

Comparison of Somatotype Values of Football Players in Two Professional League Football Teams According to the Positions

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ABSTRACT

This study compared the somatotype values of football players according to their playing positions. The study aimed to determine the physical profiles of players and to analyze the relationships between somatotypes and playing positions. Study participants were members of two teams in the Turkey Professional Football League, Gençlerbirliği Sports Team (GB) (N=24) and Gençlerbirliği Oftas Sports Team (GBO) (N=24). Anthropometric measurements of the players were performed according to techniques suggested by the Anthropometric Standardization Reference Manual (ASRM) and International Biological Program (IBP). In somatotype calculations, triceps, subscapular, supraspinale and calf skinfold thickness, humerus bicondylar, femur bicondylar, biceps circumference, calf circumference and body weight and height were used. Statistical analysis of the data was performed using the Graph Pad prism Version 5.00 for Windows (Graph Pad Software, San Diego California USA); somatotype calculations and analyses used the Somatotype 1.1 program and graphical representations of the results were produced. Analysis of non-parametric (two independent samples) Mann-Whitney U Test of the player data showed that there were no statistically significant differences between the two teams. The measurements indicated that, when all of the GB and GBO players were evaluated collectively, their average somatotypes were balanced mesomorph. The somatotypes of GBO goalkeepers were generally ectomorphic mesomorph; GB goalkeepers were balanced mesomorphic, although they were slightly endomorphic.

Key words: football, somatotype

Introduction

Football is the most common and popular sport across the world. It is actively played and watched by a great number of people with close interest in all countries around the world. Playing football requires specific anthropometric and physiological characteristics, in addition to skill, experience and intelligence^{1,2}. The amount of body fat is used as one indicator of being healthy and is also used as one of the most important criteria of optimal efficiency in high performance sports³. Football is played for at least 90 minutes in official competitions. There are technical, tactical, physiological and psychological factors affecting the performance of players. The body composition of footballers can influence their performance in games and affect their success. The amount of body fat is related to the athlete's strength, speed and internal body

heat, which affect sporting achievement. Somatotypical measurements are applied based on external features of body structure and somatotype is accepted as one of the indicators of physical body structure³. The most common method of determining somatotype is the Heath-Carter Method. This method involves a three-phase classification: endomorphy, mesomorphy, ectomorphy^{3,4}. There are stationary positions in the football game plan such as defense, middle and forward. Every player takes part in the position that they are assigned and improve their skills with training appropriate to that role. These individual players in their positions have to function as a team to be able to most efficient. Another factor affecting their achievement is their somatotype structure. Recent studies suggest that anthropometric properties have an influ-

ence on football players' performance³. The body composition related to performance is usually evaluated on the basis of somatotype and body fat determination in performance-related issues. It is suggested that appropriate body structure plays a key role in achieving high performance in sports. Previous studies indicated that anthropometric properties affected the performance of football players³⁻⁶. Therefore, the present study aimed to determine somatotype values of professional football players according to their positions and to analyze the relationship between somatotype and playing positions.

Materials and Methods

Total of 48 male players were selected from Gençlerbirliği Football Team (GB) and Gençlerbirliği Oftas Football Team (GBO), both of which compete in the first level of the Professional Turkish Football League.

According to the techniques suggested by the Anthropometric Standardization Manual (ASRM) and International Biological Program (IBP), triceps, subscapular, supraspinale, and calf skin convolution thickness measurements were taken with a skinfold calliper (Holtain country) from each player; data were collected twice in order to minimise the possible errors. Humerus bicondylar and femur bicondylar were measured with a small-size compasses, biceps and calf were measured with a tape measure, weight with digital scale (100 g sensitive), and height was measured using an anthropometer. The somatotypical calculations and analyses were completed using the Somatotype 1.1 Programme, and Statistical analysis of the data was performed using the Graph Pad prism Version 5.00 for Windows (Graph Pad Software, San Diego California USA). Analysis of non-parametric (two independent samples) Mann-Whitney U-Test.

Heath and Carter's Protocol (1990) was used to calculate somatotypes of players.

Endomorphy:

$$-0.7182 + 0.1451(x) - 0.00068(x^2) + 0.0000014(x^3)$$

x = triceps (mm) + subscapular (mm) + supraspinale (mm)
 Height correction formula: $x \cdot 170.18 / \text{boy (cm)}$

Mesomorphy:

$$(0.858 \cdot \text{Humerus bicondylar (mm)} + 0.601 \cdot \text{femur bicondylar (mm)} + 0.188 \cdot \text{corrected upper arm girth (cm)} + 0.161 \cdot \text{corrected calf girth (cm)}) - (\text{height} \cdot 0.131) + 4.50$$

Ectomorphy:

$$\text{HWR} \cdot 0.732 - 28.58$$

$$\text{HWR} = \text{boy (cm)} / \text{weight}^{1/3} \text{ (kg)}$$

HWR < 40.75 but if HWR > 38.25, then Ectomorphy = $\text{HWR} \cdot 0.463 - 17.63$
 HWR < 38.25 Ectomorphy = $\text{HWR} \cdot 0.1$

Results

The aim of the study was to determine the somatotypes of professional football players according to their positions. The following findings were obtained from the study.

The average age of GB players was 25.12 years, while the average age of GBO players was 23.29. The average height of GB players was 179.08 cm, and average weight was 76.6 kg; the average height of GBO players was 179.28 cm, and average weight was 76.86 kg (Tables 1 and 2). Tables 1 and 2 show that somatotype values of both teams (endomorphism, mesomorphy, ectomorphy) were quite similar.

TABLE 1
 PHYSICAL AND ANTHROPOMETRIC CHARACTERISTICS OF GBO FOOTBALL PLAYERS

Variable	X±SD	Range
Endomorphy	2.28±0.41	1.5–3.3
Mesomorphy	4.40±1.05	2.3–6.9
Ectomorphy	2.31±0.64	1.2–3.5
Age	23.29±2.12	19.92–28.3
Height	179.28±5.71	167.7–190.4
Mass	76.86±5.39	64.1–88.7
Triceps SF	7.01±1.63	4.05–10.55
Subscapular SF	9.61±1.32	6.9–12.3
Supraspinale SF	6.42±1.81	4.8–11.6
frmtxty0Calf SF	4.93±1.25	3.65–9.75
Arm Girth	30.18±2.60	26.5–34.9
Calf Girth	40.81±3.56	35.1–47.5
Humerus B.	6.78±0.48	6.0–7.6
Femur B.	9.22±0.60	7.6–10.1

TABLE 2
 PHYSICAL AND ANTHROPOMETRIC CHARACTERISTICS OF GB FOOTBALL PLAYERS

Variable	X±SD	Range
Endomorphy	2.34±0.44	1.6–3.3
Mesomorphy	4.35±0.93	2.4–6.2
Ectomorphy	2.30±0.61	1.4–3.8
Age	25.12±3.60	18.55–32.03
Height	179.08±5.73	169.9–194.0
Mass	76.60±6.56	64.9–92.6
Triceps SF	7.15±1.70	4.7–9.7
Subscapular SF	9.57±1.69	7.3–15.65
Supraspinale SF	6.86±1.53	4.4–9.9
Calf SF	5.32±1.22	3.75–7.9
Arm Girth	29.05±2.00	25–33
Calf Girth	37.99±2.16	33.1–42.2
Humerus B.	7.01±0.43	6.2–8.0
Femur B.	9.87±0.42	9.2–10.8

When the GBO players were evaluated collectively (Figure 1), it was found that the average somatotype was balanced mesomorphic. In terms of the distribution of the players according to the regions in the somatotype graphic, it was found that 9 (39%) players were fully mesomorphic, 7 (30%) players were slightly endomorphic mesomorphic and 5 (22%) players were slightly ectomorphic mesomorphic.

When the GB players were evaluated collectively (Figure 2), it was found that the average somatotype was balanced mesomorphic. When the somatotype graphic was analyzed according to the regions, it was found that 6

(22%) of the players were mesomorphic, 6 (22%) were slightly endomorphic mesomorphic, and 6 (22%) were ecto-mesomorphic.

When the players in GBO and GB teams were analyzed according to their playing positions, it was found that GBO goalkeepers were generally ectomorphic mesomorph; GB goalkeepers were slightly endomorphic balanced mesomorph (Figure 3).

Figure 4 indicates that defensive players of both GBO and GB teams were balanced mesomorphic; however, GB defense players were slightly ectomorphic.

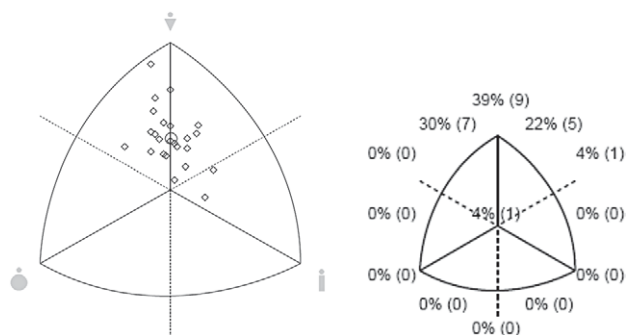


Fig. 1. Somatotype values of gbo players.

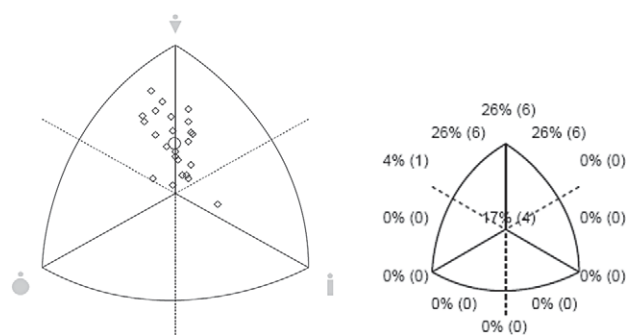


Fig. 2. Somatotype values of gb players.

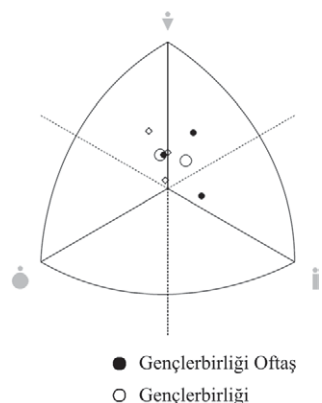


Fig. 3. Somatotype values of gb and gbo goalkeepers.

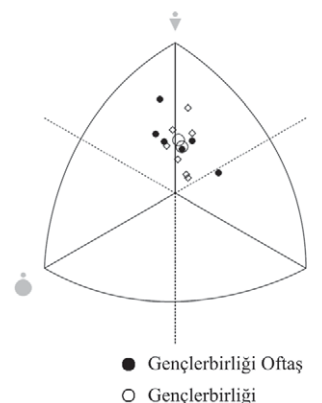


Fig. 4. Somatotype values of gbo and gb defenders.

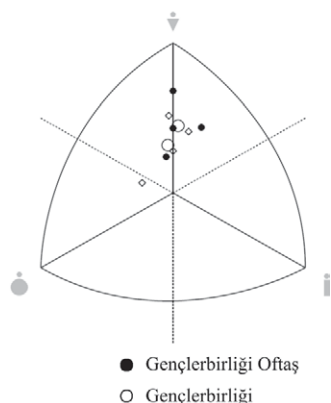


Fig. 5. Somatotype values of gbo and gb mid-fielders.

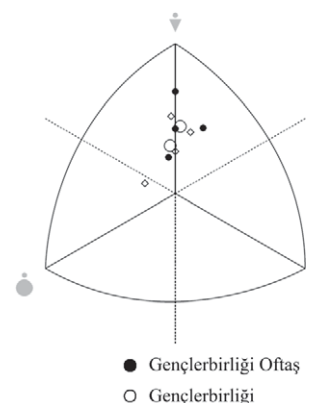


Fig. 6. Somatotype values of gbo and gb forward players.

It was found that the somatotypes of mid-field players of both GBO and GB teams were generally balanced mesomorph; however, the mid-fielders of the GBO team were slightly endomorphic (Figure 5).

As indicated in Figure 6, the somatotypes of GBO and GB forward players were generally balanced mesomorph.

Discussion and Conclusion

In this study, the somatotypes of football players from two different professional league football teams were compared and the results were analyzed in line with the literature.

Jankovic et al.⁴ found that average age was 21.6 years; average height was 176.5 cm and average weight was 76.01 kg. Heller et al.⁵ found that the average age of 12 football players was 23.5 years; average height was 1.83 cm and average weight was 75.6 kg. Reilly⁷ found that the average height of 9 professional football players was 1.77±1.6 m and average body weight was 74.0±1.6 kg. In the present study it was found that the average age of football players in the GB team was 25.12 years, average height was 179.08 cm and average body weight was 76.6 kg. The average age of football players in the GBO team was 23.29 years, average height was 180.28 cm and average body weight was 76.86 kg. The results of the present study were consistent with the literature.

When the GB and GBO Sport players were analyzed collectively, it was found that their somatotypes were balanced mesomorph.

Martirasov et al.³ analyzed national junior team players of 10 different countries and found that the somatotype values of the players were balanced mesomorphic and ecto-mesomorphic, on average. Rienzi et al.⁸ found that the somatotype values of South Africa football players were balanced mesomorphic. Vivani et al.⁹ analyzed 19 football players and found that the components were 2.1 (endomorph), 5.2 (mesomorph) and 2.4 (ectomorph). In the same study, somatotype values of 29 Brazilian football players were reported as 2.8 (endomorph), 4.2 (mesomorph) and 2.1 (ectomorph). Casajus¹⁰ reported

that the somatotype values of 15 professional football players were mesomorphic.

In the present study it was found that the players of both football players (GBO-GB) were balanced mesomorphic. A review of the literature revealed that the values determined in the present study are similar to those reported in the literature. Since football is played on a large field and the players are assigned different tasks, positional evaluations should be made according to the physical and physiologic requirements of each playing position¹¹. In terms of the somatotype values of the football players of GB and GBO teams: It was found that GBO goalkeepers were generally ectomorphic mesomorph; GB goalkeepers were slightly endomorphic balanced mesomorph. Analysis of variance (ANOVA) indicated that there was no significant difference between the players of the two teams. Defense players of both GBO and GB teams were balanced mesomorphic in general terms; however, GBO mid-field players were ectomorphic. Analysis of non-parametric (two independent samples) Mann-Whitney U Test indicated that there was no significant difference between the teams. The somatotypes of GBO and GB forward players were balanced mesomorphic in general terms. No significant differences were found between the players of the two teams. Ramadan et al.¹² found that average somatotype values of defense players were balanced mesomorphic; average somatotype values of mid-fielders were ecto-mesomorphic; average somatotype values of forward players and goalkeepers were endomorphic-mesomorph; and average somatotype values of all players were balanced mesomorphic. Pelin et al. found that average somatotype values of football players were balanced mesomorphic¹³. Casajus et al.¹⁰ carried out a study of 30 professional football players. They found that the players were mesomorphic, and that seasonal changes did not affect somatotype. Although the findings reported in the literature are similar to those of the present study, there are some differences. Previous studies show variations according to factors such as country, ethnicity, league, age of sport and individual differences.

TABLE 3
SUBJECTS' SOMATOTYPE VALUES ACCORDING TO PLAYING POSITIONS

Parameters		Endomorphy		Mezomorphy		Ectomorphy	
			P value		P value		P value
Goalkeepers	GB	2.67±0.21	0.64	3.90±0.66	0.21	2.33±0.57	0.18
	GBO	2.20±0.46		3.77±1.37		3.07±0.49	
Defenders	GB	2.26±0.32	0.94	4.26±0.77	0.94	2.56±0.36	0.36
	GBO	2.20±0.42		4.42±0.76		2.37±0.76	
Mid-Fielders	GB	2.34±0.42	0.56	4.64±1.17	0.62	2.20±0.83	0.67
	GBO	2.35±0.45		4.33±1.12		2.01±0.52	
Forward Players	GB	2.33±0.94	0.68	4.13±0.66	0.20	2.10±0.28	0.18
	GBO	2.23±0.39		5.05±1.08		2.48±0.36	

p<0.05

Carter¹⁴ analyzed the relationship between somatotype and sporting performance and found that, in successful sportsmen, 25–60% of the change in physical competencies can be explained by somatotype.

In the present study, it was found that the players of both teams were mesomorphic. These results indicate that there is no specific relationship between somatotype and playing positions. The trend in football increasingly focuses on improving the performance of all players in all positions. For example, a defense player can not play a defensive game alone for a long period; likewise, a forward player can not organize attacks over a long time. In junior and elite footballers, the roles undertaken according to their positions are related to their physical performance. Somatotype is a method used for evaluating physical profile. However, anthropometric and physiological factors are evaluated, together with genetic factors,

and the effect of training. No single method is adequate to determine physical profile⁷.

Talent selection and guidance is important in sports requiring high performance. Therefore, in talent selection, objective criteria should be used; and collective guidance should be used, based on anthropometric and physiologic tests. Appropriate guidance, based on individual differences and development, should be given priority.

The somatotype evaluation in the present study indicated that there is no specific relationship between somatotype and playing position in football. Football is one of the most popular forms of sport in the world. We believe that, in order to identify new, talented players, other physiological performance tests should be used, together with somatotype studies, and the players' development should be monitored.

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USPOREDBA VRIJEDNOSTI SOMATOTIPOVA NOGOMETAŠA U DVA NOGOMETNA TIMA PROFESIONALNE LIGE U TURSKOJ

SAŽETAK

U ovom istraživanju uspoređuju se somatotipovi nogometaša prema njihovim igračim pozicijama. Istraživanje nastoji odrediti fizičke profile igrača te analizirati odnose između somatotipova i igračih pozicija. Sudionici istraživanja bili su članovi dva tima i turskoj profesionalnoj nogometnoj ligi. Gençlerbirliği tim (GB) (N=24) and Gençlerbirliği Oftas tim (GBO) (N=24). Antropometrijska mjerenja igrača obavljena su prema Anthropometric Standardization Reference Manual (ASRM) te International Biological Program (IBP). Podaci su statistički obrađeni rabeći Graph Pad prism v5.00, a za izračun i analizu somatotipova rabio se program Somatotype 1.1. Analiza neparametarskih (dva nezavisna uzorka) Mann-Whitney U test podataka igrača pokazala je kako nema statistički značajnih razlika između dva tima. Mjerenja pokazuju da su kod kolektivne evaluacije GB i GBO igrača, njihovi prosječni somatotipovi bili balansirani mezomorf. Somatotipovi GBO golmana bili su uglavnom ektomorfni mezomorf dok su GB golmani bili balansirano mezomorfni, premda su bili blago endomorfni.