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Positional differences in somatic traits among inter university level male football players

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Abstract

The present study was aimed to assess and compare the somatic traits of endomorphy, mesomorphy, ectomorphy characteristics of inter university male football players according to their playing positions. The study was carried out 36 male inter university football players from Vidyasagar University, Paschim Medinipur, West Bengal, aged between 19 to 23 years, who were participated in the East Zone Inter University Football Tournaments (Men) in the year 2015 and 2016 consecutively. Out of 36 players; 05 players were goalkeepers, 11 defenders, 12 midfielders and 08 players were forwards. Their positions in the play field were determined from their positions in the game practices by the chief coach during their coaching camps and also were confirmed by asking them their respective field positions. The Skinfold thickness measurements of all subjects were recorded by Harpenden Skinfold Caliper. Different girths were taken with a steel tape and widths of different body parts measured by using a small Caliper instrument. To assess the somatic traits (endomorphy, mesomorphy and ectomorphy) of all subjects, Heath and Carter (1990) somatotype estimation equations were used. One way analysis of variance (ANOVA) was used to observed differences of mean among the positional differences. The level of significance was set at 0.05. The results showed that there were significant differences in Endomorphy character among Goalkeepers with Defender, Midfielder and Forward as well as Midfielder and Forward. Significant differences were found in Mesomorphy character among Goalkeepers with Midfielder and Forward. The findings also revealed that significant differences were found in Ectomorphy character between defender and midfielder as well as midfielder and forward according to their playing positions.

Keywords: Somatic traits, endomorphy, mesomorphy, ectomorphy, skinfold thickness

Introduction

Soccer is the most popular sport in the world because it is performed by the man and women, children and adults with deferent level of expertise. The popularity of the game is reflected in the millions who participate in soccer in lower level of play. Soccer is now being played in more than 210 countries throughout the world. Soccer is popular because of the fact it is a simple game requiring very minimum infrastructure and equipments. Success in any sports has been associated with specific somatic traits of the individual athletes.

The somatotyping method is especially helpful in sports in which the body could directly influence the biomechanics of movements and the performance's results. High performance sport is constantly searching for ways to improve results, win competitions and break records. The search for as well as the identification and orientation of talents are considered a concern in high performance sports (Borin and Gonçalves, 2008) [1]. Coaches generally report that technical and tactical aspects are extremely important for performance (Souza and Zucas, 2003) [8]; however, great importance has been ascribed to the morphological characteristics of players because they can be considered the basis of technical and tactical development (Chamari *et al.*, 2004) [3]. Some factors such as heredity, nutritional aspects and physical training can significantly contribute to the success of an athlete, especially in high performance sport (Gobbo *et al.*, 2002) [4]. High performance teams continuously seek strategies that may be useful in selecting new talents. A tool that can be used in this type of "diagnosis" is the somatotype. Although body shape and size are not the only variables necessary to determine the success of an athlete, they may represent important prerequisites for certain sports (Gualdi-Russo and Zaccagni, 2001) [5].

Somatotype identification allows the development of specific training programs for each physical characteristic, which differs between sports, positions and game requirements.

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It also allows the verification of differences between athletes who practice the same sport, differentiating them based on their adiposity level, robustness and musculoskeletal linearity (Carter and Heath, 1990) [2]. In this context, the objective of this study was to identify the positional differences in somatic traits among inter university level male football players.

Methods and materials

Sample: The present study was carried out 36 male inter university football players from Vidyasagar University, Paschim Medinipur, West Bengal, aged between 19 to 23 years (mean age: 20.94 years), who were participated in the East Zone Inter University Football Tournaments (Men) in the year 2015 and 2016 consecutively from their residential coaching camps for the participation in Zone Inter University Football Tournaments (Men). Out of 36 players, 05 players were goalkeepers, 11 defenders, 12 midfielders and 08 players were forwards. Their positions in the field of play were determined from their positions in the game practices by the chief coach during their coaching camps and were confirmed by asking them their respective field positions. Prior to the administration of tests, a meeting of the subjects was held in the presence of researcher, coaches and other recorders. The requirements of the testing procedures were explained to them in detail so that there was no ambiguity in their minds regarding the assistant required of them.

Measurement of Somatic Traits: The skinfold thickness measurements of all subjects were measured by Harpenden Skinfold Caliper to the nearest 0.1 mm. Girths were taken with a steel tape to the nearest 0.5 cm. Widths of body parts were measured by using a small Caliper. To assess the somatic traits (endomorph, mesomorph and ectomorph) of positional differences among inter university level male football players, the Heath and Carter (1990) [2] somatotype estimation equations were used.

Equation of endomorphy character:

$$\text{Endomorphy} = 0.1451 (X) - 0.00068 (X)^2 + 0.0000014 (X)^3 - 0.7182.$$

(Where, X = sum of supra-spinal, sub-scapular and triceps skinfold and corrected for stature by multiplying the sum of

skinfolds by 170.18/Body height in cm.)

Equation of mesomorphy character:

$$\text{Mesomorphy} = (0.858 \times \text{Humerus Width}) + (0.601 \times \text{Femur Width}) + (0.188 \times \text{Corrected Arm Girth}) + (0.161 \times \text{Corrected Calf Girth}) - (\text{Body Height} \times 0.131) + 4.5.$$

(Where, Corrected Arm Girth = Arm Girth - Biceps Skinfold, Corrected Calf Girth = Calf Girth - Calf Skinfold).

Equation of ectomorphy character:

$$\text{Ectomorphy} = (\text{HWR} \times 0.732) - 28.58.$$

(Where, HWR = (Body Height in cm) / (Weight in kg)^{1/3}).

Statistical Procedure: For the purpose of analysis of data descriptive statistics the mean, standard deviation and mean difference were obtained through the Statistical Package for Social Studies, (SPSS, Version 20, Inc., Chicago, Illinois). To determine the significant difference between the mean scores of positional differences in somatic traits among inter university level football players the one way analysis of variance (ANOVA) was applied. The level of significance was set at 0.05.

Results

The findings pertaining to the positional differences in somatic traits among inter university level male football players are presented in Table-1.

Table 1: The positional differences in somatic traits among inter university level male football players

Positional Differences	N	Endomorph		Mesomorph		Ectomorphy	
		Mean	SD	Mean	SD	Mean	SD
Goalkeeper	5	3.20	0.15	4.10	0.15	2.80	0.15
Defender	11	2.37	0.19	4.28	0.22	3.04	0.28
Midfielder	12	2.50	0.21	4.30	0.17	2.77	0.26
Forward	8	2.31	0.19	4.41	0.18	3.05	0.26
Total	36	2.51	0.34	4.29	0.20	2.92	0.28

The research that was conducted aimed to determine the differences in somatic traits among inter university level football players. One way analysis of variance (ANOVA) represents the positional differences in somatic traits among inter university level football players F values and their significant levels in Table-2.

Table 2: ANOVA of different positional differences in teams of their somatic traits

Somatic traits		Sum of Squares	df	Mean Square	F	Sig.
Endomorph	Between Groups	2.899	3	0.966	24.731	0.00*
	Within Groups	1.251	32	0.039		
	Total	4.150	35	-		
Mesomorph	Between Groups	0.305	3	0.102	2.767	0.05*
	Within Groups	1.174	32	0.037		
	Total	1.479	35	-		
Ectomorphy	Between Groups	0.632	3	0.211	3.081	0.04*
	Within Groups	2.190	32	0.068		
	Total	2.822	35	-		

*Significant at .05 level.

In table-2, F value of somatic traits clearly indicated that there are significant difference in positional differences among endomorphy, mesomorphy and ectomorphy components. In

order to determine which positional differences different from other positions in somatic traits, the Tukey post hoc test applied and the results are presented in table-3.

Table 3: LSD post hoc multiple comparisons in somatic traits among inter university level football players in terms of their playing positions

S.T	Playing Position with mean values		M.D	Std. Error	Sig.
ENDOMORPH	Goalkeeper (3.20)	Defender (2.37)	0.82	0.106	0.00*
	Goalkeeper (3.20)	Midfielder (2.50)	0.70	0.105	0.00*
	Goalkeeper (3.20)	Forward (2.31)	0.88	0.112	0.00*
	Defender (2.37)	Midfielder (2.50)	0.82	0.106	0.13
	Defender (2.37)	Forward (2.31)	0.70	0.105	0.51
	Midfielder (2.50)	Forward (2.31)	0.88	0.112	0.04*
MESOMORPH	Goalkeeper (4.10)	Defender (4.28)	-0.18	.10332	0.08
	Goalkeeper (4.10)	Midfielder (4.30)	-0.20	0.101	0.04*
	Goalkeeper (4.10)	Forward (4.41)	-0.31	0.109	0.00*
	Defender (4.28)	Midfielder (4.30)	-0.02	0.079	0.74
	Defender (4.28)	Forward (4.41)	-0.13	0.089	0.15
	Midfielder (4.30)	Forward (4.41)	-0.10	0.087	0.24
ECTOMORPH	Goalkeeper (2.80)	Defender (2.80)	-0.24	0.141	0.09
	Goalkeeper (2.80)	Midfielder (2.80)	0.02	0.139	0.85
	Goalkeeper (2.80)	Forward (2.80)	-0.25	0.149	0.10
	Defender (2.80)	Midfielder (2.80)	0.27	0.109	0.01*
	Defender (2.80)	Forward (2.80)	-0.00	0.121	0.97
	Midfielder (2.80)	Forward (2.80)	-0.27	0.119	0.02*

*Significant at .05 level

Discussion of findings

The findings with regard to the comparison of positional differences in somatic traits among male inter university level football players revealed that significant differences exist in endomorphy, mesomorphy and ectomorphy character among different playing positions in the field. Table-3 revealed that significant differences were found in endomorphy character of somatic trait between Goalkeeper and Defender, Goalkeeper and Midfielder, Goalkeeper and Forward as well as Midfielder and Forward among inter university level male football players according to their positional differences. No significant differences exist in endomorphy character of somatic trait between Defender and Midfielder, Defender and Forward among inter university level male football players according to their positional differences. Table-3 also indicated that significant differences were found in mesomorphy character of somatic trait between Goalkeeper and Midfielder as well as Goalkeeper and Forward. No significant differences were noted between Goalkeeper and Defender, Defender and Midfielder, Defender and Forward as well as Midfielder and Forward among inter university level male football players according to their positional differences. Table-3 indicated that significant differences were found in ectomorphy character of somatic trait between Defender and Midfielder as well as Midfielder and Forward. No significant differences were viewed between Goalkeeper and Defender, Goalkeeper and Midfielder as well as Defender and Forward among inter university level male football players according to their positional differences.

When the somatic traits in endomorph character were examined among positional differences of inter university level male football players and it was detected that the structural values of Goalkeeper was 3.20–4.10–2.80; as per nomenclature of somatotype classification is concern, it known as Endomorphic-Mesomorph in character. The structural value of Defender was 2.37–4.28–3.04; as per somatotype classification it is known as Ectomorphic-Mesomorph in character. The structural value of Midfielder shows 2.50–4.30–2.77; as per somatotype nomenclature is concern it known as also Ectomorphic-Mesomorph in character. The structural value of Forward shows 2.31–4.41–3.05; as per somatotype classification it is known as also Ectomorphic-Mesomorph in character. The structural values of positional differences in somatic traits of total team among inter university level male football players shows 2.51–4.29–2.92; as per somatotype nomenclature is concern it known as Ectomorphic-Mesomorph in character. The finding of the

present study of somatotype nomenclature is consonance with the findings of Martirosov *et al.*, (1987); and Neni *et al.*, (2006) [6, 7].

Conclusions

From the above discussion of somatic traits among positional of inter university level male football players it may be concluded that there were significant differences in somatic traits among positional of inter university level football players. From the findings it may also be concluded that volleyball coaches, physical educationists and sports scientists should examine the different aspects of somatic traits in a specific game of the players and adopt the findings for planning their training schedule and conditioning programmes. The results of the present study help to the football coaches, physical educationists and sports scientists for selection of male football teams.

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