a 6 months interval exercise training consisted in 3 times per week of 60 minutes at extensive and intensive endurance intensity zone, completed by 1 minute interval in development intensity zone for every 5 minutes of training.

RESULTS Using the paired t test to compare the data at baseline and at the end of the study, we noticed a significant improvement in body composition: PBF decreased (from 42.4 ± 6.5 to 40.2 ± 7 %, $p=0.023$) along with VFA (from 116 ± 52 to $103 \pm 48 \text{ cm}^2$, $p=0.002$) and WHR (from 0.87 ± 0.05 to 0.86 ± 0.05 , $p=0.013$). We also noticed a very significant improvement of physical fitness (VO_2 peak increased from 1.78 ± 0.3 to $2.07 \pm 0.37 \text{ l/min}$, $p<0.0001$) and aerobic capacity (VO_2 AT increased from 1.24 ± 0.27 to $1.49 \pm 0.28 \text{ l/min}$, $p=0.0002$).

DISCUSSION & CONCLUSION 6 months of interval exercise training increase physical fitness and improve body composition in young obese women. Adjusting the physical training according to CPX recommendation of Training Zones together with the feedback offered by using heart rate monitors, leads to an important increase of aerobic capacity.

KEYWORDS Interval exercise training, obese women

Aerobic performance and morphological modifications after 4 months's phisycal activity program in elderly women

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OBJECTIVE Research clearly shows that physical activity (PA) is an important factor to develop and maintain good health and adequate body functions in older people. In this context, the purpose of this study was to determine aerobic performance and morphological modifications after a 4 month physical activity program (PAP) in elderly.

METHODS Forty subjects divided in two groups (control, $n=20$; and experimental, $n=20$) were evaluated twice, at the beginning and after a 4-month-activity program period. This program called “+ age + health” consists of 3 week sessions of one hour each, based on walking and aerobic exercises. The control group had, at its first evaluation, the followings characteristics: average body mass $68 \text{ kg} \pm 15$, 28 ± 5 BMI, $37\% \pm 5$ body fat, $2.2 \text{ kg} \pm 0.4$ bone mass, $42\% \pm 9$ lean body mass and did 129 repetitions ± 46 on a 2-Minute Step Test (2MST). The assessment of anthropometric and morphological variables was measured through an electrical bioimpedance scale (TANITA - BC 545). Aerobic endurance was evaluated from a 2MST [1].

RESULTS In the control group only the percentage of body fat changed significantly, and increased over time. In the experimental group we found a positive relationship between PAP and the majority of morphological variables. The percentage of variation changed in: body fat ($-4.3\% \pm 7.6$, $p=0.014$), bone mass ($2.4\% \pm 3.1$, $p=0.004$) and 2MST ($33.6\% \pm 63.1$, $p=0.023$). In the remaining variables there were no significant modifications.

DISCUSSION & CONCLUSION The significant modification in 2MST after the activity period means that the aerobic performance can be improved in elderly, and attenuates the negative effects of age. Moreover, the benefits of PAP can be seen by positive alterations registered in lean body mass and in the percentage of body fat.

KEYWORDS Elderly, aerobic performance, physical activity

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Effects of winning / losing on competitive stress physiological markers in elite sports-women

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OBJECTIVE In humans, hormonal responses to winning/losing and their relationships to mood and status change have mostly been examined in professional athletic competitions, we investigated the effects of winning and losing on saliva composition.

METHODS The subjects were 10 healthy female university students who were members of a handbal club. Profiles of mood states (POMS) and Salivary samples were obtained before (Pre), during of competition (Competition), and after competition (Post). Salivary cortisol, dehydroepiandrosterone (DHEA), and total protein levels in the samples were determined by ELISA and EIA, respectively. After finishing each game, the competitiveness of the game was evaluated using questionnaires.

RESULTS In the samples taken after playing handbal, there was an increase in the levels of salivary cortisol, regardless of whether the subject won or lost, and the tendency was more pronounced in competitive games.

DISCUSSION & CONCLUSION Our results suggest that stress response is intimately linked with competition and could be used to determine which players are more capable of handling stress in a competitive environment and the athlete's anxiety level relative to winning or losing.

KEYWORDS Winning/losing, Cortisol, Mood

Maternal voluntary exercise in during pregnancy modulate of pain responses in Rat Offspring

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OBJECTIVE In this study the effects of maternal voluntary running (WVR) and forced swimming (FS) during pregnancy on pain responses in offspring has been evaluated.

METHODS The pregnant female Wistar rats ($n=30$, 10 for each group) were randomly assigned into three groups: the sedentary control group, WVE group and the FS group. Each of the WVR rat was given access to a running wheel which was freely rotated against a resistance of 100g, for during pregnancy. Also the swimming pool was filled with water at 32°C and the rats in the swimming group were forced to swim for 10 min once a day for 5 days. After delivery of mothers and pups reach to 2 month age, Hot Plate and Tail Flick tests were used to study the pain responses by measure of classic criteria.

RESULTS Results indicated that WVR of mother during pregnancy and FS during pregnancy modulate pain responses in off spring ($p<0.05$).

DISCUSSION & CONCLUSION Finding above showed that WVR and FS during pregnancy have modulated and decreased of pain reaction in offspring that for clear of mechanisms need to further researches.

KEYWORDS Voluntary exercise, Pain, Swimming, Pregnancy, Rat