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Research Paper

Changes Observed on Leg Explosive Power and Sprinting Performance of Male Handball Players During A Handball Match

Education

KEYWORDS : handball match, leg explosive power, sprinting performance, handball players

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ABSTRACT

The study was proposed to investigate the changes observed on leg explosive power and sprinting performance 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 leg explosive power by standing broad jump and sprinting performance by 30 metres run. The data was collected at two points one at the end of first half and the second at the end of second half. The result of the study showed that leg explosive power (t = 0.178, p = 0.862) and sprinting performance (t = 0.625, p = 0.545) 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 no changes in leg explosive power and sprinting performance of male university handball players.

Introduction

Handball is a fast body contact Olympic team sport that requires running, jumping, sprinting, throwing, repeated sprinting, faking, hitting, blocking and pushing. Handball requires a high standard of preparation in order to complete sixty minutes of competitive play and to achieve success. At present the requirements for the players have changed as the game of handball has developed over the years. The amount of training and the number of matches have increased considerably and the recently introduced rule on quick throw-off and the tightening-up of the rule concerning passive playing have led to an increased number of attacks and intensity for players (Ronglan *et al.* 2006). This has contributed to increase the dynamics and physical demands imposed on the players. With this development in mind, there is a need to examine, plan and implement optimal physical training regimes for handball players.

The ability to perform and to produce top performance for prolonged periods plays a key role in competitive handball match. As a consequence, training and testing strategies have been proposed to monitor and enhance players' ability to perform high during the match (Castagna *et al.* 2009). During a handball match players perform frequent sprints and jumps to gain advantage over their opponents. They run for quick attacks like fast breaks and returns back to defend their goal.

Today jump shots are most 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 players undergo strength training, plyometric training and combined strength and plyometric training to facilitate their explosive power in legs, speed and prevent injuries (Chelly *et al.* 2014, Hermassi *et al.* 2011, Cherif *et al.* 2012, Petersen *et al.* 2002). 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 leg explosive power and sprinting performance 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

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

30 metres dash

The purpose of the test was to determine the player's maximum sprint speed and the ability to accelerate from a stationary position. The test involved running a single maximum sprint over 30 metres, with the time recorded. The start was from a stationary standing position, with one foot in front of the other. The front foot must be on or behind the starting line. This starting position should be held for two seconds prior to starting, and no rocking movements were allowed. The tester provided hints for maximizing speed (such as keeping low, driving hard with the arms and legs) and encouraged to continue running hard through the finish line. The time elapsed was recorded manually by stop watch and 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	
30^{th} min	60^{th} min

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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

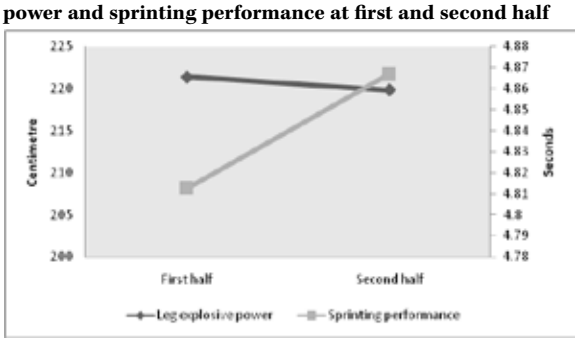
Leg explosive power

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 $d = 0.12$).

Sprinting performance

The comparison revealed no significant difference between first and second half on sprinting performance ($t = 0.625$ $p = 0.545$). The 95% confidence interval indicated that the handball players mean difference is likely to fall within –0.24 and 0.13. However, there was no significant difference in sprinting performance between first and second half which can be confirmed as the effect sizes (Cohen's $d = 0.15$). The leg explosive power and sprinting performance scores are displayed in figure 2.

Figure 2: Mean and standard deviation on leg explosive power and sprinting performance at first and second half



Discussion

In the present study which revealed no significant difference between first and second half a handball match on leg explosive power and sprinting performance. Although all players performed better in the first half when compared to second half in leg explosive power and sprinting performance. Póvoas *et al.* (2012) found that heart rate, time spent in high-intensity activities, frequency of stops, changes of direction, one-on-one situations, and most intense periods of the game were higher during the first half than during the second half ($p \leq 0.05$). Handball is an intermittent exercise that primarily uses aerobic metabolism, interspersed by high-intensity actions that greatly tax anaerobic metabolism. Additionally, exercise intensity decreases from the first to the second half of the match, suggesting that neuromuscular fatigue may occur during the game (*Thorlund et al. 2008*). The progressive accumulation of muscles' bi-products can affect muscular contractility and impair neuromuscular performance throughout a game (*Girard, Mendez-Villanueva and Bishop 2011*). The decline on performance in second half stressed that players has to be exposed to sprint training, strength and power training in order to increase sprint performance and explosive power (Granados *et al.* 2008, Jensen *et al.* 1997). The training of handball players should comprise exercises targeting the ability to perform specific high-intensity actions throughout the game and to rapidly recover during the less intense periods.

Conclusion

This study provides the first thorough analysis of leg explosive power and sprinting changes during a handball match on male handball players. The outcome of this study showed that there was no change in leg explosive power and sprinting performance between first and second half of a handball match. However, motion analysis study would have strengthened our result.

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REFERENCE

Castagna, C., Impellizzeri, F., Cecchini, E., Rampinini, E., and Barbero Alvarez, J.C. (2009). Effects of intermittent-endurance fitness on match performance in young male soccer players. J Strength Cond Res, 23(7): 1954–1959. | Chelly, M.S., Hermassi, S., Aouadi, R., Shephard, R.J. (2014). Effects of 8-week in-season plyometric training on upper and lower limb performance of elite adolescent handball players. J Strength Cond Res, 28(5): 1401-10. | Cherif, M., Said, M., Chaatani, S., Nejlaoui, O., Gomri, D., Abdallah, A. (2012). The effect of a combined high-intensity plyometric and speed training program on the running and jumping ability of male handball players. Asian J Sports Med, 3(1): 21-8. | Chittibabu, B. (2014). Relationship of selected physical fitness components on shooting accuracy of women handball players. International Journal for Life Sciences and Educational Research, 2(2): 49 – 51. | Girard, O., Mendez-Villanueva, A., Bishop, D. (2011). Repeated-sprint ability - Part I: Factors contributing to fatigue. Sports Med, 41: 673-694. | Granados, C, Izquierdo, M., Ibanez, J., Ruesta, M., & Gorostiaga, E. M. (2008). Effects of an entire season on physical fitness in elite female handball players. Medicine & Science in Sports & Exercise, 40, 351-361. | Hermassi, S., Chelly, M.S., Tabka, Z., Shephard, R.J., Chamari, K. (2011). Effects of 8-week in-season upper and lower limb heavy resistance training on the peak power, throwing velocity, and sprint performance of elite male handball players. J Strength Cond Res, 25: 2424-2433. | Jensen, J., Jacobsen, S. T., Hetland, S., & Tveit, P. (1997). Effect of combined endurance, strength and sprint training on maximal oxygen uptake, isometric strength and sprint performance in female elite handball players during a season. International Journal of Sports Medicine, 18, 354-358. | Petersen, W., Zantop, T., Steensen, M., Hypa, A., Wessolowski, T., Hassenpflug, J. (2002). Prevention of lower extremity injuries in handball: initial results of the handball injuries prevention programme. Sportverletzung Sportschaden, 16:122-126. | Póvoas, S.C., Seabra, A.F., Ascensão, A.A., Magalhães, J., Soares, J.M., Rebelo, A.N. (2012). Physical and physiological demands of elite team handball. J Strength Cond Res, 26(12): 3365-75. | Ronglan, L. T., Raastad, T., & Borgesen, A. (2006). Neuromuscular fatigue and recovery in elite female handball players. Scandinavian Journal of Medicine & Science in Sports, 16, 267-273. | Thorlund, J.B., Michalsik, L.B., Madsen, K., Aagaard, P. (2008). Acute fatigue-induced changes in muscle mechanical properties and neuromuscular activity in elite handball players following a handball match. Scand J Med Sci Sports, 18: 462-472. |