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BOOK OF ABSTRACTS

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3% and 5% reducing cuff in low intensity of blood flow restriction (LI-BFR) exercise on growth hormone (GH) and insulin-like growth factor-1 (IGF-1) levels in middle-aged women. Methods Subjects were randomly assigned to 5 groups: a control group (CG; n = 8), a low intensity resistance exercise group (LI; n = 9), a high intensity resistance exercise group (HI; n = 9), a low intensity resistance exercise with 5% reduction in cuff circumference for blood flow restriction group (LI-5%BFR; n = 7), and a low intensity resistance exercise with 3% reduction in cuff circumference for blood flow restriction group (LI-3%BFR; n = 11). Subjects in all training groups completed pre- and post- training assessment of all variables, including GH and IGF-1 levels. Results A significant interaction effect (p < 0.05) was observed for WHR. WHR was reduced in the HI group compared to the LI group. GH showed a significant interaction effect (p < 0.05). Elevated GH was observed in the HI group and the LI-5%BFR group compared to the CG group (p < 0.05). In addition, elevated GH was observed in the HI group compared to the LI group (p < 0.05). Elevated IGF-1 was observed in the HI, LI-5%BFR, and LI-3%BFR groups compared to the CG group (p < 0.05). Moreover, increased IGF-1 was observed in the HI, LI-5%BFR, and LI-3%BFR groups compared to the LI group (p < 0.05). For muscle strength, a significant interaction effect (p < 0.05) was observed for biceps curls, triceps extensions, leg curls, and leg extensions; muscle strength showed improvement in the HI and LI-5%BFR groups compared to the CG group (p < 0.05). Further, biceps curls, triceps extensions, leg curls, and leg extensions were increased in the HI and LI-5%BFR groups compared to the LI group (p < 0.05). Discussion We demonstrated that use of portable cuffs reducing arm and thigh circumference by 5% was effective in improvement of GH, IGF-1, and muscle strength in middle-aged women. In particular, performance of low-intensity exercise with a 5% reduction of circumference with blood flow restriction resulted in similar increases in GH and IGF-1 levels compared to traditional high-intensity resistance exercise. We also demonstrated that using LI-5%BFR resulted in similar improvement in muscle strength compared to traditional high-intensity resistance exercise.

A TEST-DERIVED EQUATION TO ESTIMATE OXYGEN UPTAKE DURING INTERVAL TRAINING SESSIONS USING HEART RATE

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Introduction. Heart Rate (HR) monitoring represents a noninvasive tool to evaluate fitness (Strath et al. 2000) since, during incremental effort below the anaerobic threshold (AT), there is a direct relationship between HR and oxygen uptake (VO2). Thus, HR can be used to assess energy expenditure. The purpose of this study was to examine in middle distance runners the relationship between HR and VO2 in (1) an incremental running test and (2) in an interval training (IT) session with the aim to test the validity of estimating VO2 from HR data during IT. Methods. Thirteen athletes performed an incremental test until exhaustion, and an IT session on a treadmill set at two different intensities: at 80% AT and at 120% AT speed. HR and VO2 were continuously measured during the two tests (VO2real) by a portable gas analyzer. An incremental test-derived equation was used on the IT test to estimate VO2 from HR data (VO2est). Bland and Altman statistics were carried out in order to evaluate the agreement between VO2real and VO2est. Results. The mean correlation between HR and VO2 was r = 0.92 ± 0.05. The Bland and Altman plot highlighted that limits of agreement of the difference between VO2real and VO2est were widespread. The limit of agreement at 80% of AT were +1384.33 and -1641.95 mL•min⁻¹, while at 120% of AT were +1252.54 and -2411.95 mL•min⁻¹. Conclusion. This study demonstrates that the use of HR monitoring to assess intensity of exercise during interval training session is unreliable. Indeed, it is known that HR response is affected by several potentially perturbing factors, such as cardiac drift, heat stress and dehydration, as well as CO2 production (Crisafiulli et al. 2006). This fact should be taken into account to correctly estimate energy expenditure by HR during training. References. Crisafiulli A, Pitulla G, Lorrai L, Carascia AM, Cominu M, Tocco F, Melis F, Concu A. (2006). Int J of Sports Med 27, 55 – 59. Strath SJ, Swartz AM, Bassett DR, JR, O’Brien WL, King GA, and Ainsworth BE. (2000) Med. Sci. Sports Exerc. 32 (9), S465-5470.

KINEMATIC AND HEART RATE DEMANDS IN 4X4 VS 7X7 SMALL SIDED GAMES IN PROFESSIONAL SOCCER PLAYERS

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Introduction The small sided games (SSG) are one of the most common drills used by coaches for soccer training. In the past, SSG were mainly used for developing technical and tactical abilities. In recent years, there is a growing interest to investigate the effects of the SSG to improve the physical condition of the football player [1-5]. Therefore, the aim of this study was to compare the physiological load, indicated by the response of heart rate (HR) and kinematic variables during exercise SSG 4x4 and 7x7 in professional football players from the Spanish La Liga. Material and methods During the season 2011/2012, twenty professional players performed two types of SSG, 4x4 and 7x7, both on the same dimensions (40x25 m.). The response of kinematic variables and HR measured with global positioning system was analyzed using T test for two related samples. Results Players performed higher distances in the 4x4 vs 7x7 (p <0.01 ) but decreases the motivation of the players, and allows technical and tactical work simultaneously [6]. Previous studies have shown that this type of training exercise below the anaerobic threshold (AT), there is a direct relationship between HR and oxygen uptake (VO2). Thus, HR can be used to assess energy expenditure. The purpose of this study was to examine in middle distance runners the relationship between HR and VO2 in (1) an incremental running test and (2) in an interval training (IT) session with the aim to test the validity of estimating VO2 from HR data during IT. Methods. Thirteen athletes performed an incremental test until exhaustion, and an IT session on a treadmill set at two different intensities: at 80% AT and at 120% AT speed. HR and VO2 were continuously measured during the two tests (VO2real) by a portable gas analyzer. An incremental test-derived equation was used on the IT test to estimate VO2 from HR data (VO2est). Bland and Altman statistics were carried out in order to evaluate the agreement between VO2real and VO2est. Results. The mean correlation between HR and VO2 was r = 0.92 ± 0.05. The Bland and Altman plot highlighted that limits of agreement of the difference between VO2real and VO2est were widespread. The limit of agreement at 80% of AT were +1384.33 and -1641.95 mL•min⁻¹, while at 120% of AT were +1252.54 and -2411.95 mL•min⁻¹. Conclusion. This study demonstrates that the use of HR monitoring to assess intensity of exercise during interval training session is unreliable. Indeed, it is known that HR response is affected by several potentially perturbing factors, such as cardiac drift, heat stress and dehydration, as well as CO2 production (Crisafiulli et al. 2006). This fact should be taken into account to correctly estimate energy expenditure by HR during training. References. Crisafiulli A, Pitulla G, Lorrai L, Carascia AM, Cominu M, Tocco F, Melis F, Concu A. (2006). Int J of Sports Med 27, 55 – 59. Strath SJ, Swartz AM, Bassett DR, JR, O’Brien WL, King GA, and Ainsworth BE. (2000) Med. Sci. Sports Exerc. 32 (9), S465-5470.

Thursday, June 27th, 2013 15:00 - 16:00