



Percentage of heart rate reserve observed during bouts of small sided handball game

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Abstract

The study was proposed to investigate the changes observed on percentage of heart rate reserve of male handball players during a small sided handball game. Sixteen (16) university represented male handball players from Department of Physical Education and Sports Sciences, Annamalai University, Tamilnadu. The Percentage of heart rate reserve was selected as criterion variables and assessed by following formula: $(HR_{\text{mean}} - HR_{\text{rest}}) / (HR_{\text{peak}} - HR_{\text{rest}})$. The data were collected four minutes bout of small-sided handball game. For every bouts peak and mean heart rate was measured and prior to which resting heart rate was calculated. The data were collected for 4 bouts of 4 minute duration. The 4 minutes of small sided game followed by 4 minutes of recovery. The results show that percentage of heart rate reserve of handball players was not significantly affected during the handball match as $F = 0.253, p > 0.05, \omega^2 = 0.25$. Handball players' percentage of heart rate reserve was affected slightly during four bouts of small sided handball games. It is concluded that present study reveals that small-sided games sufficient enough to stimulate maximal oxygen uptake in university male handball players. The time spent on a high proportion of percentage of heart rate reserve was greater with this small sided game.

Keywords : Handball, heart rate, handball, male players and oxygen consumption

Introduction

Success in handball depends on the physique, fitness, physiological and psychological parameters of handball players which attributes to technical and tactical ability of handball players. Therefore to prepare top quality handball players, coaches administer various types of training methodology to improve their fitness and positive physiological adaptations. It is established that game handball is a combination of intermittent and high intensity exercise, which places great physical demands on the body. The success of a handball player depends on aerobic and anaerobic performance (Hoffman and Maresh, 2000). However, handball requires tremendous endurance, speed, agility, repeated sprint ability and power (Ziv and Lidor, 2009).

The importance of developing good conditioning programs based on the specific physiological demands of each sport is considered a key factor to success (Gillam 1985; Taylor 2003 and 2004). The handball player needs to train multiple components of fitness. Thus, the athlete will concurrently perform various modes of training (e.g., strength, anaerobic, endurance). In the present study handball specific aerobic training was employed. This incorporates skills and movements specific to the sport, at intensities sufficient to promote aerobic adaptations, are being increasingly implemented in the professional team sports environment (Lawson, 2001). The perceived benefit of performing sports-specific exercise is that the training will transfer better into the athlete's competitive environment and

that the greatest training benefits occur when the training stimulus simulates the specific movement patterns and physiological demands of the sport (McArdle *et al.*, 2001). The study was proposed to investigate the changes observed on percentage of heart rate reserve of male handball players during a small sided handball game.

Methods

Selection of Subjects

Sixteen (16) university represented male handball players from Department of Physical Education and Sports Sciences, Annamalai University, Tamilnadu. The selected handball player's age were 23.32 ± 4.31 years; height 178.65 ± 5.91 cm and weight 69.72 ± 6.92 kg. However, in the present study goalkeepers were excluded from the study.

Selection of Variables

The Percentage of heart rate reserve was selected as criterion variables and assessed by following formula: $(HR_{\text{mean}} - HR_{\text{rest}}) / (HR_{\text{peak}} - HR_{\text{rest}})$. The data were collected four minutes bout of small-sided handball game. For every bouts peak and mean heart rate was measured and prior to which resting heart rate was calculated. The data were collected for 4 bouts of 4 minute duration. The 4 minutes of small sided game followed by 4 minutes of recovery.

Statistical analysis

The data collected on exercise heart rate was statistically analyzed to examine the changes. The one-way repeated measure ANOVA was applied to examine the difference between testing conditions on handball players. When the F was significant Bonferroni post hoc test was applied which control the Type I error. All the statistical tests were calculated using the statistical package for the social science (SPSS) for windows (Version 16). The level of statistical significance was set at $p < 0.05$.

Results

The results show that percentage of heart rate reserve of handball players' was not significantly affected during the handball match as $F = 0.253$, $p > 0.05$, $\omega^2 = 0.25$. Handball players percentage of heart rate reserve was affected slightly during four bouts of small sided handball games. Since the obtained F value (0.253 , $p = 0.859$) is not significant post hoc test was not applied. This clearly shows that percentage of heart rate reserve of handball players remained unaltered during the handball match. The descriptive values on %HRR were graphically depicted in Figure - 1.

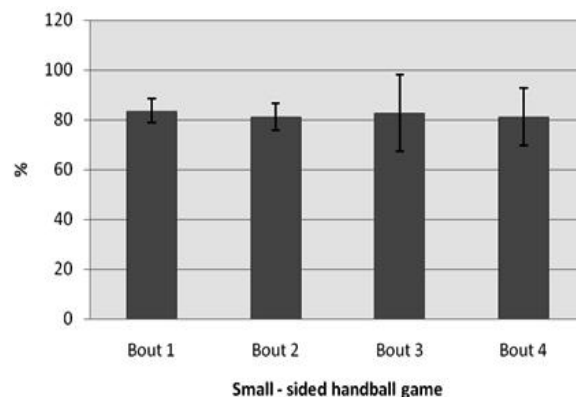


Fig. - 1 Changes in percentage of heart rate reserve of during the small-sided handball game

Discussion

In this study percentage of heart rate reserve values ranged between 81 to 84%. During the four bouts of small sided handball game percentage of heart rate reserve found to decrease as bout progresses. It has shown that intensity of the bout through percentage of heart rate reserve (Della *et al.*, 2008 and Hoff *et al.*, 2002). In the present study allows one to reach the same values of percentage of heart rate reserve than those previously described (Kelly and Drust, 2009). The physiological stress imposed during 4 bouts of small sided game clearly shows the reduction in fourth bout. The time spent at a high portion of the percentage of heart rate

reserve was significantly lower in the fourth bout. This present game was effective in duration and total duration which confirming the data of Katis and Kellis (2009) reported that small sided games induce greater heart rate responses. The present small sided game in handball influenced both aerobic and anaerobic metabolism. The changes in percentage of heart rate reserve may be due to the reduction in movement patterns during the game. The number of sprints and other activity would expect to increase energy consumption (Reilly and Ball, 1984), thereby leading to increased cardiac responses. It clearly shows the reduction of the activity patterns in fourth bout. 4 × 4 small sided handball game effective enough maintaining 80 percentage exercise intensity which may sufficient enough to improve aerobic capacity of male handball players.

It is concluded that present study reveals that small-sided games sufficient enough to stimulate maximal oxygen uptake in university male handball players. The time spent on a high proportion of percentage of heart rate reserve was greater with this small sided game.

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