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Morphological Profile of Football Players in Junior Category

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Abstract

Research was conducted with the aim to determine related typological categories of football players related to morphological profile. For measuring anthropometrical characteristics 12 variables were used, which estimate longitudinal and transversal dimensionality of skeleton, volume and body mass and under skin adipose tissue. By applying hierarchical procedure three groups of examinees were isolated according to affinity of structures of variable correlations of morphological characteristics. Discriminant analysis determined that there are quantitative differences between examinees groups. Authors conclude that football can be played successfully by football players with different morphological profiles, and that it does not require specific body structure.

Key words: **morphological profiles, quantitative differences, junior football players**

Sažetak

Istraživanje je rađeno sa ciljem utvrđivanja srodnih tipskih skupina nogometaša u odnosu na morfološki profil. Za mjerenje atropometrijskih karakteristika korišteno je 12 varijabli koje procjenjuju longitudinalnu i transverzalnu dimenzionalnost skeleta, volumen i masu tijela te potkožno masno tkivo. Hijerarhijskom procedurom izdvojene su tri grupe ispitanika prema srodnosti struktura međuodnosa varijabli morfoloških karakteristika. Diskriminativnom analizom utvrđene su kvantitativne razlike između tipskih skupina ispitanika. Autori zaključuju da nogomet mogu uspješno igrati različiti morfološki profili nogometaša, te da nogomet ne zahtijeva izrazito specifičnu tjelesnu građu.

Ključne riječi: **morfološki profili, kvantitativne razlike, nogometaši juniori**

Introduction

Morphological characteristics are used for determining construction type, which is most frequently defined by method *Heath i Cartera iz 1967 (Bajramović, 2011.).* By this method soma type of professional sportsmen is determined. Football, differing from greater number of other team sports (basketball and volleyball), does not require sportsmen with specific body structure (Marković i Bradić, 2009.). Some examinations of relations between anthropometric dimensions and success in play (Jerković, 1986.) confirm that there is no significant relation between structure of locomotor system and effectiveness in playing football. Based on that, it can be concluded that morphological factors do not have prime importance in football, except with goalkeepers. Previous anthropometric measures of football players height (Mekić, 1985.), considering position on the field, have showed that tallest players were goalkeepers, followed by defensive midfielders, while the shortest were right and left backs (external defenders) and right and left midfielders (central field players).

Some researches (Barišić, 1996.) isolate two groups of soccer players: goalkeepers and players on the field, who differ in morphological area (longitudinal and transversal dimensionality of skeleton). Today's players are slightly taller than before. The tallest are still goalkeepers, with average height and mass of: 187 kg and 83 kg, which is justified because of their function in play, while that values for right and left midfielders are average: 184 cm and 78 kg (Marković i Bradić, 2009.). Differences in height of soccer players in certain lines are reduced, which can be interpreted by the fact that today's players are more universal, and they are equalized in their ability and constitution. Goal of the research is determining soccer player groups relative to morphological profile.

Method of research

Sample of examinees

The research includes a sample of 149 junior football players, who are members of following football clubs of Canton Sarajevo:

„Željezničar" (N=34), „Sarajevo" (N=32), SAŠK „Napredak" (N=28), „Radnik" (N=29) and „Olimpik" (N=26).
All players met conditions for measuring. Because of their specific rule on the field, goalkeepers were not involved in the research.

Sample of variables

Measuring of anthropometrical characteristics are performed according to instructions of IBP „International Biological Program"(Weiner & Lourie, 1969.). Measures of longitudinal dimensionality of skeleton: body height -

ALVT, leg length - ALDN and feet length - ALDS; Measures of transversal dimensionality of skeleton: diameter of knee - ATDIK and diameter of ankle joint–ATDSZ; measures of volume and body mass: body mass - AVTT, amplitude of thigh - AVONAT, amplitude of lower leg – AVOPOT and amplitude of upper arm - AVONAD;. Measures of body skin curves: abdominal curve – ANTRB, curve of thigh- ANNAT, and curve of lower leg- ANPOT.

Methods for analysing results

By applying hierarhical procedure *(Hierarchical Cluster Analysis)* taxonomization of examinees has been conducted, according to structure of correlations between variables of morphological characteristics. For classifying entities in groups, Wards method has been used *(Ward, 1963.) Bajramović (2011),* based on euclidean distances. Determining related groups was main precondition for applying K-means algorithms. Discriminant analysis determined quantitative differences between related groups of examinees. For all related groups, measures of averages and variability of used variables have been calculated (Rađo, Wolf, 2002.)

Results

Based on examinations of dendrogram in area of morphological characteristics of football players, four relatively homogeneous related groups have been identified (Diagram 1). First group is comprised of 43, second 36, third 45, and forth 25 examinees. It can be noticed that, by its number, related group number 3 (N=45) differs from others. Middle values of related group 1 are on the level below average of majority of variables, although they are the closest to the average values determined on total sample of examinees. Related group 2 has lowest average values of all variables, and all are placed in the zone of values which are significantly lower than arithmetic means. Related group 4 has highest average values of variables for estimating longitudinal dimensionality of skeleton, which are placed above average of total sample.

Related group 3 shows above average values of measures for estimating longitudinal dimensionality of skeleton, which are slightly lower, when compared to group 4. Related group 3, relative to other groups have highest values of all variables for estimating transversal dimensionality of skeleton, volume and body mass, and variables for estimating underskin adipose tissue. Two significant discriminative functions can be determined p<,01 (table 2 and 3). First discriminative function explains high percentage of common variance, where value of coefficient of canonic correlation is significantly high, and value of discriminative strength applied variables is low, which notifies that there are great differences among related groups.

Second discriminative function appoints to high coefficient of canonic correlation and low value of discriminative strength of applied variables. From structures of dis-

criminative functions it can be seen which morphological measures discriminate related groups the most (table 4). Based on size and augury of projection of centroid, the difference among identified related groups has been shown, relative to distance of every discriminative function (Table 5). Positions of centroid groups show differences among classes, which is confirmed by discriminative analysis. Centroids of group 2 and group 4 differ the most. The remaining centroids of related groups 1 and 3 are grouped in a way to show slightly smaller difference.

Dendogram
Wand metod
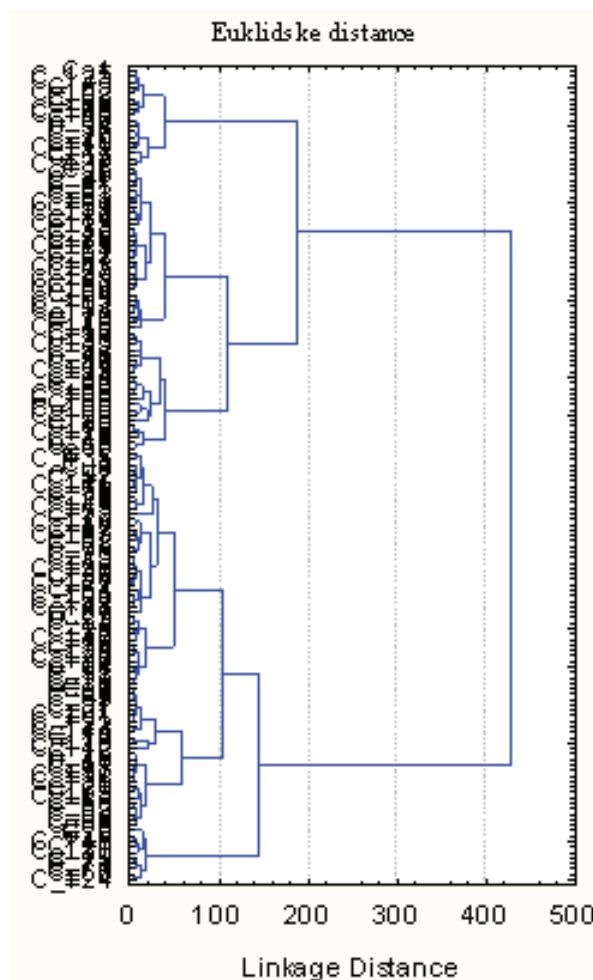149 junior football players
Morphological characteristics

Table 1. Descriptiv statistic morphological characteristics

Variable	Group 1 N=43		Group 2 N=36		Group 3 N=45		Group 4 N=25		Summary N=149	
	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
ALVT	177,00	3,21	174,11	3,69	184,76	2,94	186,08	3,23	180,34	6,05
ALDN	102,97	2,89	101,36	3,18	108,04	2,83	109,57	2,91	105,42	4,55
ALDS	26,93	0,72	26,34	0,98	28,46	1,09	28,41	1,06	27,49	1,31
ATDIK	9,70	0,39	9,36	0,29	10,26	0,32	9,80	0,51	9,75	,472
ATDSZ	7,64	0,42	7,21	0,33	7,99	0,43	7,82	0,35	7,65	,46
AVMT	72,71	3,41	62,58	4,29	81,86	3,96	70,76	3,67	71,21	7,22
AVONAT	56,08	3,79	51,05	2,88	57,54	3,35	52,90	1,96	54,15	3,85
AVOPOT	37,53	1,83	34,87	1,47	39,42	2,17	36,97	1,43	37,04	2,23
AONAD	27,56	1,53	25,50	2,68	28,14	1,41	26,37	1,62	26,80	2,10
ANTRB	9,58	2,61	6,88	1,81	10,60	2,36	7,35	1,73	8,42	2,57
ANNAT	9,93	2,39	7,52	1,27	10,68	2,17	8,20	1,67	8,95	2,24
ANPOT	8,25	2,02	6,47	1,62	7,88	2,12	6,84	1,84	7,33	2,02

Table 2. Discriminant analysis

Function	Coefficient	% Variance	% Cumulat.	Coef Canon.corel.
1	4,013	71,9	71,9	,895
2	1,465	26,3	98,2	,771

Table 3. Wilks'ova Lambda

Test function	Wilks'L	X2	df	Sig.
1 through 3	,074	365,429	36	,000
2 through 3	,369	139,741	22	,000

Table 4. Structure

Varijable	1	2
AVTT	,76	,47
ALDS	,42	-,35
AVOPOT	,40	,25
ATDSZ	,35	-,04
ATDIK	,34	,07
ALVT	,65	-,69
ALDN	,47	-,58
ANTRB	,22	,43
ANNAT	,21	,37
ANPOT	,09	,24
AVONAT	,29	,43
AONAD	,19	,26

Table 5. Centroid

Group	1	2	3
1	-,23	1,22	,36
2	-2,94	-,05	-,29
3	,88	-1,66	,12
4	3,04	,95	-,43

Discussion

The results presented show that values of morphological measures of total sample of examined junior football players of Canton Sarajevo (Bosnia and Herzegovina) do not differ significantly from results of similar researches conducted on population of soccer players U-18. However, observing isolated related groups within the sample of examinees, results indicate that soccer players of junior category vary relative to their morphological characteristics. Lower values of standard deviations of related groups, relative to standard deviation of total sample is understandable, since related groups are more homogeneous groups of entities relative to total sample.

By observing mean values of forth related group, it can be assumed that it represents metamorphic constitutional types (tall, slender, long bones). Second related group indicates significant below-average values of all treated morphological measures. Third related group has greater muscle mass. It is evident that there are different morphological/constitutional profiles present in football, which successfully compete in highest rank of competitions in Bosnia and Herzegovina for that age. These factors perhaps are not important for successfully playing football, but they could eventually determine position on the field. Especially height and body mass can be advantages in certain situations in play, while in others they could be disadvantages (Ostojić, 2007.).

Evident differences in treated measures of morphological variables could be ascribed to different factor. Constitutional type and individual specificity certainly plays important rule in grouping entities, which could be main cause of statistically significant differences. The reason of these differences between variables of entities placed in relatively similar groups can be found in biological age (Glinder, 1994). Biological age explains that some individuals grow up faster, while this process is slower and longer for others, which certainly could cause morphological differences (Malacko, Rađo, 2004).

Conclusion

Based on presented results of the research, it can be concluded that values of morphological measures of junior football players vary. Considering that related groups comprise soccer players whose values treated morphological measures appoint to similar values inside, and different values between groups, which is tested by multivariate statistical methods, it can be concluded that football can be successfully played by different morphological profiles or constitution types (Matković, 1993), and it can be confirmed that football does not demand specific body structure (Puga, 1993).

Also, it is evident that morphological measures of football players sample (longitudinal and transversal dimensionality of skeleton, volume and body mass, and underskin adipose tissue) are within optimal values range for this population (Ozoner, B., (2007). Certainly, results of this and similar resources can be used when selecting football players.

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