Effects of Body Composition on Achievement in Goalball

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Abstract

Goalball is a sports branch played by visually impaired people as mutual two teams. The purpose of this study was to determine the effects of selected body composition of Turkish male goalball players on their tournament achievement. Totally 38 male players participated in this study voluntarily. 8 teams were selected among the teams participating in Turkish Goalball Championship according to "tournament-end standings" and two groups were formed from four successful and four unsuccessful teams. While the teams were evaluated as "successful or unsuccessful", tournament ranking was considered. For determining of participants' characteristics; age, body weight and height, body mass index, body fat percentage, body fat mass and fat-free mass were measured. Statistical analysis was done by using "Mann-Whitney U Tests in SPSS" and alpha (α) was set as 0,05. There were not any statistical differences in selected body composition characteristics between successful and unsuccessful groups. As a conclusion; it may claim that differences in selected body composition characteristics have no effect on the tournament success of male goalball players.

Keywords: Goal ball; Body composition; Achievement

Abbreviations: SG: Successful Group; UG: Unsuccessful Group; BIA: Bioelectrical Impedance Method

Introduction

Blindness can cause low physical work capacity, posture problems, orientation difficulties, depressions and problems with balance. Previous studies include information about these disturbances [1-3]. Participation in physical activity during childhood can aid the development of motor abilities and lay the foundation for good health [4]. Children who start sports participation soon in life gain additional bone mineral content and mineral density during growth. People with visual impairment need more support in their psychosocial and physical development. Sports give visually impaired children a chance to be part of the group. Craft [5] suggested that physical education can promote the acquisition of daily living skills, orientation and mobility skills needed by students with visual impairments by helping to develop.

Goalball was originally developed by Hanz Lorenzen from Austria and Sepp Reindl from Germany in 1946, as a rehabilitation programme for visually impaired World War II veterans. Within the next few decades, Goalball evolved into a competitive sport and was featured as a demonstration sport at the 1976 Montreal Summer Paralympic Games. The success of this led to the first goalball world championships being held in Austria in 1978, before it was officially included within the Paralympic movement in the 1980 Summer Games in Arnhem and there after [6].

Goalball is a game played by two teams of three players with a maximum of three substitutions on each team. It is open to both male and female visually impaired athletes, and sighted players can also play domestically. It has three main distinguishing features:

a)   All players wear eyeshades so that they are totally blindfolded.

b)   Goalball is played on an indoor court that is 18m long and 9m wide. The court has tactile markings (a string that is taped to the floor), which helps players determine where they are.

c)   The ball contains internal bells, which help players locate it during play. The ball used in the game has the basketball-sized and 1250g (±50g) weight. It has sonorous bells inside. There are small holes located on the surface of the ball for the purpose of hearing the sound of the bells. The game field must be completely quiet during the game in order to provide players' concentration and react instantly to the ball's movement by hearing the bell inside of the ball.

The object of the game is to score a goal by bowling the ball along the floor so that it crosses the goal line for the opposing team. The defending team has to prevent the ball going into their goal by stopping it while remaining in their team area. They

must then try to control the ball and attack by bowling the ball back again thereby trying to score in the other goal [7].

Although physical and physiological requirements of goalball have not been explained by the scientific works in a clear way, when any game is observed, it could be analysed that the game includes high-intensity intermittent effort in short time periods. Due to shortness of the game period, and throwing the ball with 1250 grams strongly against the goal by players repeatedly for scoring in the game, it is considered that anaerobic process in the goalball is more prominent. Scherer et al. [8] reported that goalball was a sport that required agility and strength; however, the experience gained over the years at the level of concentration and body, auditory and spatial perceptions were extremely important to maintain a good level of play. When the goalball players are prepared for the competitions, coaches mostly prefer "Quick strength/elastic strength, endurance strength and hearing reactions" workouts in training.

Benefits of sports for blind and visually impaired people were investigated before [3,5,9-13]. But these studies generally interested in psychological and social areas in sports. There are few studies about physical and physiological characteristics of blind athletes. So, the aim of this study was determined the effects of body composition characteristics of men goalball players on their tournament achievement.

Materials and Methods

Participants

In this study, 38 players of 8 teams in Turkey Men's Goalball Championships voluntarily participated. All participants were informed about the study procedure, purposes and all gave their informed consent. Participants were divided into two groups according to their tournament ranking as the top four finishers and four last finishers. These groups "Successful Group (SG)" and "Unsuccessful Group (UG)" were named. Every group consisted of 19 athletes.

Measurements

The height of the participants was measured via a tape measure which hung on the surface of a wall, and their ages were determined according to the year of birth writing on the athlete license. Participants' body weight, body mass index, body fat percentage, body fat mass and fat free mass characteristics were determined by Tanita TBF-300 (Japan) body fat analyser. Bioelectrical Impedance Method (BIA) is a commonly used method for estimating body composition, and in particular body fat with a high accuracy [14]. Reliability coefficients of BIA for determining body fat percentage and mass have been reported as 0, 95 and 0, 99 by Hazir [15]. Body fat analysis by BIA method is a very useful and easy method in terms of having high accuracy. Body weight is determined by embedding platform scale. The current is transmitted through electrodes from a leg to another leg with a 50kHz and 0.8mA, and so bioelectric impedance is measured. The measurement takes approximately 30seconds. Over this time which is too short; body weight, body fat percentage, fat mass, lean body mass, lean body weight, total body water, basal metabolism value, the average energy values, and Ohm values of skin impedance are obtained [14]. Measurements were carried out while the participants were dressed in shorts and t-shirts."Athletic" mode on the information section of the analyser was selected, and with a 0,5kg weight decreased due to players' clothing. Also; age and height of the players were entered into the information section. Electrodes on the platform were wiped with a damp cloth before each player stepping on the platform. Measurements were performed in the morning before players eating any food.

Analysis of Data

SPSS programme was used for statistical analysis. Obtained data evaluated by "Mann-Whitney U" test and Spearman's correlation analysis, due to Shapiro-Wilks test result. Alpha was set as 0, 05.

Results

The data obtained from measurements and the comparison and regression results of groups were given in Tables 1 & 2. Values were indicated as "Mean±Standard deviation" in the table. According to comparing results between successful group and unsuccessful group were not statistically significant differences for all parameters (p>0, 05). The Spearman's analysis results indicated that there is no relationship between tournament success and body composition of the players.

Table 1: Comparison of Selected Physical Characteristics of Successful and Unsuccessful Groups.

Parameters	Successful Group (n=19)	Unsuccessful Group (n=19)	Z	p	Results
Age (year)	19,10±2,05	21,53±5,26	-1,710	0,087	p>0,05
Height (cm)	176,37±6,81	175,95±8,64	-0,660	0,509	p>0,05
Body Weight (kg)	69,77±12,78	71,12±11,74	-0,234	0,815	p>0,05
Body Mass Index (kg/m^2)	22,31±3,13	23,01±3,56	-0,526	0,599	p>0,05

Body Fat Percentage (%)	8,20±4,48	9,53±5,52	-0,540	0,589	p>0,05	
Body Fat Mass (Kg)	6,13±4,08	7,23±4,99	-0,423	0,672	p>0,05	
Fat Free Mass	63,72±9,29	63,89±8,11	-0,073	0,942	p>0,05	
(Kg)						

Table 2: Relationship between Tournament Success and Body Composition of Players.

Variable		Age	Height	Body Weight	Body Mass Index	Body Fat Percentage	Body Fat Mass	Fat Free Mass
Tournament Success	Spearman Correlation	,281	-,109	,038	,086	,089	,070	-,012
	Sig.	,087	,517	,819	,606	,596	,678	,943
	(2-tailed)							
	N	38	38	38	38	38	38	38

Discussion

When the literature was reviewed, few studies were observed to have realised with goalball athletes. So, this part of the article was obliged to be discussed with too little references. Scherer et al. [8] reported two groups of Paralympic goalball players' characteristics respectively, age; 22 years and 18 years, height; 174cm and 174cm, body weight; 54,90 kg and 63,60 kg, body fat mass; 5,70 kg=10,38% and 9,09 kg=14,30%, and then body mass index; $18,11kg/m^2$ and $20,96kg/m^2$. Karakollukçu [16] expressed their study results about Turkish National Team Goalball Players' physical characteristics respectively; the average age was 16, 90 years, height was 173,20cm, and body weight was 62,13kg. Aslan [17], reported Paralympic blind players' characteristics respectively, height was 173,87cm, body weight; 66,74 kg, body mass index; 21,97kg/m2, body fat mass; 8,74kg (12,06%), and then fat free mass was 58,00 kg. It can be said that the mean values of physical characteristics in the present study are similar to other studies' results.

When the studies about "Non-visually impaired (normally sighted)" athletes from different branches were reviewed; it became clear that physical characteristics of players in the current study were similar to other studies' results. For example; Erkmen et al. [18] determined mean age of male athletes as 21, 11±2,52 years, height as 173,44±6,81cm, and body weight as 66,16±7,09kg. Aslan, Ersoz [19] determined physical parameters of amateur soccer players as follows, age: 21,6 years, height: 179,20cm, body weight: 73,80 kg, body mass index: $22,90kg/m^2$, body fat mass and percentage: 6,12kg and 7,70%, fat free mass: 67,70kg. Cerrah et al. [20] reported three groups of male athletes' body mass index characteristics respectively, 23,8kg/m2, 22,9kg/m2 and $23,6kg/m^2$ and similar as Koklu et al. [21] found $21,15kg/m^2$, $21,52kg/m^2$ and $21,61kg/m^2$. Also, Kumartasli et al. [22] and Colak et al. [23] found similar age and body composition characteristics with the present study.

Conclusion

As a result of the comparison of data obtained from the measurements; even though the successful group has higher height value than the unsuccessful group, and it has lower than unsuccessful group in terms of age, body weight, body mass index, body fat percentage and fat mass characteristics, these differences were not statistically significant. In addition, there is no relationship between tournament success and body composition of the goalball players. In this case, it is claimed that; achieving success in the goalball, age and the measured body composition components are not distinctive characteristics. Researchers can try to answer the question; "Which characteristics of goalball players may effect on their match performance" in future researches.

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