



EFFECT OF HIGH INTENSITY INTERVAL TRAINING IN A HOT ENVIRONMENT ON AEROBIC AND ANAEROBIC PERFORMANCE IN MALE WRESTLERS

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Introduction Coaches and sport science experts are trying to find ways to improve athletic performance and increase the efficiency of training in a short timeframe. This is especially important when the time for exercise is limited. Therefore, high-intensity interval training (HIT) has been studied by researchers. HIT not only increases aerobic performance as in traditional continuous training, but athletes also greatly improve their anaerobic performance (Barnett et al., 2004; Burgomaster, Hughes, Heigenhauser, Bradwell, & Gibala, 2005). Therefore HIT can be more efficient in achieving maximum preparedness in a short period of time compared to traditional continuous training (Gibala et al., 2006). On the other hand, exercise generates heat naturally from muscle contractions and causes increases in core body temperature and rating of perceived exertion (Febbraio et al., 1994). Also, stressful environments, especially warm environments when compared to the natural, physiological and functional responses poses multiple negative influences to physical activity (Sawka, Young, Cadarette, Levine, & Pandolf, 1985; Tucker, Rauch, Harley, & Noakes, 2004). Since the competitive athletes have to compete in a variety of conditions including hot environments, one of the main concerns of many experts is to reduce the probable negative effects of a hot environment on the performance of athletes (Astorino et al., 2013). For this reason, most researchers have applied heat acclimation as a possible solution (Chen, Tsai, Lin, Lee, & Liang, 2013; Lorenzo, Halliwill, Sawka, & Minson, 2010; Lorenzo & Minson, 2010). This type of adaptation starts immediately after the first practice session in the hot environment and is quickly achieved after 10-12 days of consecutive practice (Weledji, Assob, Verla, & Meli, 2013). For training sessions to achieve this adaptation, there must be at least 30-100 minutes per day in combination with aerobic exercise, insofar as the environment able to import adequate pressure for adaptation (Sawka, Leon, Montain, & Sonna, 2011; Weledji et al., 2013). Studies have shown that those individuals who have the ability to do physical work in a hot environment, but will also have a higher performance in natural environments than those not compatible with this type of heat adaptation (Lorenzo et al., 2010; Sawka et al., 1985). For this reason, can the heat acclimation be used as a natural supplement for more adaptation (Lorenzo et al., 2010; Sawka et al., 1985)? According to our findings, since all studies were done with HIT in the natural environment and none of them used of heat as supplementary in their research, the present study will examine the effect of high-intensity interval training in a hot environment as a supplement to improve the efficiency of this type of training on aerobic and anaerobic performance in male wrestlers.

METHODOLOGY

The population of this study was formed from wrestlers who were invited to the national team camp and participated in the premier league. Initially, 33 volunteers completed the questionnaire and medical assessment. Their performance was assessed by using a maximum incremental test on a treadmill (Lode treadmill Valiant, Netherlands) in order to determine VO2max (ZAN-600, German). After results were determined in a pretest, 24 subjects were selected according to age, height, weight and fitness level divided suitably into 3 matched groups. Table 1- Profile of the participants (M±SD)

Table with 7 columns: Group, Total, Height (Cm), Age (Years), Weight (Kg), Fat (Percent), vVO2max (Km/h). Rows include Warm group, Natural group, and Control group.

The participants were asked not to do any activity other than their usual activities and not to consume food supplements or medication during the study period. Before and after training, all subjects performed maximal incremental test and Tmax (time to exhaustion test with the v VO2max intensity) tests on a treadmill to evaluate the aerobic performance and a Wingate test to assess anaerobic performance. These three were run within an interval of 48 hours. It should be noted that all the pre-test and post-test measurements were performed in the natural environment (temperature 23±1 degree and humidity 35±5 percent). The subjects of natural group (NE) performed all of their training in the natural environment and subjects of warm group (HE) performed all their training in the heat simulation laboratory. NE and HE subjects before the start of heating season were trained 12 sessions for two consecutive weeks. In the first week each session included 5 set of 150 seconds running on treadmill with %90 of VO2max with 150 seconds active recovery between each set with 50 percent of VO2max. Then subjects to finished in the second week with an increase in intensity by 5 percent of the overload, including 5 sets of 150 seconds running with 95% of VO2max with 150 seconds active recovery between each set with 50 percent of VO2max. The control group did not perform any activity during the study, in fact difference in activity control group with the two groups was only training for HE and NE considered. Normal distribution of data and homogeneity of variance was confirmed by Kolmogorov-Smirnov and Levin test. The statistical analysis used T-test for changes within groups and for differences between-groups, a one-way ANOVA (p < 0/05). An HSD post hoc test was used to detect differences in each of means.

RESULTS Table 2- Indicators performance aerobic and anaerobic before and after training (M±SD)

Table with 6 columns: Variable, Group, Pretest, Posttest, p, %Δ. Rows include VO2 max, vVO2 Max, T MAX, Peak power anaerobic, and Mean power anaerobic.

T- Index significant difference compared to the control and natural group (p<0.05); NS-not significant; \* -Index significant difference between pre-test and post-test within the group (p<0.05). † -Index significant difference compared to the control group (p<0.05).

CONCLUSION In generally, according to data of Table2 the most important finding of this study was two weeks high-intensity interval training in a heat environment than natural environment, significantly increase all indices of aerobic performance and some indices anaerobic performance. So it seems that the mechanism of heat acclimation can more prominent with impact high intensity interval training in a heat environment then the natural environment and heat to be used as a supplement training.

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