EFFECT OF HANDBALL SPECIFIC REPEATED – SPRINT TRAINING ON AEROBIC CAPACITY OF MALE HANDBALL PLAYERS

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Abstract: The purpose of this study is to assess the effect of handball specific repeated – sprint training on aerobic capacity of male handball players. To achieve the purpose of the study thirty male handball players were selected randomly from Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu. The selected subjects were assigned into 2 groups: handball specific repeated - sprint training group (n=15) and control group (n=15). The selected subjects mean age: 23.15±3.00 years; weight: 68.74±7.25 kg and height: 176.37±7.67 cm. The criterion variable selected in this study was aerobic capacity which was measured by multistage fitness test. The handball specific repeated - sprint training group underwent eight weeks of training. Pre and post aerobic capacity was measured on the indoor. The data was analysed using Analysis of co-variance (ANCOVA). The result of the study showed post test (F = 20.13) and adjusted post test mean (F = 10.68) showed significant ($p < 0.05$) difference among repeated – sprint training group and control group on aerobic capacity. It is concluded that handball specific repeated sprint training for eight weeks is more effective in increasing aerobic capacity of men handball players. The training load adopted in repeated – sprint training which resulted in 11.79% of changes in aerobic capacity.

Keywords: *Repeated, Sprint, Handball, Aerobic capacity*

Introduction

Handball is a modern ball game which belongs to the family of team sports. It combines the best features of different branches of sport, that is, the advantages of physical abilities, technical skills and tactical knowledge. It is a strenuous body contact Olympic team sport that places emphasis on running, jumping, sprinting, throwing, hitting, blocking, and pushing. It"s a team sports which require a high standard of preparation in order to complete sixteen minutes of competitive play and to achieve success. In this game movement patterns are characterized as intermittent and change continuously in response to different offensive and defensive situations in which anthropometric characteristics and high levels of strength, muscle power, aerobic capacity and handball throwing velocity are the most important factors that give a clear advantage for successful participation in elite levels of handball leagues [1].

Training is any organized and regular activity done for increasing the performance of athletes and are divided into different kinds considering the performance requirements of athletes. Repeated-sprint ability (RSA)-based training is characterized by performing repeated sprints with minimal recovery between sprint bouts (i.e., 10–20 maximal sprints or shuttle sprints of ≤ 10 seconds, with brief recovery periods (≤ 60 seconds); work : rest ratio of 1:4 or 1:6) [2]. During such training, there is an increase in the activity of some anaerobic enzymes, which leads to a higher rate of anaerobic energy turnover and increases the number of muscle membrane transport proteins involved in pH regulation and muscle capillarization and in some cases enhances the muscle buffering capacity. Also, the performance of maximal or near- maximal short-term can lead to higher VO_2max values and an increased aerobic enzyme activity [2]. These findings suggest the effectiveness of repeated-sprint for enhancing aerobic capacity. The purpose of this study is to assess the effect of handball specific repeated – sprint training on aerobic capacity of male handball players.

Methods

Subjects and variable

To accomplish the purpose of the study thirty male handball players were selected randomly from Department of Physical Education and Sports Sciences, Annamalai University, Chidambaram, Tamilnadu. The selected subjects were assigned into 2 groups: handball specific repeated - sprint training group (n=15) and control group (n=15). The selected subjects mean age: 23.15±3.00 years; weight: 68.74±7.25 kg and height: 176.37±7.67 cm. The criterion variable selected in this study was aerobic capacity which was measured by multistage fitness test.

Training

Handball specific repeated sprint training program was performed 3 day per week for eight weeks. They perform 3 sets and each set constitutes of 10 repetition totally they perform 30 repetitions. They ran for 30 meter distance while running they perform four passes, one dribble and end with jump shot. They were given 15 seconds of passive recovery between the

repetitions and 150 seconds rest between the set. The players were instructed to perform at high intensity. In this the players passing, dribbling and shooting abilities were incorporated simultaneously along with sprint (Figure 1).

Statistical technique

The experimental design used for the present investigation was Analysis of Covariance (ANCOVA). Since two groups are involved post hoc test was not applied to determine the significant paired mean differences. The level of confidence was fixed at 0.05 to test the significance. The data was analysed in computer system by using statistical package for social science (SPSS) version 17.

Figure 1
Handball specific repeated sprint training

Results

It is clear from the table 1 that there is no significant difference between handball specific repeated sprint training and control group on aerobic capacity before commencement of training, as obtained *F* ratio of 3.79 is less than the required table value of 4.196 at = 0.05 for the df of 1 and 28. It denotes that the random assignment of subjects for the two groups is successful, however initial difference not elicited. Table 2 also reveals that there is a significant difference on aerobic capacity during post test. The obtained *F* ratio of 20.13 is greater than the required table value of 4.196 at = 0.05 for the df of 1 and 28. Thereby it infers that the aerobic capacity found increase significantly before and after eight weeks of handball specific repeated sprint training.

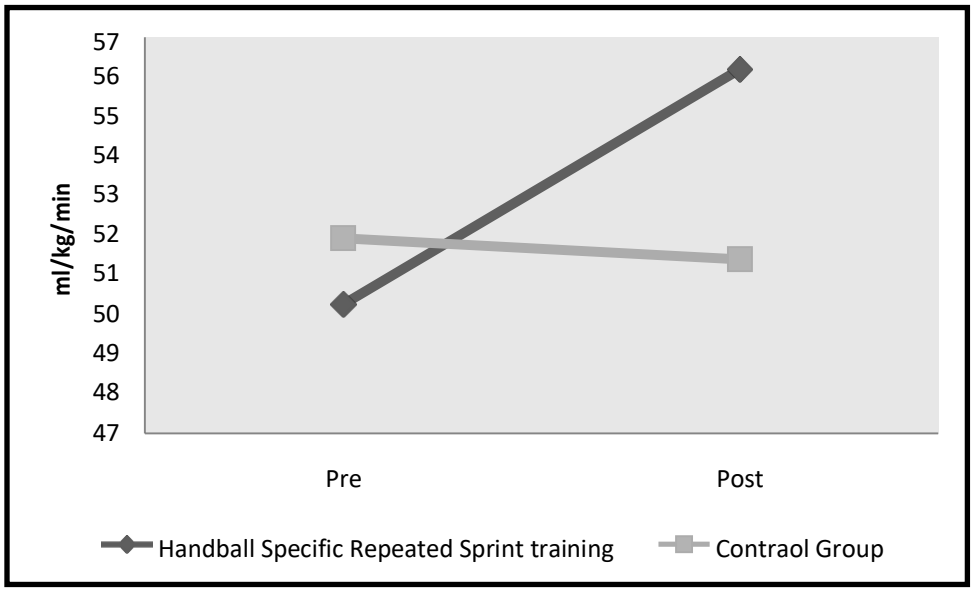
Table 1
Summary of ANCOVA on aerobic capacity

Testing Conditions	SOV	SS	df	MS	*F*
Pre (M ± SD)	Between	73.54	1	73.54	3.79
	Within	53.28	28	19.40	
Post (M ± SD)	Between	72.27	1	72.27	20.13*
	Within	100.7	28	3.59	
Adjusted (M)	Between	22.04	1	22.04	10.68*
	Within	55.72	27	2.063	

*Significant at 0.05 level of confidence

Further, table 1 clearly shows that aerobic capacity between the groups was significant, as obtained *F* ratio of 10.68 is greater than the required table value of 4.210 at = 0.05 for the df of 1 and 27, indicating that after adjusting pre-test scores, there was a significant difference between the two groups on adjusted post test scores on aerobic capacity. The findings of the study shows that higher aerobic capacity was recorded in handball specific repeated sprint training (M = 56.71) when compared to control group (M = 50.88). Thus, it is concluded that eight weeks of handball specific repeated sprint training significantly increased aerobic capacity by 11.79% than control group. The changes in aerobic capacity are presented graphically in figure 2.

Figure 2
Graphical representation of the data on aerobic capacity



Discussion

In the present study handball specific repeated sprint training protocols elicited improvements in aerobic capacity. In this regard, recent studies using sprint training have reported significant increases in both anaerobic and aerobic power [3], which can be related to increases in glycolytic [4] and oxidative enzyme activities [5-7], muscle buffering capacity [8-10], and/or ionic regulation [11]. The improvement in aerobic fitness after the handball specific repeated sprint training protocol is consistent with the findings of previous studies using sprint-based training protocols [12-14]. The present results support the conclusions of Gibala *et al.* (2004) that handball specific repeated sprint training might be a time-efficient training strategy in enhancing aerobic adaptations and maintenance of skill ability in handball players [15]

Conclusion

It is concluded that handball specific repeated sprint training programs might be appropriate to optimize the development of cardiorespiratory fitness in handball players. In terms of practicability, it seems that handball specific repeated sprint training might be a time efficient training strategy in enhancing aerobic adaptations, given the better adaptations (i.e., handball specific endurance and skill).

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