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Changes Observed on Upper and Lower Extremities Explosive Power of Male Handball Players During a Handball Match

KEYWORDS: handball match, upper extremity, lower extremity, explosive power, handball

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ABSTRACT *The study was proposed to investigate the changes observed on upper and lower extremities explosive power of male handball players during a handball match. We selected twelve (12) university represented male handball players from Department of Physical Education and Sports Sciences, Annamalai University, Tamilnadu. However, in the present study goalkeepers were excluded from the study. The players were tested on upper extremity explosive power by handball throw for distance and lower extremity explosive power by standing broad jump. The data was collected at two points one at the end of first half and the second at the end of second half. The comparison of first and second half on upper extremity explosive power showed a significant difference (t = 2.42, p = 0.034) and lower extremity explosive power (t = 0.178, p = 0.862) showed no significant difference between first and second half during a handball match. It is concluded that comparison of first and second half of a handball match displayed a reduction in upper extremity explosive power but no changes is elicited on lower extremity explosive power of male university handball players.*

Introduction

Handball is a fast body contact Olympic team sport that requires greater amount of fitness among which upper and lower extremity explosive power plays a vital to throw, jump and sprint frequently during a hard fought sixty minutes handball match. To achieve this players are exposed to various types of training modes either individual or combined form during preparatory and competitive phase of training. When the players are exposed to strength training would enhance both upper and lower extremity strength which in turn improves the throwing performance, jumping and sprinting ability (Chelly et al. 2014, Hermassi et al. 2011, Cherif et al. 2012).

The importance of fitness analysis during a game can elicit the weakness and strength of the players based on which the training programme can be administered. Along with this coach has to understand the nature and demand of the game. It has been proved that handball game is of intermittent nature, so high anaerobic fitness produce high level of explosive strength. Simultaneously, players must have high aerobic fitness to enable quick recovery. The game includes numerous repetitive actions like full speed running, changes in speed and direction, jumping, throwing and collisions between players (Marques et al. 2007).

It is noted that one of the key skills necessary for success in team handball is throwing performance (Gorostiaga et al. 2006, Marques and González-Badillo 2006). Although the technique of motion and the fitness level can be improved by the training process, others variables like strength and power can determine throwing ball velocity. It is well known that a successful shot on goal in handball depends on throwing ability and ball velocity (Skoufas et al. 2003; Skoufas et al. 2008).

Jump shots are mostly used shooting technique by handball players during a handball match. To perform this muscles of lower limbs require to produce a large contractile forces in a relatively short period of time which facilitate longer time in air would improve their shooting accuracy. Chittibabu (2014) earlier identified that back court players require greater amount of speed and endurance to have better jump shoot accuracy in women handball players. The coaches face several problems during handball competition among which whether the players perform jumps and sprints similar from start to end of the game. Although this game has running substitution, coaches manage to replace the players who fail to perform at any point of the game. The fatigue is the most common factor that deteriorates the performance of the players and to counter fatigue players were exposed to several training methods which produces adaptation thereby they perform during the competition. The aim of the study was to investigate the changes observed on upper and lower extremity explosive power of male handball players during a handball match.

Methods

Subjects

We selected twelve (12) university represented male handball players from Department of Physical Education and Sports Sciences, Annamalai University, Tamilnadu. The selected handball player's age were 22.12 ± 3.22 years; height 174.50 ± 7.83 cm and weight 65.62 ± 7.79 kg. However, in the present study goalkeepers were excluded from the study and number of players based on position was considered as limitation of the study.

Variables and test

Handball throw for distance

The subjects were directed to stand with a handball in their dominant hand (right). They were permitted to take three steps and execute over hand throw. The distance from the restraining line to where the handball ball landed was recorded. The measurement is recorded to the nearest centimetre (10 cm).

Standing broad jump

Standing broad jump test is an effective way to measure leg explosive power. The players were asked to stand with their both feet at the edge of the long jump sand pit. They were asked to leap forward as far as possible. After landing, the distance from the edge of the sand pit to the first contact point in the sand pit was measured and the

Volume : 4 | Issue : 11 | November 2014 | ISSN - 2249-555X

performance was noted in metres. They were provided with one trial.

Collection of data

The data will be collected during 60minutes handball match. The players will provide data at the end of first half and second half of the match. The regular 10 minutes break was granted excluding 2 minutes of data collection between first and second half of the match. The Graphical representation of data collection was presented in figure 1.

Figure 1

Graphical Presentation of data collection during a handball match

Handball match (30-10-30 minutes)	
First half (30 minutes)	Second half (30 minutes)
Data Collection	
⬆	⬆
30th min	60th min

Statistical technique

All statistical analyses were conducted using SPSS Version 16. All data are expressed as group mean values ± standard deviations (SD) unless otherwise stated. The paired Student t test was applied to know the difference between the first and second half of the match. The level of statistical significance was set at $p \leq 0.05$ using a 2-tailed test design.

Results

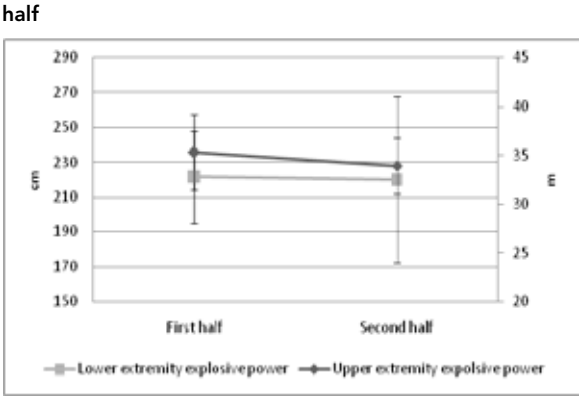
Upper extremity explosive power

The comparison revealed a significant difference between first and second half on upper extremity explosive power ($t = 2.423$ $p = 0.034$). The 95% confidence interval indicated that the handball players mean difference is likely to fall within 3.077 and 0.147. Since, there was a significant difference in upper extremity explosive power between first and second half which can be confirmed as the effect sizes (Cohen's $d = 0.47$) was moderate.

Lower extremity explosive power

The comparison revealed no significant difference between first and second half on leg explosive power ($t = 0.178$ $p = 0.862$). The 95% confidence interval indicated that the handball players mean difference is likely to fall within −21.16 and 17.99. However, there was no significant difference in leg explosive power between first and second half which can be confirmed as the effect sizes (Cohen's $d = 0.12$). The upper and lower extremity explosive power scores are displayed in figure 2.

Figure 2: Mean and standard deviation on upper and lower extremity explosive power at first and second half



Discussion

In the present study which revealed a significant reduction of 4.53% from first to second half of a handball match on upper extremity explosive power. The effectiveness of the throwing skill depends on both ball velocity and accuracy. Therefore, players should maintain

their ability in both parameters throughout the game. However, the effort players exert during the game can potentially reduce the effectiveness in throwing skill over the course of the game, either in velocity or in accuracy (Zapartidis et al. 2007). Regular handball training alone might lead to increases in throwing performance over time. This specific throwing training might lead to even greater increases in combination with traditional resistance training. Resistance training induces improvements in muscle velocity and power during submaximal-load bench press and parallel squat actions. In addition, specific overloading throwing exercises using variably weighted handballs and core stability training routines should be performed. In contrast, the lower extremity explosive power showed no changes between first and second half of a handball match. Krustrup and his colleagues (2010) assessed explosive power during a football match and which showed no changes. In our study lower extremity explosive power was not compromised by handball match, indicating the physiological mechanisms provoking fatigue vary with different forms of exercise. Krustrup et al. (2010) speculated that transient metabolic disturbance toward the end of soccer match-play, rather than impaired neuromuscular performance, may have contributed to a decrease in the performance of intense intermittent exercise without influencing counter movement jump performance. Similarly result is elicited in our study with lower extremity explosive power remained unaltered.

Conclusion

The present study provides an insight into the upper and lower extremity explosive power during a handball match on male handball players. The outcome of this study showed that there was a significant reduction in upper extremity explosive power and lower extremity explosive power remained unaltered between first and second half of a handball match.

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