



Anthropometric characteristics, somatotyping and Body composition of Handball and basketball Players

KEYWORDS

Mahesh B Devarmani

RESEARCH SCHOLAR RESIDENTIAL ADDRESS GANAPAT NAGAR, GANAPAT PALACE

ABSTRACT *The purpose of the study was to compare the anthropometric characteristics and somatotype of the Karnataka University Dharwad, male basketball players and Handball players. Sixty sportspersons (Handball=30 and basketball=30) of age group 18-25 years were selected from different colleges affiliated to Karnataka University Dharwad, Karnataka, India. All the participants' were assessed for height, weight, breadths, girths and skin fold thickness. An independent samples t-test revealed that basketball players had significantly higher height ($p<0.01$), weight ($p<0.01$) and body surface area ($p<0.01$) as compared to Handball players. The basketball players were also found to have significantly greater biceps ($p<0.01$) and supra iliac ($p<0.01$) skin fold thicknesses, calf circumference ($p<0.05$), percent body fat ($p<0.01$), total body fat ($p<0.01$), fat free mass ($p<0.05$) and endomorphic component ($p<0.05$) as compared to Handball players. Handball players had significantly greater body density ($p<0.01$) as compared to basketball players.*

Introduction

Handball 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. Such physical abilities are important for both Handball 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 Handball require lifting the ball above the head; therefore, having a greater height is an advantage in these sports. Higher body mass however, is a hurdle for Handball players in achieving good jumping height. Various researchers suggested that different body size, shape and proportions are beneficial in different physical activities (Malhotra et al., 1972). Several studies on the anthropometric characteristics and somatotype of basketball and Handball players have been reported in literature (Wallet et al., 2005; Apostolicism et al., 2003; Gualdi and Zaccagni, 2001) however, similar studies in the context of India are limited. The present study has been conducted on Indian university Handball and basketball players to evaluate their selected physical characteristics along with somatotype thus fills up already existing void of literature in Indian concern.

Objectives of the study

1. To study the anthropometric characteristics and body composition of basketball and Handball players.
2. To study the body types of the basketball and Handball players.

Material and methods

The present study was conducted on 60 young male subjects (Handball =30 and basketball = 30) of age group 18-25 years.

The subjects were randomly selected from the different colleges affiliated to Karnataka University Dharwad, India irrespective of their caste, religion, dietary habits 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 0.5kg. Body surface area (BSA) and body mass index (BMI) were recalculated by the following formulae: $BSA (m^2) = (Body\ mass\ in\ kg) \times 0.425 \times (Body\ Height\ in\ cm) \times 0.725 \times 0.007184$ (Du Bois and Du Bois, 1916) $BMI (kg/m^2) = (Body\ mass\ in\ kg) / (Stature\ in\ m^2)$ (Meltzer et al., 1988) Skin fold thickness measurements of the subjects were measured by slim guide skin fold caliper. Girths were taken with the steel tape to the nearest 0.5 cm. Widths of body parts were measured by using sliding caliper with digital readout. Somatotype was determined from the following equations (Heath and Carter, 1990): (i) Endomorphic = $-0.7182 + 0.1451(X) - 0.00068(X)^2 + 0.0000014(X)^3$ Where $X =$ sum of supra-spinal, sub scapular and triceps skin fold and corrected for stature by multiplying the sum of skin folds by $170.18 / Body\ Height\ in\ cm$ (ii) Mesomorphy = $(0.858 \times Humers\ width) + (0.601 \times Femur\ width) + (0.188 \times Corrected\ arm\ girth) + (0.161 \times Corrected\ Calf\ Girth) - (Body\ Height \times 0.131) + 4.5$ Where $Corrected\ Arm\ Girth = Arm\ girth - Biceps\ skin\ fold$, $Corrected\ Calf\ Girth = Calf\ Girth - Calf\ Skin\ fold$. (iii) Ectomorphy = $(HWR \times 0.732) - 28.58$ [Where $HWR = (Body\ Height\ in\ cm) / (weight\ in\ kg) \times 0.33$] Percentage body fat as estimated from the sum of skin folds was calculated using equations of Sire (1956) and Durnin. The regression equations for the prediction of body density from the log of the sum of skin fold thickness at four sites in mm are as follows: For 17 to 19 years age group: $Body\ Density (gm/cc) = 1.1620 - 0.0630(X)$ (Durnin and Womersley, 1974) For 20 to 29 years age group: $Body\ Density (gm/cc) = 1.1631 - 0.0632(X)$ (Durnin and Womersley, 1974) Where $X = \log(Biceps + Triceps + Sub\ scapular + Suprailliac)$. % Body Fat = $[4.95 / Body\ density - 4.5] \times 100$ (Sire, 1956) Total Body Fat (kg) = $(\% Body\ fat / 100) \times Body\ mass (kg)$ Lean Body Mass (kg) = $Body\ mass (kg) - Total\ body\ fat (kg)$. 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 In.).

Table 1
Physical parameters of the Handballers and basketballers

Variables	Basketballers (N=30) Mean SD		Handballers (N=30) Mean SD		t- Value
Height (cm)	186.32	5.06	181.14	6.07	2.45**
Weight (kg)	76.25	7.48	73.02	7.18	3.12**
BMI	22.63	2.33	21.78	2.35	1.41
BSA	2.04	0.09	1.94	0.94	3.95**

** indicates $p < 0.01$.

Table 2
Different skin folds measurements of the Handballers and basketballers.

Variables	Basketballers (N=30) Mean SD		Handballers (N=30) Mean SD		t- Value
Biceps (mm)	4.88	1.25	4.00	1.17	2.89**
Triceps (mm)	7.48	1.31	8.69	3.43	1.37
Subscapular (mm)	12.55	3.04	11.38	3.66	1.34
Suprailliac (mm)	14.77	2.96	9.03	5.45	4.49
Calf (mm)	13.07	3.57	11.19	3.97	1.94

** indicates $p < 0.01$.

Table 3
Diameters and circumferences of the Handballers and basketballers

Variables	Basketballers(N=30) Mean SD		Handballers(N=30) Mean SD		t- Value
Bi-hummers diameter	69.77	3.45	70.45	6.49	0.49
Bi-femur diameter	102.66	5.89	100.03	6.99	1.58
Upper arm circumference	30.00	1.33	26.33	1.88	1.56
Calf circumference	30.66	2.28	35.50	2.10	2.56

* indicates $p < 0.05$.

Table 4
Different components of body composition of the Handballers and basketballers

Variables	Basketballers (N=30) Mean SD		Handballers (N=30) Mean SD		t- Value
Body density	1.062	0.004	1.068	0.009	3.13**
% BF (kg)	15.95	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*

* indicates $p < 0.05$. ** indicates $p < 0.01$.

Results:

Table 1 shows the descriptive statistics for physical parameters of Handball and basketball players. Mean body height of basketball players was significantly higher than those of Handball players ($p < 0.01$). Basketball players also had significantly greater weight ($p < 0.01$) as compared to Handball players. No statistically significant difference was observed between the basketball players and the Handball players in relation to BMI. BSA was significantly higher in basketball players than those of Handball players ($p < 0.01$). In Table 2 descriptive statistics for skin fold measurement values are depicted. Both biceps ($p < 0.01$) and supra iliac skin folds ($p < 0.01$) measurements were observed to be significantly

higher for basketball players than Handball players. The differences observed between the two groups for triceps, sub scapular and calfskin 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 Handball 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 Handball players. Descriptive statistics for different components of body composition are presented in Table 4. Handball 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 Handball players. Fat free mass (FFM) was also significantly greater in basketball players ($p < 0.01$) than those of Handball players. Table 5 summarizes the descriptive statistics of the somatotyping components. Endomorphic values of basketball players were significantly higher ($p < 0.01$) than those of Handball players. In relation to mesomorphy and ectomorphy, no significant differences were observed between the two groups.

Table 5
Somatotyping of the Handballers and basketballers

Variables	Basketballers(N=30) Mean SD		Handballers(N=30) Mean SD		t- Value
Endo-morph	3.21	0.56	2.68	1.05	2.37
Meso-morphy	2.91	1.14	3.06	1.11	0.51
Ectomorphy	3.40	1.30	3.57	1.41	0.50

* indicates $p < 0.05$.

Discuss:

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 in Handball, teams compete by manipulating skills of hitting and blocking high above the head. Therefore, the presence of tall players is an indispensable factor in the success of a team. The basketball players in the present study have greater height and weight than the Handball players from West Bengal studied by [unintelligible] whereas they are shorter and lighter than their international counterparts (Guild and Mascagni, 2001; Morques and Merino, 2009; Gobbet, 2008). The present data regarding the % fat of the players is approximately accords with the proposal that percentage fat value among basketball and Handball players should be within the range of 6-15% (Wilmore and Costill, 1999). The basketball players in the present study have higher percentage body fat than the elite level Greek basketball players (Sallet et al., 2005) and French professional basketball players (Apostolicism et al., 2003). The Handball players have higher body fat percentage than the Handball players from West Bengal studied by Bandyopadhyay (2007).