



Anthropometric characteristics, Somatotyping and body composition of volleyball and basketball players

KEYWORDS

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INTRODUCTION

Volleyball and basketball are among the world's popular sports, played practically in every nation at varying levels of competence. Successful participation in these sports requires from each player a high level of technical and tactical skills and suitable anthropometric characteristics.

All ball games require comprehensive abilities including physical, technical, mental, and tactical abilities. Among them, physical abilities of the players are more important as these have marked effects on the skill of players and the tactics of the teams because ball games require repeated maximum exertion such as dashing and jumping (Tsunawake, 2003). Such physical abilities are important for both volleyball and basketball players to achieve higher levels of performance.

To evaluate these physical abilities, the anthropometric measurements, parameters of the body composition such as the percent body fat (% FAT), fat-free mass (FFM) and somatotype components are often used. Studies on the physical characteristics of the human body to-date indicate that the morphological characteristics of athletes successful in a specific sport differ in somatic characteristics from the general population. Basketball and volleyball players are typically taller than the players of other games (Rahmawati et al., 2007). Basketball and volleyball require handling the ball above the head; therefore, having a greater height is an advantage in these sports (Kansal et al., 1986). Higher body mass however, is a hurdle for volleyball players in achieving good jumping height (Bandyopadhyay, 2007). Various researchers suggested that different body size, shape and proportions are beneficial in different physical activities (Malhotra et al., 1972; Kansal et al., 1986; Sidhu et al., 1996). Gabbett, 2008); however, similar studies in the context of India are limited. The present study has been conducted on Indian university volleyball and basketball players to evaluate their selected physical characteristics along with somatotype thus fills up already existing void of literature in Indian concern.

Table 1

Physical parameters of the volleyball and basketball

Variables	BASKETBALL		VOLLEYBALL		T Value
	Mean	SD	Mean	SD	
Height (cm)	187.44	5.19	183.25	6.15	2.85*
Weight (kg)	79.40	7.70	73.70	7.58	3.28*
BMI	22.63	2.33	21.87	2.35	1.41
BSA	2.04	0.09	1.94	0.10	3.95*

Objectives of the study

- (1) To study the anthropometric characteristics and body composition of basketball and volleyball players.
- (2) To study the body types of the basketball and volleyball players.

MATERIALS AND METHODS

The present study was conducted on 63 young male subjects (volleyball =36 and basketball = 27) of age group 18-25 years. The subjects were randomly selected from the different colleges affiliated to Gujarat University, Ahmadabad, and Gujarat, India irrespective of their caste, religion, dietary hab-

its and socioeconomic status. The age of each subject was calculated from the date of birth as recorded in his institute.

The height of the subjects was measured with anthropometric rod to the nearest 0.5 cm (HG- 72, Nexgen ergonomics, Canada). The weight of subjects was measured by using portable weighing machine to the nearest 0.5 kg. Body surface area (BSA) and body mass index (BMI) were calculated by the following formulae:

Statistical analyses

Values are presented as mean values and SD. Independent samples t tests were used to test if population means estimated by two independent samples differed significantly. Data was analyzed using SPSS Version 16.0 (Statistical Package for the Social Sciences, version 16.0, SSPs Inc, and Chicago, IL, USA).

RESULTS

Table 1 shows the descriptive statistics for physical parameters of volleyball and basketball players. Mean body height of basketball players was significantly higher than those of volleyball players ($p < 0.01$). Basketball players also had significantly greater weight ($p < 0.01$) as compared to volleyball players. No statistically significant difference was observed between the basketball players and the volleyball players in relation to BMI. BSA was

Significantly higher in basketball players than those of volleyball players ($p < 0.01$) In Table 2 descriptive statistics for skin fold measurement values are depicted. Both biceps ($p < 0.01$) and suprailliac skin folds ($p < 0.01$) measurements were observed to be significantly higher for basketball players than volleyball players.

Table 2

Different skin folds measurements of the volleyball and basketball.

Variables	BASKETBALL		VOLLEYBALL		T Value
	Mean	SD	Mean	SD	
Biceps (mm)	4.88	1.25	4.00	1.17	2.89*
Triceps (mm)	7.84	1.31	8.69	3.43	1.73
Sub scapular (mm)	12.55	3.04	11.38	3.66	1.43
Suprailliac (mm)	14.77	3.96	9.03	5.45	4.94*
Calf (mm)	13.07	3.57	11.19	3.97	1.94

Table 3

Diameters and circumferences of the volleyball and basketball

Variables	BASKETBALL		VOLLEYBALL		T Value
	Mean	SD	Mean	SD	
Bi-hummers diameter	69.77	3.45	70.45	6.49	0.94
Bi-femur diameter	102.66	5.89	100.03	6.99	1.58
Upper arm circumference	27.00	1.33	26.33	1.88	1.56
Calf circumference	36.66	2.28	35.50	2.10	2.09*

Table 4

Different components of body composition of the volleyball and basketball

Variables	BASKETBALL		VOLLEYBALL		T Value
	Mean	SD	Mean	SD	
Body density	1.62	0.04	1.068	0.09	3.13*
% BF (kg)	15.96	2.12	13.30	4.01	3.10*
TF (kg)	12.67	2.11	9.88	3.75	3.46*
FFM (kg)	66.72	6.59	63.13	5.39	2.37*

The differences observed between the two groups for triceps, sub scapular and calf skin fold measurement were not statistically significant. And suprailliac skin folds ($p < 0.01$) measurements were observed to be significantly higher for basketball players than volleyball players. The differences observed between the two groups for triceps, sub scapular and calf skin fold measurement were not statistically significant.

Descriptive statistics of diameters and circumferences are shown in Table 3. There was no significant difference between basketball players and volleyball players in bihumerus and bi-femur diameters. Since arm and calf circumference measurements reflect the bone, muscle and fat mass of the limbs, these two variables have also been evaluating. No significant difference was observed in upper arm circumference between the two groups, but calf circumference ($p < 0.05$) was significantly higher for basketball players when compared to volleyball players.

Descriptive statistics for different components of body composition are presented in Table 4. Volleyball players were found to have significantly greater body density

($p < 0.01$) when compared to basketball players. The basketball players were observed to have significantly higher percent body fat ($p < 0.01$) and total body fat ($p < 0.01$) when compared to volleyball players. Fat free mass (FFM) was also significantly greater in basketball players ($p < 0.01$) than those of volleyball players. Table 5 summarizes the descriptive statistics of the somatotyping components. Endomorph values of basketball players were significantly higher ($p < 0.01$) than those of volleyball players. In relation to mesomorphy and ectomorphy, no significant differences were observed between the two groups.

Table 5

Somatotyping of the volleyball and basketball

Variables	BASKETBALL		VOLLEYBALL		T Value
	Mean	SD	Mean	SD	
Endomorph	3.21	0.56	2.68	1.05	2.73*
Mesomorphy	2.91	1.14	3.06	1.11	0.51
Ectomorphy	3.40	1.30	3.57	1.41	0.50

DISCUSSION

In the present study the anthropometric characteristics of the athletes have not been evaluated in relation to their performance, but were instead compared with each other. This study indicates the existence of differences among the players of different games. The overall results show that basketball players were taller and heavier as compared to the volleyball players. Similar findings were found in the studies on Malaysian male athletes (Nudri et al., 1996) and Turkish male athletes (Pelín et al., 2007) which reported that the height of basketball players was greater when compared to other sports groups. The basketball players were also reported to have greater body fat percentage, skin fold measurements, FFM and endomorphic component as compared to volleyball players.

These results show that basketball players were taller, heavier and fatter as compared to their counterparts. On average, the basketball players of the present study are considerably taller and heavier than the State level players studied by Sodhi (1976) and top ranking Indian basketball players (Sodhi, 1980). On the other hand, they are considerably shorter and lighter when compared to their international counterparts (Sallet et al., 2005; Apostolidis et al., 2003). Because the basketball and volleyball require handling the ball above the head, having a greater height is an advantage in basketball and volleyball games (Kansal et al., 1986).

Lower height of Indian basketball players might be the one of the reason for their dismal performances at the international level.

In volleyball, teams compete by manipulating skills of spiking and blocking high above the head. Therefore, the presence of tall players is an indispensable factor in the success of a team. The volleyball players in the present study have greater height and weight than the volleyball players from West Bengal studied by Bandyopadhyay (2007) whereas they are shorter and lighter than their international counterparts (Gualdi and Zaccagni, 2001; Morques and Marinho, 2009; Gabbett, 2008).

The present data regarding the % fat of the players is approximately accords with the proposal that percentage fat value among basketball and volleyball players should be within the range of 6-15% (Wilmore and Costill, 1999).

The somatotyping scores of basketball players in the present study are 3.2-2.9-3.4 and they are reported as endo-ectomorphic. The results in present study are not in line with those of Hebbelink and Ross (1974) who reported an ecto-mesomorphic somatotype as the prototype for basketball players. The basketball players in the present study have greater endomorphic component and lower geomorphic component than those of the top ranking Indian basketball players studied by Sodhi (1980) and Turkish basketball players studied by Pelín et al. (2009). The somatotyping scores of volleyball players in the present study are 2.6-3.0-3.5 and they are reported as meso-ectomorphic.

REFERENCE

- Apostolidis N, Nassis GP, Bolatoglou T, Geladas ND (2003). Physiological and technical characteristics of elite young basketball players. *J. Sports Med. Phys. Fitness*, 43: 157-163. | Bandyopadhyay A (2007). Anthropometry and body composition in soccer and volleyball players in West Bengal, India. *J. Physiol. Anthropol.*, 26(4): 501-505. | Carter JEL, Heath HB (1990). Somatotyping-development and application. Cambridge University Press. | DuBois D, DuBois EF (1916). A formula to estimate approximate body surface area if height and weight be known. *Arch. Int. Med.*, 17: 863. | Durnin JVJA, Womersley J (1974). The body fat assessed from total body density, estimation from skinfold thickness measurements on 481 men and women age from 16-72 years. *Brit. J. Nutr.*, 32: 77-97.