Neural and Performance Adaptations to Plyometric Training versus Combined Plyometric and Sprint Training in Young Soccer Players

Aboozar Kavehei [1*] - Reza Gharakhanlou[2] – Hamid Rajabi[3]

1. PHD student of exercise physiology, faculty of human sciences, Department of Physical Education(exercise physiology) of Tarbiat Modares University, Tehran, Iran, 2. association professor, Faculty of human sciences, Department of Physical Education (exercise physiology)of Tarbiat Modares University, Tehran, Iran, 3. association professor, faculty of Physical Education (exercise physiology) of University of Kharazmi, Tehran, Iran

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Abstract

The purpose of this study was the comparison of neural and performance adaptations to plyometric training versus combined training. 22 available young soccer players (age 14.28±0.82 years, weight 41.18±7.5 kg, height 154.5±9.36, body fat 7.43±2.68%) were randomly assigned to plyometric group (plyometric and soccer skills training, PL) (n=8), combined group (combined plyometric and sprint and soccer skills training, COM) (n=7) and control (soccer skills training) group (n=7) that performed 6 weeks of training (16 seasons). To assess neural adaptations surface EMG was done on vastuslateralis and vastusmedialis muscles in the static mode, pre and post training program. Hoffmann reflex was also evaluated in soleus muscle at rest. At baseline and after training, performances of players were assessed with the tests: 5-meter sprint, 10-meter sprint, 20-meter sprint, agility test, counter movement jump [CMJ], and Bosco (5 seconds). Paired test and one- way ANOVA was used to identify any significant differences and $P \leq 0.05$ was accepted. Both plyometric and combined groups were associated with significant decreases in 5-meter sprint (-5.97, -3.87%), 10-meter sprint (-4.05, -2.33%), 20-meter sprint (-2.64, -1.64%), agility (-8.99, -7.5%) and significant increases in jump height for CMJ (12.95, 7.3%) and Bosco (14.08, 13.44%). Control group showed only a significant decrease in agility (-4.72%). PL and COM groups showed significant increase in SEMG of vastuslateralis and medialis muscles (36.54, 15.06%), respectively. In three groups H-reflex did not show significant variation. However, magnitude of changes in PL and COM groups was not significant ($P \geq 0.05$). Therefore, according to these results it seems that effects of plyometric and sprint training is similar and PL and COM training induced similar performance adaptations, which have possibly a neural origin and may be attributable to increased motor unit recruitment and/or faster firing rates, but motor reflex does not seem to play any role in these adaptations.

Keywords:

Soccer, Plyometric, Explosive actions, Surface electromyography, Hoffmann reflex.

* Corresponding Author : Tel : 09123279536, Email : ghara_re@modares.ac.ir

Physical Fitness, Anthropometric and Body Composition Profile of Adolescent Players of Iran National Volleyball Team

Alireza Salimi Avansar[1] - Mostafa Baranchi[2*]- Samane Koneshlou[3]

1. Assistant Professor of Exercise Physiology, Faculty of Physical Education and Sport Sciences, Shahid Beheshti University, Tehran, Iran 2. M.Sc. in Exercise Physiology, Faculty of Humanities, Tarbiat Modares University, Tehran, Iran 3. PhD Student of Exercise Physiology, Faculty of Physical Education and Sport Sciences, Shahid Beheshti University, Tehran, Iran

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Abstract

The aim of this study was to describe and examine the relationships in physical fitness, anthropometric and body composition profile male adolescent players of Iran national volleyball team. The sample of this study consisted of 40 players (Age: 17.9±0.3) present in the preparation camp of national adolescent volleyball team. Body composition factors (weight, BMI, WHR, body fat percentage, muscle mass) and anthropometric indexes (girths: waist, hip, abdomen, forearm, arm, thigh, calf; breadths: wrist, humerus, femur and lengths: stature, standing reach height, arm span, midstylion-dactylion, radiale-stylion, tibiale mediale, sphyrion tibiale) were measured. Also, physiological and physical fitness variables: heart rate, blood pressure, basal metabolic rate (BMR), long jump, bar fix, sit up, 20-m sprint, 4×9 m agility, spike jump, block jump, anaerobic power (15 s Ergo Jump test), aerobic capacity (2400 m run), explosive power (vertical jump), flexibility (sit and reach test) were measured. Descriptive statistics were used to describe the subjects' profile and Pearson correlation coefficient was used to study the relationships of variables. The results showed significant relationships among some variables. Block jump and spike jump were negatively and significantly correlated with stature and standing reach height ($P>0.05$) and positively and significantly correlated with long jump and flexibility ($P<0.05$). Also, mean height and spike and block heights were lower than the mean of top adolescent players in the world. The data presented in this paper can be a proper model for coaches for talent identification, for selecting competent players, for determining strengths, weaknesses and the position of Iran national team comparing to international levels and for optimally planning particularly in training designs.

Keywords:

Adolescents, Anthropometry, Body Composition, Physical Fitness, Talent Identification, Volleyball.

* Corresponding Author : Tel : 09185403074, Email : m.baranchi@modares.ac.ir

The Effect of Two Types of Physical Activity on Serum VEGF-A Response in Non-Athletic Men

Ali Asghar Ravasi[1] - Mehdi Yadegari[2*] - Siroos Choobineh[3]

1. Professor, Department of Sport Physiology, University of Tehran 2. PhD Student, Department of Sport Physiology, University of Mazandaran 3. Assistant Professor, Department of Sport Physiology, University of Tehran

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Abstract

One of the important adaptations that occur with exercise is an increase in the capillary density or angiogenesis. Vascular endothelial growth factor (VEGF) has a mitogen role for endothelial cells and is considered as an important intermediary in angiogenesis process. The aim of this study was to compare the effect of two types of physical activity on the response of serum VEGF-A in non-athletic men. For this purpose, 11 male non-athletes (mean age 23.80 yr) were voluntarily selected and performed a session of progressive aerobic exercise and high intensity interval exercise. Blood samples were gathered before, immediately after and two hours after the exercises. Analysis of variance with repeated measures was used to investigate VEGF changes within a group and paired t test was used to compare the data derived from two types of exercises. The results showed that one session of progressively aerobic exercise increased serum VEGF-A immediately after the performance (%31.44). Also, two hours after this performance, serum VEGF-A level continued to rise and increased %59.90 compared to the rest level. Immediately after the high intensity interval exercise, the level of serum VEGF-A decreased (%10.74), but two hours after the performance, it increased %13.20 compared with the rest level. Comparative investigation between the two types of progressive aerobic exercise and high intensity interval exercise showed no significant difference between these two types of exercise in influencing the levels of serum VEGF-A of non-athletic men before (P=0.257), immediately (P=0.620) and two hours after the performance (P=0.704). Based on the findings of this study, one session of progressive aerobic exercise and one session of high intensity interval exercise can affect the levels of angiogenesis factor of serum VEGF-A in non-athletic men to the same extent.

Keywords:

Angiogenesis, High Intensity Interval Exercise, Progressive Aerobic Exercise, Vascular Endothelial Growth Factor.

* Corresponding Author : Tel : 09387677501, Email : mehdi.sport313@yahoo.com

The Effect of L-Carnitine and Aerobic Exercise on Aerobic Power and Blood Lactate in Young Males

Majid Kashef[1] - Alireza Ramezani[2] - Mahmoud Mohammadi[3*]

1. Associate Professor, Department of Exercise Physiology, Shahid Rajaee Teacher Training University 2. Assistant Professor, Department of Exercise Physiology, Shahid Rajaee Teacher Training University 3. MSc, Department of Exercise Physiology, Shahid Rajaee Teacher Training University

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Abstract

This study was carried out to determine the effect of the consumption of Lcarnitine and selected exercises on aerobic power and blood lactate in young men. In this study, 30 non-athlete students of Shahid Rajaee University (mean age 22.63±1.75 yr, height: 176.47+6 cm, weight 72.33±10 kg and BMI: 23.17±2.6 kg/m^2) participated in this study. Subjects were randomly divided into three groups: exercise, supplement and supplement + exercise. Exercises were performed with intervals for 4 weeks, 3 sessions (each session 60 minutes) per week with 65-80% MHR. Before the exercises and supplement consumption and after four weeks, the aerobic power was measured by Bruce test and blood lactate was measured by lactometer. Data were analyzed by descriptive statistics, Kolmogorov Smirnov test, Levin test, dependent t test and one-way ANOVA. The results showed that L-carnitine improved the aerobic power, increased exhaustion time ($P<0.01$) and decreased rest blood lactate ($P<0.01$) while it did not have a significant effect on the maximal blood lactate. Also, there was no significant difference in the effects of exercises, supplement and exercises + supplement on the aerobic power, rest blood lactate and maximal blood lactate. Therefore, to improve sport performance and to increase aerobic power, L-carnitine supplement with the exercise can be used.

Keywords:

Aerobic Power, Blood Lactate, L-Carnitine, Young Males.

* Corresponding Author : Tel : 09122424787, Email : mmohammadi767@yahoo.com

The Effect of 6 Weeks of Resistance Training on Cardiac Morphological Factors in Untrained Females

Fatemeh Shabkhiz[1] - Nima Gharah Daghi [2*] - Yaghoub Mehri Alvar[3] - Farahnaz Amir Shaghaghi[4] - Zeinab Inanlou[5] - Niloofar Saffarian[6]

1. Assistant Professor, Department of Exercise Physiology, University of Tehran 2. PhD Student, Department of Exercise Physiology, University of Tehran 3. PhD Student, Department of Exercise Physiology, Shahid Rajaee Teacher Training University 4. PhD Student, Department of Exercise Physiology, Shahid Beheshti University 5. B.Sc., Department of Exercise Physiology, University of Tehran 6. PhD, ECG Department, Shanzdahe Azar Hospital

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Abstract

The aim of this study was to investigate the effect of 6 weeks of resistance training on cardiac morphological indicators in untrained women. For this purpose, 20 sedentary females (mean age 22.6±1.8yr, height 162.3±6.5cm, weight 58±5.1 kg, BF% 18.3±5.2% and surface of body 1.62±0.15m^2) were selected to participate in the study. They were randomly assigned to experimental (n=10) and control (n=10) groups. The anthropometric, body composition and echocardiogram tests were carried out before the protocol. Then, the subjects performed 6 weeks of resistance training. Resistance training protocol consisted of 6 performances with weight training in 3 sets with 10 repetitions, at 60-70% of one repetition maximum (1RM). The results showed that after the training protocol, the ventricular wall thickness increased by 10% and left ventricular end-systolic measure dropped down by 10% compared with the control group ($P \leq 0.05$). But other factors including posterior wall thickness, end diastolic dimension, left ventricular mass, left atrium volume, total heart volume, left ventricular end systolic volume, left ventricular end diastolic volume and aortic stenosis did not change significantly. The results showed that 6 weeks of resistance weight training can improve the performance and cardiac health in sedentary females as this training significantly affected some variables under study.

Keywords:

Echocardiogram Factors, Resistance Training, Untrained Females.

* Corresponding Author : Tel : 09193665330, Email : N_gharahdaghi@ut.ac.ir

Listening to Music Decreased Cardiorespiratory Efficiency during Fast Recovery after Exhaustion

Ali Akbarnezhad1 - Hamed Barzegar*[2] - Rahman Soori[3]- Elham Vosadi[4]

1. Assistant Professor, Department of Exercise Physiology, University of Tehran, Tehran, Iran 2,4. PhD Student, Department of Exercise Physiology, University of Tehran, Tehran, Iran 3. Associate Professor, Department of Exercise Physiology, University of Tehran, Tehran, Iran

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Abstract

The aim of this study was to investigate the effects of different music rhythms (fast rhythm and slow rhythm) on some cardiorespiratory responses of healthy young males during primary minutes of recovery after an exhaustive exercise session. In this semi-experimental study, 17 healthy young males (mean age: 19.76±0.97yr, height: 176±6.72cm, weight: 68.5±5.95kg) voluntarily participated in this study. The subjects performed Bruce protocol until exhaustion in three consecutive sessions with 72 hours of interval between stages of test. Immediately after the exhaustion in each session, the subjects received recovery while listening to the slow rhythm music, fast rhythm music or no music with counter balanced format. The variables (heart rate, cardiac output, stroke volume, minute ventilation, tidal volume, respiratory rate, oxygen consumption and blood pressure) were measured in the 30, 60, 90 and 120 minutes of recovery period. The results showed that listening to music in the first minutes of recovery significantly decreased cardiac output, stroke volume, blood pressure, minute ventilation, tidal volume, oxygen consumption ($P<0.05$) and significantly increased respiratory rate and heart rate ($P<0.05$). The present study showed that listening to music during the recovery immediately after vigorous exercise decreased cardiorespiratory efficiency through decreasing stroke volume and tidal volume and increasing respiratory rate and heart rate.

Keywords:

Cardiorespiratory System, Different Music Rhythms, Exhaustion, Recovery.

* Corresponding Author : Tel : 09195322571, Email : H.Barzegar@ut.ac.ir

The Effect of Regular Endurance Exercises and Galbanum Supplement on Vascular Function during Chronic Hypertension in Male Wistar Rats

Zohreh Jalali[1*] - Valiollah Dabidi Roshan[2]

1.M.Sc. in Exercise Physiology, Physical Education Faculty, Mazandaran University, Babolsar, Iran 2. Associate Professor in Exercise Physiology, Physical Education Faculty, Mazandaran University, Babolsar, Iran

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Abstract

Chronic inflammation is an integral part of cardiovascular diseases and hypertension is found to be associated with endothelial dysfunction. The aim of this study was to evaluate the effect of endurance training and galbanum supplement on parameters related to vascular function including endothelial selectin (E-selectin) and angiotensin converting enzyme inhibitor (ACE-I) as inflammatory and vasoconstriction factors and nitric oxide (NO) as a vasodilation factor during chronic hypertension induced by Nitro-L-arginine methyl ester (L-NAME) in male Wistar rats. 48 male Wistar rats were randomly divided into six groups: 1. basic, 2. sham, 3. L-NAME, 4. endurance training, 5. galbanum and 6. training + galbanum. Groups 3 to 6 received 10 mg/kg L-NAME solutions under peritoneal space five times a week for eight weeks. Also, rats in the sham group received saline under the same condition. Groups 4 and 6 were performed the endurance running protocol on a treadmill with the speed of 15 to 20 meters per minutes for 25 to 64 minutes, 5 times a week for 8 weeks. Groups 5 and 6 received 90 mg/kg galbanum solution using gavage 5 times a week for 8 weeks. Infusion of L-NAME led to hypertension which was detected by a significant decrease in ACE-I ($P<0.00$). Furthermore, hypertension was associated with increased E-selectin and decreased NO. The training protocol significantly reduced E-selectin ($P<0.00$) and significantly increased NO ($P<0.04$) in group 4 and consumption of galbanum significantly decreased E-selectin ($P<0.00$) in group 5 and the combination of training and galbanum significantly decreased E-selecting ($P<0.00$) and significantly increased NO ($P<0.03$) in group 6 compared to L-NAME group at $P\leq0.05$. Chronic hypertension is associated with endothelial dysfunction and nonpharmacological strategies such as endurance training and galbanum antioxidant supplement probably control hypertension through the improvement of vascular endothelial function.

Keywords:

Antioxidant, Endurance Exercise, Hypertension, Nitric Oxide, Vascular Function.

* Corresponding Author : Tel :09124734959, Email : zohreh_asal_mehraboon@yahoo.com

The Comparison of the Effect of One Session of Exhaustive Swimming and Running on Appetite and Calorie Intake in Healthy Girls

Zohre Davarzani[1*] - Mohammad Reza Hamedinia[2] - Seyyed Ali Reza Hosseini[3] Kakhk - Mitra Khademosharie[4]

1. M.Sc. in Exercise Physiology, Physical Education Faculty, Hakim Sabzevari University, Sabzevar, Iran2. Associate Professor of Exercise Physiology, Physical Education Faculty, Hakim Sabzevari University, Sabzevar, Iran 3. Assistant Professor of Exercise Physiology, Physical Education Faculty, Hakim Sabzevari University, Sabzevar, Iran 4. PhD Student of Exercise Physiology, Physical Education Faculty, Kermanshah Razi University, Kermanshah, Iran

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Abstract

The aim of the present study was to examine the effect of one session of exhaustive swimming and running exercise on the appetite and calorie intake in healthy girls. The research design was cross-sectional and 12 female university students (mean age 22.5±1.3 yr, weight 56.07±5.46 kg, body fat percent 27.125±8.316 and BMI 21.175±2.68 kg/m²) voluntarily participated in three modes of control, swimming and running exercise with 80-85% intensity of maximum heart rate up to exhaustion. The subjects' appetite rate was measured two hours before the exercise (fasting), immediately after the exercise, two and eight hours after the exercise through appetite questionnaire. Also, the calorie intake was recorded during, before and after the research protocol. Data were analyzed using ANOVA with repeated measures and one-way ANOVA. The test significance level was taken as $P \leq 0.05$. The results showed no significant change in the appetite and calorie intake in one session of swimming and running exercise ($P=0.05$). It can be concluded that one session of swimming and running had no effect on the appetite and calorie intake. In conclusion, in contrast to what some people believe, one session of exercise does not increase appetite until eight hours and can be used to control and reduce weight. In other words, exercise can balance the calorie intake negatively. This negative balance may not recover in a short-term period and there is no difference between swimming and running in this regard.

Keywords:

Appetite, Calorie Intake, Running, Swimming.

* Corresponding Author : Tel :09128989604, Email : davar_z2005@yahoo.com