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DIFFERENCES IN ANTHROPOMETRIC CHARACTERISTICS OF YOUTH IN FOOTBALL BETWEEN ELITE AND NON-ELITE PLAYERS

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Authors' Contribution: A – Study design; B – Data collection; C – Statistical analysis; D – Manuscript Preparation; E – Funds Collection

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Abstract

Study purpose. This paper is about the differences in anthropometric characteristics between elite and non-elite youth football players in the Republic of Kosovo. Therefore, our current study aims to compare the differences in anthropometric characteristics between elite and non-elite youth players. The test was conducted with 132 young football players aged 14±0.5 years.

Materials and methods. The sample was divided into two groups, namely 66 young players playing in the elite league and 66 young players playing in the non-elite league. The sample of variables consisted of 10 anthropometric measurements. The results of the measurements were analyzed using statistical procedures characterized by descriptive parameters and analysis of variance (ANOVA).

Results. The results show that the elite league players have higher values in height and body mass compared to the non-elite league players. It should be noted that the length of the left leg is also higher in the elite league players, while the waist circumference is higher in the non-elite league players. As for knee diameter, the values are identical in both groups. Subcutaneous adipose tissue is more pronounced in the non-elite group than in the elite league players. According to the analysis of variance (ANOVA), significant differences were presented only in the three variables such as the subcutaneous adipose tissue of the back, triceps and suprailiac between the elite and non-elite groups at the level ($p<0.05$), while no differences were presented in other variables. That is, between the elite and non-elite groups.

Conclusions. In summary, the elite league players had better values in the anthropometric characteristics compared to the non-elite league players.

Keywords: anthropometry, differences, football, elite, non-elite.

Introduction

Football is the most popular and widely played sport in the world in recent decades, and a body of research has focused primarily on examining the factors that influence a player's performance (Reilly et al., 2000; Brocherie et al., 2014). Anthropometric characteristics are important indicators and have the potential to influence the success of football players (Norton & Olds, 1996). A review of the literature has shown that body size, body mass and body fat percentage are among the important anthropometric characteristics that are related to performance (Norton & Olds 1996). Body mass and height, body mass index and subcutaneous fat are the most studied anthropometric measures. However, there is a need to better study the anthropometric characteristics of players, including diameter and girth (Cavia et al., 1999). Elite youth players are taller and heavier than their non-elite league peers and perform significantly better physically (Rebelo et al., 2013; Lenjani et al., 2018).

The aim of this work is to determine the anthropometric characteristics of young players playing in the elite and non-elite leagues of the Republic of Kosovo. Thus, the main objective of this study is first to determine the normative

values of anthropometric parameters for young players of this age. Therefore, the results of this research can provide useful information for experts in this field of sport. First, we assume that there will be significant differences in the anthropometric variables between the elite and non-elite group of soccer players. Second, we assume that reference values have been presented in favor of the anthropometric variables in elite league players.

Materials and methods

Study participants

This study was designed to investigate the differences in anthropometric characteristics in youth soccer between elite and non-elite players. The sample of participants included 132 teste, mainly young elite and non-elite players from the Republic of Kosovo. Young players aged (14 years ± 6) months were tested. For the purpose of the study and comparison, the players were divided into two groups: 1. the first group includes (N=66), young players playing in the elite league; and 2. the second group includes (N=66), young players playing in the non-elite league. All measurements with the players of the two groups were performed under the same conditions in a closed hall with a room at a temperature of 24°C. The measurements were taken in the morning hours from 9:00–11:00. The players wore light clothing consisting mainly of a T-shirt and sports shorts. All players tested at this age were clinically healthy and had no visible physical defects, as evidenced by their sealed notebooks at medical examination. Therefore, all subjects in this study were treated and assessed in accordance with the ethical standards of the Declaration of Helsinki. The entire study includes all players whose parents consented to participate in this research. Players were informed in advance of the protocols to be followed during the experiment.

Table 1. Characteristics of the participants (Mean ± Std. Dev.)

Characteristics	Elite (N=66)	Non-elite (N=66)
	Mean±Std.Dev.	Mean±Std.Dev.
AGE	14.3	14.4
AVIS	155.42±10.90	152.50±9.38
ATTM	45.69±10.37	45.31±11.39
ABMI	18.61±2.22	19.24±3.22

Test protocol

Length parameters, body height was measured with a stadiometer with an accuracy of up to 1 cm (SECA Germany), while leg length was measured with a short Martini anthropometer (Eurofit 1988). Body weight is estimated in light clothing and without trainers with an accuracy of up to 0.1 kg (Tanita BC530).

Body mass index (BMI) is a value derived from a person's mass (weight) and height. BMI is defined as body mass divided by the square of height and is expressed in the unit kg/m^2, which is derived from mass in kilograms and height in metres (BMI 1995).

Knee joint diameter-is measured from behind by placing the ends of the pelvimeter on both epicondyles of the knee and compressing the soft tissues. The result is read with an accuracy of 0.1 cm (Eurofit, 1988).

The subcutaneous adipose tissue on the back of the scapula, the subcutaneous adipose tissue on the lower part of the calf, the subcutaneous adipose tissue on the triceps of the upper arm and the subcutaneous adipose tissue on the suprailiac part were measured using calipers for measuring subcutaneous adipose tissue according to standard procedures (Lohman et al., 1988).

Statistical analysis

For each variable, descriptive statistics were calculated for the arithmetic mean (Mean) and standard deviation (Std.Dev). Through the analysis of variance (ANOVA) was applied for independent variables between the elite and non-elite league group at the value level < 0.005. Classification and testing of differences between these two groups of football players was carried out. Furthermore, in this case, the analysis of the data processing was carried out using the statistical software SPSS for Windows version 22.0.

Results

Table number 2 shows the results of the table of anthropometric variables among the group of elite and non-elite football players, so the data for each result will be presented separately in the presented table. Elite league players have higher height and body mass values compared to non-elite league players. It should be noted that left leg length is also higher in elite league players, while waist circumference is higher in non-elite league players. Regarding knee diameter, the values are identical in both groups. Subcutaneous adipose tissue is more pronounced in the non-elite group than in the elite league players.

Table 2. Basic indicators and differences between the elite and non-elite football groups in anthropometric variables

Indicators	Elite (N=66)	Non-elite (N=66)	ANOVA	
	Mean±Std.Dev.	Mean±Std.Dev.	F	P
VIS	155.42±10.90	152.50±9.38	2.723	0.101
DLN	94.23±7.07	92.73±7.91	1.510	0.221
ONK	44.61±4.24	45.23±4.70	0.632	0.428
TTM	45.69±10.37	45.31±11.39	0.041	0.839
BMI	18.61±2.22	19.24±3.22	1.669	0.199
DZK	9.74±0.78	9.74±0.89	0.000	0.992
KNG	6.68±3.87	9.02±6.25	6.648	0.011
KNP	14.70±4.65	16.38±6.07	3.182	0.077
KNNT	8.32±4.35	10.59±5.15	7.496	0.007
KNS	8.64±6.18	12.14±8.11	7.780	0.006

While according to the analysis of variance (ANOVA) we have significant differences between the groups are presented in elite and non-elite, the variable subcutaneous adipose tissue in the back has shown differences with a value of .011, the other variable subcutaneous adipose tissue of the triceps has shown a difference with a value of .007 and the

suprailiac subcutaneous adipose tissue variable with a value of .006. Meanwhile, the system of variables between elite and non-elite groups did not present significant differences between the groups.

Discussion

The focus of this paper is on the differences in anthropometric characteristics between elite and non-elite football players. First, we will compare our results between elite and non-elite youth football players, while we will then analyse and compare our results with those of other authors. We will present the differences in anthropometric characteristics between elite and non-elite football players and how they compare. The main results of our study on youth anthropometric characteristics in elite and non-elite football players will be analysed. Elite league players have shown higher values in height compared to non-elite league players, and elite league players also have a larger body mass. Body mass index (BMI) is higher in non-elite league players than in elite league players, and the values of players in both leagues are within the normal range. The length of the left leg is also higher in elite league players, while the waist circumference is higher in non-elite league players. As for knee diameter, the values are identical in both groups of players. Subcutaneous adipose tissue is more pronounced in the non-elite group than in the elite league players. As the research of Portuguese players of this age divided into elite and non-elite groups, also the players we tested height and body mass have shown differences between elite and non-elite league players (Rebelo et al., 2013). In fact, height has been cited as an important criterion in the selection of football players (Carling et al., 2009; Coelho et al., 2010, Gil et al., 2010), while thigh, calf and upper arm circumference are measures needed to distinguish professional athletes from the general population as well as from non-professional athletes (Fragoso et al., 2015). In this context, Le Gall et al. (2010), assessed several anthropometric variables in young football players and showed that top international athletes had above-average scores from the age of 14 years. Furthermore, Matkovic et al. (2003) found that height plays a crucial role in the selection of young football players, with tall players being preferred (Fragoso et al., 2015). When we compare the players of the Pristina, Trepça and Besa teams with our players tested in the elite and non-elite leagues, we see that we have approximate values in the indicators of subcutaneous adipose tissue (Gardasevic et al., 2020). If we compare for comparison elite league players from Macedonia have shown higher results in body mass, height and body mass index (Gontarev et al., 2016), while Greek players have shown approximate values (Michailidis et al., 2022), while games from Italy have shown lower values in these three anthropometric indicators (Rinaldo et al., 2021). Elite and non-elite games have significant values in the corats, like the players we took for the research (Bidaurrazaga-Letona et al., 2016). Also, in terms of height and body mass, elite and non-elite league players have shown significant differences among themselves (Nughes et al., 2020). In our study, elite or select league players were on average taller than their non-elite league counterparts (Nughes et al., 2020). This is consistent with previous research showing that adult players reaching higher levels of play were on average, with significant differences from non-elite league players in height and body mass (Le Gall et al., 2010). Based on the research of the authors Grendstad et al. (2019), in body height, elite players have shown better values than non-elite players, while in elite body mass, they have shown lower values, but if we compare with the players we have taken for studies, we see that the body height is the same as the study of the top author noted in the group of the elite league and the non-elite league. Subcutaneous adipose tissue in the back of the subscapula in the elite players that we took for studies showed a value of 6.68 mm while the players of a study showed a value of 8.5 mm, it should also be noted that in the triceps the difference was 0.42 in favors of our elite players. It should also be emphasized that the suprailiac in the players we have treated for studies have a higher value compared to other elite players (Bernal-Orozco et al., 2020). In this case, it should be emphasized that the subcutaneous adipose tissue was more pronounced in the elite players that we treated, than in those players that we did not have for the purpose of the experiment-study.

Conslusions

This study-research has examined the anthropometric characteristics of football players, in which differences between elite and non-elite players have been highlighted. Anthropometric characteristics body height, left leg length, waist circumference, body mass, body mass index, knee joint diameter was higher in the players of the elite group than in the non-elite group. In contrast, players of the non-elite group showed greater values in subcutaneous adipose tissue indicators. According to the analysis of variance (ANOVA), significant differences were presented only in the three variables such as the subcutaneous adipose tissue of the back, triceps and suprailiac between the elite and non-elite groups at the level ($p<0.05$), while no differences were presented in other variables. That is, between the elite and non-elite groups. These findings of this study provide reference values for elite league players that can help coaches improve performance and identify young elite players to make the most of a career in the game of football. To reach a final conclusion, this study highlights that elite and non-elite league players can improve their anthropometric characteristics and results based on the level of competition they have attended.

Conflict of interest

The authors state that there is no conflict of interests.

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ВІДМІННОСТІ В АНТРОПОМЕТРИЧНИХ ХАРАКТЕРИСТИКАХ МОЛОДІ У ФУТБОЛІ МІЖ ЕЛІТНИМИ ТА НЕЕЛІТНИМИ ГРАВЦЯМИ

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Реферат. Стаття: 5 с., 2 табл., 24 джерела.

Мета дослідження. У цій статті йдеться про відмінності в антропометричних характеристиках між елітними та неелітними юнаками-футболістами в Республіці Косово. Таким чином, метою нашого поточного дослідження є порівняння відмінностей в антропометричних характеристиках між елітними та неелітними юними гравцями. Тест проводився за участю 132 юних футболістів віком 14±0,5 року.

Матеріали та методи. Вибірку було розділено на дві групи, а саме: 66 молодих гравців, які грають в елітній лізі, і 66 молодих гравців, які грають в неелітній лізі. Вибірка змінних складалася з 10 антропометричних вимірювань. Результати вимірювань аналізували за допомогою статистичних процедур, що характеризуються описовими параметрами, та дисперсійного аналізу (ANOVA).

Результати. Результати показують, що гравці елітної ліги мають вищі показники зросту та маси тіла порівняно з гравцями неелітної ліги. Слід зазначити, що довжина лівої ноги також більша у гравців елітної ліги, а окружність талії більша у гравців неелітної ліги. Що стосується діаметра коліна, то значення в обох групах однакові. Підшкірна жирова клітковина більш виражена в неелітній групі, ніж у гравців елітної ліги. Відповідно до результатів дисперсійного аналізу (ANOVA), статистично значущі відмінності між елітною та неелітною групами були представлені лише в трьох змінних, таких як підшкірна жирова клітковина спини, трицепса та гребня клубової кістки, на рівні ($p<0,05$), тоді як в інших змінних відмінностей не було. Тобто між елітною та неелітною групами.

Висновки. Таким чином, гравці елітної ліги мали кращі значення антропометричних характеристик порівняно з гравцями неелітної ліги.

Ключові слова: антропометрія, відмінності, футбол, елітний, неелітний.

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