Beach Handball – The Effect of The Sand Surface on the Explosive Force in the Training of Handball (Indoor) Players at Junior Level (16-18 Years Old)

Maria Daniela MACRA-OȘORHEAN^a, Paul Ovidiu RADU^a, Rodica Cristina PETRUȘ^b, Radu Adrian ROZSNYAI^c

^aFaculty of Physical Education and Sport, Babes-Bolyai University, Pandurilor Street 7, Cluj-Napoca 400376, Romania ^bSchool Sports Club "Viitorul, Paul Chinezu 1, Cluj-Napoca 400021, Romania ^c"Gheorghe Dima" National Music Academy, Ion I. C. Brătianu 25, Cluj-Napoca 400079, Romania

Abstract

Beach sports are widespread (e.g. football, volleyball, handball) and appeal to a wide range of athletes, including professionals. Their purpose is to satisfy the need for socialization, relaxation and at the same time to perform a sports activity in their free time. Objectives. The main objective of the study was to outline the level of explosive force of athletes practicing (indoor) handball and the effect of integrating the specific training of the beach handball game, on the sandy surface, regarding the jump level of juniors aged 16-18. Materials and methods. The evaluation of the athletes' relaxation was performed with the help of the BTS G-Walk equipment. The Shapiro-Wilk test was used to test the normal distribution, and the variance was tested with the F test. In order to summarize the distribution of quantitative variables, the mean \pm sample standard deviation (SD) was used. Student-t, Mann–Whitney (U) or Wilcoxon tests were used to compare quantitative characteristics of two sets of samples. The significance threshold for the tests used was $\alpha = 0.05$ (5%). Statistical data analysis was performed using StatsDirect software (v.2.7.2). Excel application (from the Microsoft Office 2010 package) was used to graphically represent the results. Results. In the statistical analysis of the jump values, no statistically significant differences were observed between the two groups at the time of T.I. (p > 0.05) but statistically

^{*} Corresponding author. Tel.: +40742990457.

E-mail address: radu.paul1993@yahoo.ro

significantly higher values were observed in group II compared to group I at the time of T.F. (p = 0.0192). **Conclusion.** Constant training, performed in summer (off-season), on sand field by beach handball specific means, at juniors aged 16-18 years old, showed a statistically significant increase in explosive force (jump) compared to the control group that developed a training plan specific to indoor handball.

Keywords: beach handball, explosive force, sand field, juniors.

1. Introduction

Beach sports are widespread (e.g. football, volleyball, handball) and appeal to a wide range of athletes, including professionals. Their purpose is to satisfy the need for socialization, relaxation and at the same time to perform a sports activity in their free time (Gkagkanas et al. 2018). The game of beach handball appeared in the 1990s as a means of training athletes in the summer, its evolution moving away from the discipline of classic handball, despite the fact that today many beach handball players also practice (indoor) handball. (Cobos et al., 2018).

Beach handball is a sport derived from handball indoor and has its specific characteristics. First, beach handball is played on a sandy field, with small dimensions, time per game period, a well as ball size, material and dimensions differing from those in indoor handball. Also, different indood and outdoor weather conditions, like temperature, wind, humidity, factors who plays a role in players performance (Puebo et al., 2017).

The off-season is the time between the last regular season and the start of the next season. It is recommended that players take advantage of this time to recover properly for the coming season. Detraining is a process that can affect performance (Baechle & Earle, 2008; Fleck & Kraemer, 2004).

In sports practice it is well known that the level of development of motor skills is a determining factor in expanding and improving the technical baggage of athletes. The success of some athletes' technical playing actions also largely depends on the strength and power they develop through blocking, pushing, holding or even jumping (Gorostioaga et al., 2005; Granados et al., 2008). In children aged 16-18, attention is focused on the increase of strength-speed indices, this being in accordance with the development of jump level, both vertically and horizontally. (Hantău, 2004).

Explosive force is one of the motor skills approached with great interest among sports, which can be effectively trained through various training methods. This particular quality can be defined as the ability to exert maximum force in a minimum amount of time (Zatsiorsky, 1995). Over time, many coaches have shown interest in discovering various methods of improving explosive force. Although opinions are divided, many of these methods have been shown to make a significant contribution to the rapid mobilization of the force. The ability to generate an explosive force during a dynamic, multi-joint movement is dependent on the nature of the movement involved (Adams et al., 1992; Newton et al., 1996). Therefore, selecting exercises for a muscle strength training program can influence both the level of performance improvement and the type of adaptation.

2. Objectives

The main objective of the study was to outline the level of explosive force of athletes practicing the game of (indoor) handball and the effect of integrating the specific training of the beach handball game, on the sand field, on the jump of juniors aged 16-18.

3. Materials and Methods

3.1. Subjects, duration of study

The study group was composed of 26 sportswomen aged 16-18, without chronic diseases and based on the consent signed by them for voluntary participation in the study. The study group was divided in two, randomly, so the control group was composed of 13 sportswomen, as well as the experimental group.

The duration of the experiment was 3 months, between July 15, 2022 and September 15, 2022. The frequency of participation in training was 3 times a week.

3.2. Jump level measurement

The evaluation of the athletes' jump level was performed with the help of the BTS G-Walk equipment, a wireless system, consisting of an inertial sensor, composed of a triaxial accelerometer, a magnetic sensor and a triaxial gyroscope, which is positioned on the L5 vertebra.

This equipment measures the vertical distance of the maximum jump that athletes can achieve using the integrated Jump Squat protocol.



Figure 1. BTS G-Walk equipment



Jumps Protocol

Figure 2. Jumps Protocol.

3.3. Statistical analysis and data processing

The Shapiro–Wilk test was used to test the normal distribution, and the variance was tested with the F test. In order to summarize the distribution of quantitative variables, the mean \pm sample standard deviation (SD) was used. Student-t, Mann–Whitney (U) or Wilcoxon tests were used to compare quantitative characteristics of two sets of samples. The significance threshold for the tests used was $\alpha = 0.05$ (5%).

Statistical data analysis was performed using StatsDirect software (v.2.7.2) (StatsDirect Ltd., Birkenhead, Merseyside, UK). Excel application (from the Microsoft Office 2010 package) was used to graphically represent the results.

4. Results

In the statistical analysis of age values, no statistically significant differences were observed between the two groups (p > 0.05). In the statistical analysis of the hight values, statistically significantly higher values were observed in group II (p = 0.0419).

Indicator	Lot	Average	±	DS	р
Age	Ι	17,00	±	0,9129	0,8083
	II	16,85	±	0,8006	
Н	Ι	169,85	±	6,2829	0,0419
	II	175,23	±	5,7613	

Table I. Comparative analysis for age and height valuesin the studied groups and statistical significance

In the statistical analysis of the jump values, no statistically significant differences were observed between the two groups at the time of T.I. (p > 0.05) but statistically significantly higher values were observed in group II compared to group I at the time of T.F. (p = 0.0192).

In the statistical analysis of the jump values in group I, no statistically significant differences were observed between T.I. and T.F. (p > 0.05). In the statistical analysis of the detention values in group II, statistically

significantly higher values were observed in T.F. compared to T.I. (p < 0.0001).



Table II. Comparative analysis for vertical jumps valuesin the studied groups and statistical significance

Graph 1. Jump level in the studied groups

5. Discussion

Due to the relatively of playing handball on the beach, few studies have been conducted in its infancy (Becerra et al. 2018). This study aims to determine if there is an effect between basic training in off-season and specific training of beach handball – the sand surface – at juniors handball players and their explosive strength. The primary findings of this study demonstrated that beach handball can be a great solution to maintaining physiological performance as practicing a different sport. Previous studies shown differences in both body mechanics and energy demands several types of movement on sandy or similar compliant surfaces. In different studies of walking and running on sandy surfaces, researchers have reported some different amount of increase in energy cost and mechanical work (Davies & Mackinnon, 2006; Pinnington & Dawson, 2001).

Several studies have investigated differences in explosive strength or landing on dissimilar surfaces (Peikenkamp et al., 2001; Giatsis et al., 2004; Muramatsu et al., 2006) even in a theoretically form (Tilp, 2006). Researchers have reported that jumping on sand surfaces is significantly smaller jumping heights during squat jumps (Bishop, 2003; Tilp, 2006) as well as during CMJ, volleyball movements as spikes and block jumps.

Different studies about dynamic, kinematic, walking, running and jumping suggested that movements on a sandly surfaces, can influence the technique considerably.

Based on data in the literature and subjective observations, we demonstrate that: beach handball can contribute to improve a good explosive strength in off-season at juniors handball players; we could observ the yield that the two groups obtained during training period.

6. Conclusions

Following this study, we notice a good index of jump level that the two groups have in the initial tests.

Constant training, performed on the sand surface by means specific to the game of beach handball in summer (off-season), at juniors aged 16-18 years, showed a statistically significant increase in explosive force (jump) compared to the control group that developed a training plan specific to indoor handball.

This study can be an indicator of performance for coaches who prepare handball teams for the competition season, including beach handball competitions that take place during summer, observing among players a much better mental state during the most difficult training period.

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