A COMPARATIVE STUDY OF SELECTED PHYSICAL PHYSIOLOGICAL CHARACTERISTICS OF HANDBALL AND BASKETBALL PLAYERS

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Abstract
The study examined the differences in the body composition of handball and basketball players. Specifically, comparisons were made on the physical and physiological characteristics which can be used to classify and identify sportsmen and women in related or similar competitive games. Participants for the study were 22 handballers and 23 basketballers, all of which are university players. The physical characteristics considered were percentage body fat, circumference of calf, thigh and biceps, lean bodyweight, height and skinfold measure, while the physiological characteristics were resting heart rate systolic blood pressure, blood pressure, diastolic blood pressure and VO_2 max. Results of t-test indicated that significant difference existed between handballers and basketballers in percentage body fat, biceps, circumference and skinfold measure at the triceps, subscapular and thigh. The result also showed that similarities existed in the body weight, height, lean body weight, thigh and calf circumference, and umbilicus supra-illine skinfold measures of both handballers and basketballers. These result suggested that physical composition of sportmen and women could be similar in players of games with similar body movements. The level of training in each game however affects the players' physiological characteristics.

Keywords*:* Comparative, Physiological, Handball, Basketball, Players.

Introduction

The game of handball is very similar to basketball, as they are both played with hands within specific court areas. The objective of both games is to move fast and score goals or make "basket" more than the opponent. According to Talabi (1992), both games are considered very vigorous where the players can be extremely fast and demand for instantaneous decisions, good coordination and quick responses. Both games also consist mainly of passes and shooting to score or make a basket in the case of basketball.

Akeredolu (1987) described and likened handball and basketball games as doing an endurance run of 10,000 meters by alternating running and resting with the runs being about three times as long as the rest. The application of the knowledge of physiology to sport training has been shown, over the years, to be significant in improving general physical and

physiological characteristics (fox, 1984). Each sport makes various demands on each athlete. These demands are on the structure and functions of the athlete's bodies. Implicitly, the training schedules specifically designed for a particular sport should develop the athletes terms of the level of physical and physiological characteristics required for good performance in that particular sport (Talbot,1981). For the games of handball and basketball, Craig (1979) and (Ogunleye & Onuoha (2017) considered both as vigorous games that requires tremendous fitness, energy, speed agility and endurance of players.

Agbonjimi (1994) and Ajiduah (1989) found that body build and body composition could be used sometimes to classify and qualify the physiological characteristics of athletes. They claimed that both body build and body composition can be determine and predict performance level of an individual in a particular activity. Akeredolu (1987) have also observed that certain groups of athletes have demonstrated body build and composition variables, which differs substantially from other categories of athletes and non-athletes.

These physical and physiological characteristics have been found to determine the participation of individual athlete in one sport or the other. According to Umedum (1982), the biological and social nature of human beings have made it necessary for mankind to engage in one form of physical activity or another from birth to death. Based on these facts, participation in various physical activities at various levels has been the priority of people and this depends on the physical and physiological characteristics of individual. Thus certain body types are apparently related to the endowment of certain performance characteristics, essential fro sports participation.

Methodology

Forty-five (45) participants from University of Lagos were selected and used for this study. All subjects were preparing for the Nigeria University Games (NUGA) preliminaries during measurements period. The measurements taken were on weight (kg) circumference of calf, thigh and biceps (cm) height (m) and skinfold using the Behinke and Wilmore (1974) measures. The % body fat was based on Brozek et al (1963) equation, as stated on Ogunleye & Nwadibia (2018).

$$\frac{\%\ \text{Body fat}=(4{,}570-4{,}142)\times 100}{\text{Body density}}$$

Lean body weight of each subject was estimated from the difference between the total weight and the fat weight as suggested by Calberg et al (1983) thus:

$$\text{LBW} = \text{Body weight} - \frac{(\%\ \text{fat} \times \text{body weight}}{\text{DB}}$$

Physiological parameters – Resting heart rate was taken before the beginning of the training and the same was applied to the measurement of resting blood pressure. Heart rat was taken for ten seconds and multiplied by six to obtain the beats per minutes.

General descriptive statistics was used to analyse the result and t-test of independent variables were used to analyse the two groups of players, and significance was set at 0.05 alpha levels.

Results

Table 1: Physical Characteristics of the Subjects

Variables	Groups	No. of Subject	Mean	SD	t-Value
Weight (kg)	Handball	22	61.45	7.51	0.74
	Basketball	23	65.48	6.09	
Height (M)	Handball	22	1.60	0.182	-2.04
	Basketball	23	1.70	0.061	
L.B.W	Handball	22	60.15	6.01	-1.08
	Basketball	23	62.30	7.22	
%fat	Handball	22	6.27	1.40	-3.35
	Basketball	23	7.77	1.60	

(t.05=1.684)

The handballers in this study have slightly higher body weight than the basketballers as shown on the table1. However, the difference in the four physical variables are insignificant when compared as shown on the table 1. The handballers in this study carry much less percent body fat (6.27) than their basketballer with (7.77%). The t-value of 2.62 shows that differences is insignificant since these demands are on structure and functions of their bodies in terms of sports and a lower body fat content due to higher degree of physical activity.

Table 2: Anthropometric Measurement of the Subject (Skinfold Measurement)

Variables	Groups	No. of Subject	Mean	SD	t-Value
Biceps	Handball	22	30.07	1.47	3.70
(CM)	Basketball	23	28.80	2.12	
Thigh	Handball	22	50.05	3.06	1.22
(CM)	Basketball	23	49.23	4.51	
Calf	Handball	22	35.03	2.18	0.60
(M)	Basketball	23	34.61	2.16	

Significant at 0.5 level

The handballers in this study have higher circumference values in the Biceps, Thigh and Calf regions of the body than their counterpart in basketball as shown in table 2. Only the t -value (3.70) for the difference in Biceps circumference is highly significant at 0.05level. The Biceps muscles of the handball players due to higher hypertrophy as a result of heavier workload.

Table 3: Anthropometric Measurement of the Subjects (Skinfold Measurement)

Variables	Groups	No. of Subject	Mean	SD	t-Value
SubScapuler	Handball	23	8.26	1.61	2.06
(MM)	Basketball	23	7.11	1.80	
Triceps	Handball	22	4.65	0.71	-2.68
(MM)	Basketball	23	5.41	0.90	
Umbilicus	Handball	22	7.65	2.81	0.68
(CM)	Basketball	23	7.60	1.17	
Supra-illiae	Handball	22	7.68	3.04	-6.61
	Basketball	23	8.20	2.67	

Significant at 0.05 level

The result in this study shows that handball players have lower value of anthropometric measurement compared to the basketball players, as indicated in table 3 with a score of 4.65mm, 5.72mm, 7.65mm and 7.68mm to 5.4mm to 5.41mm, 7.33mm, 2.00mm and 8.20mm at the triceps, supra-illiea and thigh skinfold. While the basketball players show more reduction at sub-scapular, and umbilicus

skinfold as indicated in the table. It could then be proved that handball players are more demanding on fitness and strength. The mean was 130 to 140 B/P of a t-value of 0.28 compared to diastolic B/P mean was 77 to 74 respectively of a T-value of 0.12 which shows that there was no significant difference. Which oxygen uptake in liter per minute for those of handball players is 2.99 liters per minutes, compared to basketball players with 3.03 liters per minutes with T-value of 0.257. This shows no significant difference between the ballgame players.

The two games are ball games, but the ball used in the handball is smaller compared to the one used in basketball. This is effect means more work force would have to be applied for basketball. The significantly higher hypertrophy seen in the hand muscles of handballers of over basketballers as revealed by the circumference measured could be explained along the line of the fastness and easier ball manipulation in handball as compared to basketball. This supports Talabi (1992) and Sloan (2005) studies.

The speed involved in handball game is more than that of the basketball game, due its fast nature. Since both sports consist of almost similar movement, then handball players are likely to need more speed and endurance to cover the longer distance due to fatness involve. This might also account for the significantly lower amount of body fat and thigh skinfold measure of handball players over basketball players as indicated in table 3. However, the result is compared with others result such as those obtained by Zuts and Corbun (1977) on American College Freshman which was2.89 liters per minutes and Duston and Caprariola (1984) on twenty-four healthy female subjects which was 2.98liter per minute.

Conclusion

Both handball and basketball players in this study are similar as far as body weight, height, lean body. Weight characteristics are concerned. They also show similarities in thigh and calf muscle circumferences and umbilicus and supra-illiae regions. This could be due to similarities of body movements during the game.

However, the two categories of players are different in the amount of body fat. This could be an indication in the difference of their training levels. Handball players are also different from basketball players in their skinfold measures at the sub-scapular, triceps and thigh regions. While handball and basketball players could benefit from similar training programme, specific adaptations to cater for specific parts of the

body will be needed for each group of players (Craig, 2007)

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