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Somatotype Characteristics of Male Sprinters, Basketball, Soccer, and Field Hockey Players

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Abstract

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In an effort to describe the physique associated with regular involvement in sports activity, the somatotypes of a group of 51 elite male athletes comprising sprinters (n = 10), basketball (n = 12), soccer (n = 15), and field hockey (n = 14) players, and 11 male nonathletes were studied. The subjects' physiques were assessed using the Heath-Carter anthropometric somatotype method. Analysis of variance and Newman-Keuls post hoc method were used to test for significant differences among the mean somatotype ratings of the groups. The findings indicated that the nonathletes (3.5) were significantly more endomorphic ($P < 0.05$) than the soccer players (2.5) and sprinters (2.4). The sprinters (3.6) and basketball players (3.7) had markedly higher ectomorphic ratings ($P < 0.05$) as compared with the hockey players (2.0).

The mesomorphic component did not differentiate the groups. The differences observed among the groups which could be attributed to genetic and environmental influences reflect the variability in the morphological characteristics of athletes and nonathletes.

Key words: Somatotype, sports performance, genetic-environmental influence

Introduction

Since it was originally described by Sheldon et al. (18), somatotyping has been applied in a variety of ways ranging from measuring the effect of malnutrition on physique (12) to its relationship with the incidence on coronary heart disease (7, 15) and athletic performance (5, 23). The assessment of physique and morphological characteristics of athletes elucidates the relationship between body structure and sports performance. Besides endurance, skill, motivation, and training, the physique of the athlete contributes toward successful performance in sport competition.

Tanner (22) studied the physique of different categories of Olympic athletes and stressed its importance in performance. There appears to be a general agreement that athletes' structural characteristics largely influence their capabilities to meet the physical demands of their respective sports. Consequently, a great variability in physique has been reported for different categories of athletes (2, 11, 16, 20). Despite the numerous studies which have attempted to classify athletes based on their physical traits, there is paucity of data concerning Nigerian athletes. Therefore, this study was undertaken to assess the somatotypes of a group of collegiate male athletes and nonathletes in Nigeria.

Methods

The subjects of this study were 51 male athletes and 11 male nonathletes. Their physical characteristics are presented in Table 1. The athletes, who had at least 3 years of competitive sports experience, were successful performers at the 1984 Nigeria Advanced Teachers' Colleges of Education Games (NATCEGA) held in Katsina Ala, Benue State of Nigeria. The nonathletes, who were drawn from the same student population, never actively participated in competitive sports. For the purpose of the study, the subjects were categorized as follows: sprinters (n = 10), basketball (n = 12), soccer (n = 15), field hockey (n = 14) players, and nonathletes (n = 11). Informed consent was obtained from the subjects.

A standardized protocol was used in assessing the subjects' physical characteristics and body composition. Measurements taken were standing height, body weight, biepicondylar diameter of the femur and humerus, and calf, flexed biceps, and waistline girths. Skinfold thicknesses were estimated with a Harpenden Skinfold caliper according to the procedure suggested by Katch and Katch (10). The skinfold sites measured were triceps, subscapular, suprailiac, and calf. The subject's body densities, lean weights, and percent body fat values were predicted using the equations of Wilmore and Behnke (24). The assessment of the subjects' somatotype was undertaken according to the anthropometric somatotype method (8).

To test for significant differences in the mean somatotype ratings and physical characteristics of the subjects, one-way analysis of variance (one-way ANOVA) with five levels was computed. When an F statistic indicated significant difference ($P < 0.05$), Newman-Keuls post hoc comparison (9) was performed on the ordered means to detect which of the means were significantly different from each other.

Results

Among the various categories of subjects, the basketballers were significantly tallest ($P < 0.05$), and percent body fat value was significantly highest ($P < 0.05$) in the nonathletes

Table 1 Mean (±SD) of subjects' physical characteristics

Variable		Category					
		Basketballers (n = 12)	Soccer players (n = 15)	Hockey players (n = 14)	Sprinters (n = 10)	Nonathletes (n = 11)	F ratio
Age (yrs)	Mean	26.8	25.5	25.7	25.3	27.2	0.54
	(± SD)	(4.2)	(1.7)	(1.1)	(1.4)	(4.9)	
Stature (cm)	Mean	178.3	169.3	167.2	166.3	165.1	2.96*
	(± SD)	(6.1)	(9.8)	(4.6)	(6.9)	(6.3)	
Weight (kg)	Mean	65.4	64.8	65.2	63.7	66.0	1.21
	(± SD)	(8.7)	(7.5)	(4.1)	(5.4)	(8.2)	
Lean weight (kg)	Mean	58.7	59.0	59.9	57.3	57.8	0.73
	(± SD)	(6.6)	(5.6)	(3.1)	(3.7)	(3.5)	
Percent body fat	Mean	10	9.1	10.2	9.7	14.3	8.64*
	(± SD)	(1.5)	(1.1)	(1.2)	(1.7)	(1.4)	

*Denotes a significant difference ($P < 0.05$) among the mean values of the groups

Table 2 Mean (± SD) somatotype characteristics of athletes and nonathletes

Body component		Category					
		Basketballers (n = 12)	Soccer players (n = 15)	Hockey players (n = 14)	Sprinters (n = 10)	Nonathletes (n = 11)	F ratio
Endomorphy	Mean	2.85	2.52	2.84	2.44	3.53	3.36*
	(± SD)	(0.4)	(0.6)	(0.6)	(0.5)	(1.8)	
Mesomorphy	Mean	4.87	4.65	5.12	5.86	5.14	1.58
	(± SD)	(0.4)	(0.5)	(0.7)	(0.8)	(0.7)	
Ectomorphy	Mean	3.67	2.86	2.01	3.62	2.45	3.45*
	(± SD)	(0.6)	(0.1)	(0.8)	(1.3)	(1)	

*Denotes a significant difference ($P < 0.05$) among the means of the groups

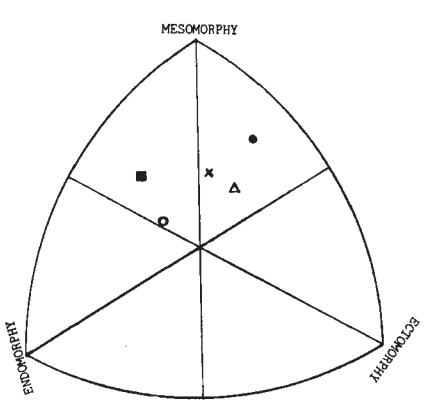

Fig. 1 The distribution of subjects' mean somatotype characteristics: ● = sprinters (n = 10); △ = basketball players (n = 12); x = soccer players (n = 15); o = hockey players (n = 14); ■ = non-athletes (n = 11)

(Table 1). The values of body weight and lean weight did not significantly vary among the groups.

As presented in Table 2, significant differences in the endomorphic and ectomorphic components were found among the groups. The post hoc comparison showed that the nonathletes were markedly more endomorphic ($P < 0.05$) than the sprinters and soccer players. Furthermore, the sprinters and basketball players were significantly more ectomorphic ($P < 0.05$) than the hockey players. The mean somatotype distribution of the groups as illustrated in Fig. 1 shows that the sprinters, soccer, and basketball players are predominantly ectomesomorphs. By contrast, it could be observed that the hockey players and nonathletes are endomesomorphs.

Discussion

The subjects of this study varied considerably in their somatotype characteristics. The results obtained indicate that the sprinters, basketball, and soccer players were ectomesomorphs. This finding is consistent with those reported in some studies (3, 5), but is in contrast with others, as reported for football players (4), cyclists (19), wrestlers (20), and weight lifters (5). As found in this study, some investigations had earlier described nonathletes as being predominantly endomorphic (6, 20).

The endomesomorphic characteristics observed in the hockey and reference groups are probably related to the comparatively high body fat values noted for the groups (Table 1). This finding supports the concept of preponderance of body fat in endomorphs (17). A high rating of mesomorphy generally found in athletes is advantageous since it quantifies the musculoskeletal system whose sturdiness is essential for sports performance (19). Apart from its relationship

to athletic performance, somatotyping, as a constitutional approach, may provide insight into the causative mechanisms underlying such human conditions and characteristics as disease and behavior (1, 14, 21). Generally, the differences found among the subjects of this study are related not only to genetic and environmental influences (13, 14) but also to that of regular participation in competitive sports. In addition to describing the physique of athletes, similar studies in future should further evaluate the role of the somatotype in sports performance.

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