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Body Composition Differences between Football Players of the Three Top Football Clubs

Diferencias de Composición Corporal entre los Jugadores de Fútbol de los Tres Mejores Clubes de Fútbol

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SUMMARY: The aim of this research was to determine the differences among the football players of three the most successful football clubs in Kosovo, FC Trepca ´89, FC Prishtina and FC Besa Peje in a terms of morphological characteristics and body composition. A sample of 53 subjects was divided into three sub-samples. Fifteen (15) players of FC Trepca ´89 of the average age 21.80±3.57, the champions of Kosovo, twenty (20) players of FC Prishtina of the average age of 24.30±4.99, the vice champions of the Kosovo Championship, and eighteen (18) players of FC Besa Peje of the average age 21.83±3.17, the champions of the Cup of Kosovo. Football players were tested immediately after the end of the competition season. Morphological characteristics in the body composition were evaluated by a battery of 10 variables: body height, body weight, waist circumference, triceps skinfold, biceps skinfold, skinfold of the back, abdominal skinfold, body mass index, fat percentage and muscle mass. The significance of the differences between the players of the three the most successful football clubs in the morphological characteristics and variables for assessing body composition were determined by ANOVA and LSD post hoc test. ANOVA test found that the football players of the three mentioned clubs have statistically significant differences in one variable that estimate the waist circumference. The LSD Post Hoc test showed that football players of FC Besa Peje had significantly less value of waist circumference compared to the football players of FC Prishtina and FC Trepca ´89. The values of the waist circumference of all football players show that they belong to professional trained players, although their differences in this variable are statistically significant.

KEY WORDS: Body composition; Morphological Characteristics; Football.

INTRODUCTION

A football game is said to be the most important secondary event in the world, it gathers huge masses at stadiums and in front of TVs (Gardasevic *et al*., 2017). It is a highly dynamic and fast team game which, with its richness of movement, falls under category of polystructural sports games. Football is a sport that is characterized by numerous and various complex and dynamic kinesiological activities which are then characterized by either cyclical or acyclical movement (Sermaxhaj *et al*., 2017). In football, top score can be achieved only under conditions of a well-programmed training process. High quality management of the training process depends on the knowing of the structure of certain anthropological capabilities and player's characteristics, as well as their development. Various researches are to be done in order to establish certain principles and norms for the transformational processes of the anthropological characteristics important for football. However, in many places much more time is spent on increasing the physical fitness of athletes without taking into consideration the assessment of their body composition and their nutritional status (Triki *et al*., 2012). Understanding the profile of successful players could give coaches, trainers, and exercise scientists better working knowledge of this particular group of athletes (Ostojic, 2003). Findings regarding morphological characteristics and body composition are of crucial importance for complex sports games such as football. The morphological space is defined by the longitudinal dimension of the skeleton, the transversal dimensionality of the skeleton and the mass and volume of the body. The purpose of knowing morphological characteristics is to improve skills in many sports (Carter & Heath, 1990). The morphological status of top level athletes is relatively homogeneous, depending on the sport, and it can be defined as a model of athletic achievement (Misigoj-Durakovic *et al*., 1995). Research on morphological characteristics and body composition among athletes of different sports indicates that athletes of different sports have

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their own specific characteristics, mostly due to the reason that absolute size contributes a significant percentage of total variance associated with athletic success (Carvajal *et al*., 2012). Muscle mass improves performance in activities that require muscular strength and endurance, but also in those that require enviable aerobic ability (Ramadan & Byrd, 1987; Green, 1992; Rico-Sanz, 1998). The athlete's belonging to a sports branch gives an athlete certain morphological characteristics and body compositions. It provides the athlete the advantage of dealing with this sport in relation to others.

Today, football is the number one sport in the world for its rating and popularity, which also applies to Kosovo. The Football Superleague of Kosovo is the top football league in Kosovo. It is headed by the Football Federation of Kosovo. Twelve teams participate in this league. The winner of the Superleague of Kosovo starts the qualifications for the UEFA Champions League from the preliminary round. The second placed team play in the first qualifying round of the UEFA Europa League. The three clubs at the top of the Superleague of Kosovo and are competing for trophies almost every year are Socer Club Trepca ´89 (hereinafter FC Trepca ´89), Socer Club Prishtina (hereinafter FC Prishtina) and Socer Club Besa Peje (hereinafter FC Besa Peje). In the 2016/17 competitive season, all of the three clubs have achieved a staggering success, FC Trepca ´89 was the champion of Kosovo, FC Prishtina was the vice champion of Kosovo and FC Besa Peje won the Cup of Kosovo. Based on results at the end of the competition season, FC Trepca ´89 and FC Prishtina have acquired the right to play on the international football scene within the framework of UEFA's competitions. It became as interesting for researchers to determine the models of anthropometric characteristics and body composition of the players who play for these clubs as to determine the differences among them.

The aim of this research was to analyze the differences in some morphological characteristics and body composition among top football players, players of FC Trepca ´89, FC Prishtina and FC Besa Peje who compete in the Superleague of Kosovo.

MATERIAL AND METHOD

The data obtained in the study of morphological characteristics and body composition are checked and prepared for processing according to the set goal. Data bases are arranged according to the features and prepared for planned statistical processing. The results obtained by statistical analysis are presented in the tables and analyzed by the corresponding logical units. In general, the results of the research, through gradualness in the explanation of individual relationships, indicate differences in the observed morphological characteristics and body composition in accordance with the aim of the research, that is, they contribute to a clearer application of the obtained results in practice. In terms of time constraint, the research is of transversal character, and it consists of one-off measurement of the corresponding morphological characteristics and body composition of top-level senior players.

Sample of subjects: A sample of the subjects consists of a total of 53 top-level senior players who performed in the Superleague of Kosovo, divided into three sub-samples. The first sub-sample of the subjects consisted of 15 players of FC Trepca ´89 of the average age 21.80±3.57, the champions of the Superleague of Kosovo, the other sub-sample consisted of 20 players of FC Prishtina of the average age of 24.30±4.99, the vice champions of the Superleague of Kosovo, and the last sub-sample of the examinees consisted of 18 players of FC Besa Peje of the average age 21.83±3.17, the champions of the Cup of Kosovo. The football players were tested immediately after the season ended. All participants signed the consent form approved, which was in accordance with the Declaration of Helsinki.

Sample of measures: Anthropometric research has been carried out with respect to the basic rules and principles related to the selection of measuring instruments and measurement techniques standardized in accordance with the International Biological Program guidelines. For the purpose of this study, seven morphological measures have been taken: body height, body weight, waist circumference, triceps skinfold, biceps skinfold, skinfold of the back, abdominal skinfold, and three body composition assessment variables: body mass index, fat percentage and muscle mass. Anthropometer, caliper, and measuring tape were used for morphological measurements. To evaluate the body composition, Tanita body fat scale - model BC-418MA, was used. The principle of this scale is based on indirect measurement of the body composition; a safe electrical signal is transmitted through the body via electrodes located in the standalone unit. The Tanita Scale, thanks to its athletics mode, enables athletes to closely monitor their body weight, health condition and form with all relevant parameters.

Method of data processing: The data obtained through the research were processed by descriptive and comparative statistical procedures. For each variable, central and dispersion parameters have been processed. The significance of the differences between the players of the three the most successful football clubs in the morphological characteristics and variables for assessing body composition was determined by ANOVA and LSD Post Hoc tests, with statistical significance of $p<0.05$.

RESULTS

The variables for assessing morphological characteristics and body composition of subjects are shown in Table I.

There were significant differences in one variable among the football players of the three clubs. A significant difference was found for the waist circumference (F=3.25; p=.047).

The significant differences of waist circumference among the football players of these three clubs are shown in Figure 1.

The LSD post hoc test showed that football players of FC Besa Peje had significantly less value of waist circumference compared to the football players of FC Prishtina and FC Trepca ´89.

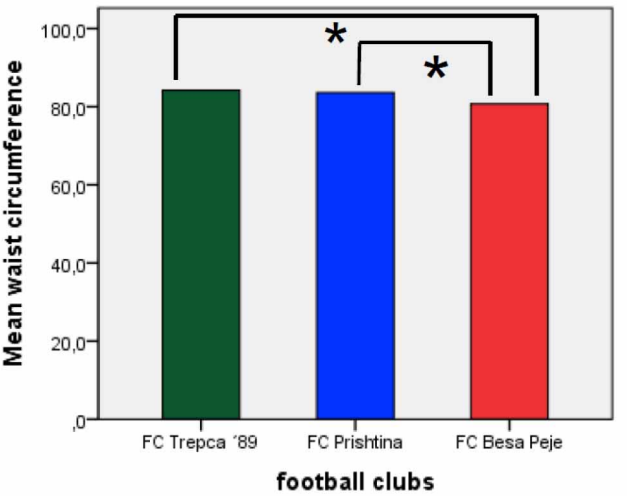

Fig. 1. LSD Post Hoc test for the waist circumference.
*= significance p < .05

Table I. Descriptive data and ANOVA of 53 football players, members of the three clubs.

Variables	FC Trepca ´89	FC Prishtina	FC Besa Peje	ANOVA	
	Mean±SD	Mean±SD	Mean±SD	F	p
body height (cm)	181.95 ± 4.41	179.72 ± 5.19	179.57 ± 6.73	.92	.406
body weight (kg)	76.61 ± 6.75	75.43 ± 7.81	73.73 ± 7.11	.66	.523
waist circumference (cm)	84.20 ± 3.76	83.60 ± 4.60	80.72 ± 4.34	3.25	.047*
triceps skinfold (mm)	7.11 ± 1.86	6.25 ± 2.16	7.48 ± 2.35	1.62	.208
biceps skinfold (mm)	4.57 ± 1.49	4.46 ± 1.43	4.79 ± 1.88	.21	.813
skinfold of the back (mm)	9.04 ± 2.07	8.89 ± 2.03	8.36 ± 1.58	.60	.550
abdominal skinfold (mm)	8.33 ± 3.84	7.79 ± 1.89	9.35 ± 3.60	1.18	.316
body mass index (kg/m^2)	23.01 ± 1.65	23.31 ± 1.65	22.86 ± 1.55	.39	.679
fat percentage (%)	9.81 ± 2.96	10.40 ± 3.83	9.20 ± 2.56	.67	.515
muscle mass (kg)	39.02 ± 2.53	38.18 ± 3.46	37.85 ± 3.33	.57	.566

* - p<.05

DISCUSSION

The importance of body composition in sport performance is a primary concern in creating athletes profiles as well as conditioning programs throughout a season at all levels of competition (Silvestre *et al*., 2006), in that describing morphological characteristics and body compositions of athletes and detecting possible differences in relation to competition levels may give coaches a better working knowledge of the studied groups of athletes.

By looking into the basic descriptive statistical parameters, it can be concluded that we have examined professional football players indeed. It can be noticed that the football players of these three clubs are of the approximately similar mean values of the variables analyzed, which is not surprising because these are the top three clubs in Kosovo, a state where there is also a concentration of the best football players. The ANOVA showed a statistically significant difference only in one variable, the waist circumference. The LSD post hoc test shows that the football players of FC Besa Peje had the significantly less value of waist circumference compared to the football players of FC Prishtina (p<.05) and football players of FC Trepca ´89 (p<.05). There were no significant differences between football players of FC Trepca ´89 and football players of FC Prishtina. The football players of FC Besa Peje are lower, they have a smaller weight and smaller bodi mass index

Table II. Descriptive data of all 53 football players.

Variables	Min	Max	Mean±SD
Age	16	34	22.75 ± 4.160
body height (cm)	168.0	192.5	180.30 ± 5.5676
body weight (kg)	57.9	92.3	75.18 ± 7.2425
waist circumference (cm)	75.0	95.0	82.79 ± 4.4780
triceps skinfold (mm)	3.4	13.0	6.91 ± 2.1764
biceps skinfold (mm)	2.6	9.6	4.61 ± 1.5883
skinfold of the back (mm)	4.6	14.8	8.75 ± 1.8871
abdominal skinfold (mm)	4.4	18.6	8.47 ± 3.1569
body mass index (kg/m^2)	19.6	26.6	23.07 ± 1.5976
fat percentage (%)	2.0	16.4	9.83 ± 3.1810
muscle mass (kg)	30.4	47.1	38.31 ± 3.1522

than the other of other 2 clubs, so it is expected that they have a smaller the waist circumference. However, the values of the waist circumference of all players show that they belong to professional trained football players, although their differences in this variable are statistically significant.

For other variables, some values are better for players of FC Trepca ´89, some for players of FC Prishtina and some for players of FC Besa Peje, although, insignificantly for statistics, which indicates that these players have very similar morphological characteristics and body composition, which is again, not surprising, considering that these two clubs FC Trepca ´89 and FC Besa Peje shared the two trophies in the competitive season in Kosovo, while FC Prishtina was a vice champion. Lead by these results, the recommendation is to analyze motor and functional abilities, technical and tactical skills as well as their physiological profile and check if there were any significant differences which could affect the result gained in Championship and the Cup of Kosovo. Also, it is expected that these clubs have the best football players, so the mean values of analyzed variables were presented (Table II) that could be the model in morphological characteristics and body composition on which basics the selection of football players could be made for other clubs in Kosovo.

The results obtained in this research can serve as model parameters for the estimated variables for players of all other football clubs in Kosovo, because the players that were analyzed in this study, were among the best and the most successful football players in Kosovo at the end of the competitive season of the Superleague of Kosovo. Similar results with elite football players received in Bosnia and Herzegovina (Corluka *et al*., 2018), in Serbia (Popovic *et al*., 2013, 2014), in Montenegro (Gardasevic *et al*., 2019), because the quality of football in this region of ex Yugoslavia is very similar.

As for average height of football players in Kosovo, comparing to all the participants in the 2018 World Football Championship in Rusia (Poli *et al*., 2018) which was 181.70 centimeters, while the average height of players from France was (180.5 cm), Brazil (180.4 cm), Spain (179.5 cm), Argentina (179.4 cm), showed by an official statistical data proved, that football players in Kosovo are tall enough and very similar to the average players in the World. The tendency to recruit taller football players is not unsworn in the scientific literature yet (Popovic *et al*., 2012).

If the body composition is analyzed, it is wellknown that low fat percentage is desirable for high physical performance in all sports. Although, not every body composition characteristic is expected to play a role in optimal performance in professional football, lower levels of body fat (that are specific to each player) are desirable for optimal performance as body mass must be moved against gravity (Rienzi *et al*., 2000; Gil *et al*., 2007). In other words, by achieving optimal levels of body fat and fat-free mass, the player can minimize the negative effects of excess body fat without compromising skill. The football players from the three best clubs from Kosovo have shown great values of all skinfolds, fat percentage, as well as body mass index, which reflects their excellent nutritional status, as many of the previous research recognized football as a predominantly aerobic sport (Kemi *et al*., 2003; Stolen *et al*., 2005). Considering these values it can be concluded that attention is focused on healthy nutrition, even though they do not have professional nutritionists or organized common everyday meals. This being a result of quality training by their coaches, that affects the mentioned values of analyzed variables. Furthermore, it is important for football players to have a determined body fat percentage in order to perform well enough and achieve their full playing potential. The fat percentage in football players of English Premier League vary from 9.9 percent to 12.9 percent, depending on the position (Sutton *et al*., 2009), in Japan 8.5-13.7 % depending on the position (Tahara *et al*., 2006), in Zimbabwe 9.2-11.2 % depending on the position (Masocha & Katanha, 2014). However, these are just guidelines and the players would work together with their coaches to determine the individual body fat percentage to enhance their physical abilities and their health.

The values obtained in this research can be useful for coaches of other clubs for making a comparison of their football players with the best football players in Kosovo, and formulate their training in a way that enables reduction of those parameters that are not good, and raise those that are good to a higher level. That will surely make their football

players even better and more successful. Also, clubs in Kosovo should turn to other researches and check the functional-motoric status, psychological preparation as well as tactical training of their players and analyze whether there is room for their improvement.

One of the next researches will be focused on analyzing differences in morphological characteristics and body composition of football players in Kosovo in relation to the position they cover in the team, as it is known that football players from different positions in team (goalkeeper, defense players, players in the midfield or attackers) have different constitution. Such analyses will be much precise and certainly would have shown certain differences. Also, it would give a model characteristics in analyzed variables which football players from Kosovo should have in relation to the position covered in the team.

All analyzed football players were professionals whose only vocation is football and all have signed professional contracts with their clubs. It would be very interesting to compare these football players with amateur football players from Kosovo and determine if there are significant differences in morphological characteristics and body composition among amateurs and professionals in Kosovan football.

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RESUMEN: El objetivo de esta investigación fue determinar las diferencias entre los jugadores de fútbol de los tres clubes de mayor éxito en Kosovo, FC Trepca ´89, FC Prishtina y FC Besa Peje, en términos de características morfológicas y composición corporal. En el estudio se dividieron los 53 sujetos en tres grupos, quince (15) jugadores del FC Trepca ´89 con una edad promedio de 21,80 ± 3,57, los campeones de Kosovo, veinte (20) jugadores del FC Prishtina con una edad promedio de 24,30 ± 4,99, los vicecampeones del Campeonato de Kosovo, y dieciocho (18) jugadores del FC Besa Peje con una edad promedio de 21,83 ± 3,17, los campeones de la Copa de Kosovo. Los jugadores de fútbol fueron evaluados inmediatamente después del final de la temporada de competencias. Las características morfológicas en la composición corporal se evaluaron mediante una batería de 10 variables: altura corporal, peso corporal, circunferencia de la cintura, pliegue de tríceps, pliegue de bíceps, pliegue de la espalda, pliegue abdominal, índice de masa corporal, porcentaje de grasa y masa muscular. El ANOVA y el LSD post hoc determinaron la importancia de las diferencias entre los jugadores de los tres clubes de fútbol más exitosos en las características morfológicas y las variables para evaluar la composición corporal. La prueba de ANOVA encontró que los jugadores de fútbol de los tres clubes mencionados tienen diferencias estadísticamente significativas en una variable que estima la circunferencia de la cintura. La prueba LSD post hoc indicó que los jugadores de fútbol del FC Besa Peje tenían un valor significativamente menor de la circunferencia de la cintura en comparación con los jugadores de fútbol del FC Prishtina y el FC Trepca ´89. Los valores de circunferencia de la cintura de todos los jugadores de fútbol muestran que pertenecen a jugadores entrenados profesionalmente; las diferencias en esta variable son estadísticamente significativas.

PALABRAS CLAVE: Composición corporal; Características morfológicas; Fútbol.

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