

ANTHROPOMETRIC PROFILE OF KOSOVO ELITE FEMALE VOLLEYBALL PLAYERS

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Abstract: *The purpose of this research is to confirm the anthropometric structure and profile of Kosovo elite female volleyball players. The sample for this study included 116 trained women volleyball players from nine clubs of Kosovo Volleyball Super League (19.91±3.59 years old). The results of this study demonstrate that Kosovo elite female volleyball players' mean body height is 172.21±6.14 cm, whereas their body mass index, determined by the weight-to-height ratio averages (BMI) 20.47 (kg/m²). The results of this research study, confirmed the average body height and body weight, measure the girth and skinfold, also determined the body mass index of Kosovo elite female volleyball players.*

Key words: *Volleyball players, female, anthropometry, Kosovo.*

1. Introduction

Based on recent scientific studies, it was noted that various types of sports have developed their own models of drills, adjusting them to the body characteristics relevant to the type of sport. As far as volleyball is concerned, these patterns have, to this day, undergone a significant transformation from the birth of volleyball, where the morphological status of a volleyball player, whether male or female, plays an important role in advancing volleyball [4]. The development

of this sport, which is one of the most modern, attractive, and highly popular because of the professionalism required, has continuously raised the need for a scientific approach. A lot of scientific research conducted by various authors to help volleyball development serves to confirm that modern volleyball has advanced and evolved both professionally and scientifically [2], [12]. Volleyball, like other sports, requires a certain level of morphological characteristics and motor functions, and always seeks to improve them according to given conditions and

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situations. This is clear because there are continuous attempts to conduct permanent research of theoretical nature and apply it practically based on certain morphological characteristics. Aside from the diversity of volleyball, there is a multitude of individual skills of anthropological nature in male and female players. If such differences did not exist, further research in methods and training load and its impact on the development of anthropological skills and profile characteristics in volleyball would have been redundant according to [4], [9], [12].

As regards woman volleyball players, there are several dominant theories concerning their anthropometric profile [9], [15]. According to one of these theories - Kretschmer classification, the body height dominates all the other anthropometric parameters. Considering the relevant research, there are differences between male and female volleyball players in terms of anthropometric parameters, for example male volleyball players' skinfold measurements range between 7% and 14% and those of female volleyball players' from 10% to 18%. Male volleyball players can have an average blocking height ranging from 320 to 335 cm, and female volleyball players from 280 to 290 cm. Male volleyball players have an attack jump height averaging between 320 and 335 cm, and female volleyball players between 305 and 325 cm [14].

In general, women's volleyball is evolving to raise the play level in terms of both quick attacks and blocking at height, which were earlier seen only in male volleyball teams. These days, however, this can be seen in female volleyball teams, too [16], [17]. In modern volleyball, each position in the field is specialized, and each necessitates having the needed

anthropometric characteristics, for example, the six players - rather than four of them which used to be the case - must be tall. The pattern of anthropometric characteristics being changed among volleyball players in terms of their height and weight is noticed in the 26th to 29th Olympic Games; it was noticed that the body height was increased by +3cm from 1.81 to 1.88 m and the body weight was proportionally increased from 71.4 to 73.4 kg. In addition, the average jumping height when blocking increased from 290.4 to 297.2 cm [15], [16].

Women's volleyball experienced an increased quality in Kosovo, too, in terms of both performance and anthropometric characteristics; however, we possess no sufficient data that would help accurately define its level in comparison with the regional level and beyond. The main purpose of the present research is to confirm the anthropometric structure and profile of elite women volleyball players in Kosovo. Another purpose is to ascertain the body height of elite female players of Kosovo Superleague in relation to other anthropometric parts.

2. Material and Method

The sample used for this study consisted of 116 trained female volleyball players from 9 clubs of Kosovo Volleyball Super League (VC Drita, VC Prishtina Volley, VC Skenderaj, VC Drenasi, VC Gryka, VC Prishtina, VC Kastrioti, VC Ulpiana and VC Vushtrria), with a very young age of 19.91 ± 3.59 in average.

Anthropometric measurements were carried out in line with the selection criterion, and players were preliminarily informed by their clubs, thereby showing regard for the criteria of their

psychophysical state and previous body deformities. Anthropometric measures including body height, body weight, chest girth, arm girth, thigh girth, calf girth, supraspinale skinfold, abdominal skinfold, arm skinfold, thigh skinfold, and calf skinfold, were carried out in line with the protocol of International Society for the Advancement of Kinanthropometry [11].

The measurers have been trained to carry out selected anthropometric measurements (the same measuring tool was used for each variable), and the quality of their measurements was assessed based on ISAK Manual. The players' measurements were taken in the morning from 08:00 to 12:00 a.m. during the 2016-2017 Kosovo Volleyball Championship.

The data were analyzed using the Statistical Package for the Social Sciences (SPSS) software for Windows 23.00. The output was analyzed by using basic statistical parameters of descriptive analysis: number of entities (N), range, minimum and maximum, average and standard deviation (Mean±SD), skewness and kurtosis. Statistical significance was

set to $p < 0.05$. Body Mass Index is determined by the body mass, expressed in kg, divided by the body height, expressed in square meter. The value is obtained by the following formula: $BMI = BW (KG)/BH^2(m)$.

3. Results

Table 1 shows the results of anthropometric measurements (body height, body weight, and body mass index) of elite female volleyball players of Kosovo Superleague obtained using basic statistical parameters. Female volleyball players' body height results: range 38.9, with minimum being 153.20 cm, maximum 192.21 cm, and arithmetic mean 172.21 ± 6.14 cm. Female volleyball players' body weight had a range of 42.00, with minimum being 43.50 kg, maximum 85.50 kg, and arithmetic mean 60.59 ± 7.62 cm; Kosovo elite female volleyball players' body mass index varied from 14.27 (kg/m^2) to 26.72(kg/m^2), with the Kosovo female volleyball players' BMI averaging $20.47(kg/m^2)$.

Table 1

Body mass index of Kosovo elite female volleyball players

| Variables | N | Range | Min | Max | Mean±SD | Skew | Kurt |
|------------------|-----|-------|--------|--------|-------------------|-------|-------|
| Body Height | 116 | 38.90 | 153.20 | 192.10 | 172.21 ± 6.14 | -.072 | 1.007 |
| Body Weight | 116 | 42.00 | 43.50 | 85.50 | 60.59 ± 7.62 | .425 | .187 |
| BMI (kg/m^2) | 116 | / | 14.27 | 26.72 | 20.47 | / | / |

Table 2 shows the result of girth measurements of Kosovo elite female volleyball players, obtained using basic anthropometric statistical parameters. Based on the results, chest girth had a range of 27.30, with minimum being 76.70 cm, maximum being 104.00 cm, and mean being 87.54 ± 4.08 cm. Arm girth had a range of 10.60, with minimum being 20.50

cm, maximum being 31.10 cm, and mean being 26.13 ± 2.31 cm. Thigh girth had a range of 21.30, with minimum being 42.00 cm, maximum being 63.30 cm, and mean being 53.34 ± 4.53 cm. Calf girth had a range of 12.40, with minimum being 29.00 cm, maximum being 41.40 cm, and mean being 35.03 ± 2.43 cm.

Table 2

Girth measurements of Kosovo elite female volleyball players

| Variables | N | Range | Min | Max | Mean±SD | Skew | Kurt |
|-------------|-----|-------|-------|--------|------------|------|-------|
| Chest girth | 116 | 27.30 | 76.70 | 104.00 | 87.54±4.08 | .422 | 1.555 |
| Arm girth | 116 | 10.60 | 20.50 | 31.10 | 26.13±2.31 | .268 | -.548 |
| Thigh girth | 116 | 21.30 | 42.00 | 63.30 | 53.34±4.53 | .040 | -.540 |
| Calf girth | 116 | 12.40 | 29.00 | 41.40 | 35.03±2.43 | .383 | .003 |

Table 3 shows the result of skinfold measurements of Kosovo elite female volleyball players, obtained using basic anthropometric statistical parameters. Based on the results, it is evident that supraspinale skinfold had a range of 16.80, with minimum being 4.80mm, maximum being 21.60, and mean being 13.03±4.13mm. Abdominal skinfold had a range of 18.60, with minimum being 2.40mm, maximum being 21.00, and mean being 13.35±4.11mm. Arm skinfold had

a range of 17.60, with minimum being 3.80mm, maximum being 21.40, and mean being 13.59±4.15mm. Thigh skinfold had a range of 18.40, with minimum being 3.60mm, maximum being 22.00, and mean being 11.68±5.38mm. Calf skinfold had a range of 13.80, with minimum being 4.80mm, maximum being 18.60, and mean being 11.62±3.34mm. Analysis of all results of asymmetrical measurements shows their normal distribution.

Table 3

Skinfold measurements of Kosovo elite female volleyball players

| Variables | N | Range | Min | Max | Mean±SD | Skew | Kurt |
|-----------------------|-----|-------|------|-------|------------|-------|--------|
| Supraspinale skinfold | 116 | 16.80 | 4.80 | 21.60 | 13.03±4.13 | -.041 | -1.169 |
| Abdominal skinfold | 116 | 18.60 | 2.40 | 21.00 | 13.35±4.11 | -.232 | -.860 |
| Arm skinfold | 116 | 17.60 | 3.80 | 21.40 | 13.59±4.15 | -.562 | -.363 |
| Thigh skinfold | 116 | 18.40 | 3.60 | 22.00 | 11.68±5.38 | .332 | -1.357 |
| Calf skinfold | 116 | 13.80 | 4.80 | 18.60 | 11.62±3.34 | .006 | -.723 |

Results from anthropometric measurements are considered to be a highly important factor for good performance in volleyball. The main profile indicator in volleyball is height-to-weight ratio which constitutes the main criterion for selecting volleyball players. Based on the measurements, the mean body height of female volleyball players is 172.21±6.14 cm, ranging from 153.20 cm to 192.21 cm. Their height appears to be greater compared to the measurements conducted by [1], where the average of

Kosovo teen girls was 165.72cm, but smaller than the measurements provided by [4], where the mean height of some selected female players was 176±0.06 cm and their weight 60.8±7.0 kg. It was observed that female players of Greek Championship, too, have a higher average height (178.8cm) [7], however, if we are to make a comparison with findings of authors [16], Philippines elite female players have a mean body height of 168.00±9.00cm, and those from Faroe Islands a mean body height of 171±7 cm

[9]. Having analyzed all this data, Kosovo elite female volleyball players' height is not highly desired for competing at the highest international and Olympic levels. If we analyze the sources provided by [3], [5], [18], concerning the body height and body weight of Olympic female volleyball players from the 26th to 29th Olympiad, published in the works of [17], we note that the mean of body height from 26th to 29th Olympiad increase from 181 cm to 184 cm respectively, or by 3 cm, and the body weight was 71.4 kg in the 26th Olympic Games and 73.4 kg in the 29th ones; the body weight was, therefore, increased by only 2 kg.

Kosovo elite female volleyball players have a body mass index—defined by weight-to-height ratio—of 20.47(kg/m²) on average, ranging from 14.27 (kg/m²) to 26.72(kg/m²). Referring to the measurements carried out by [15], the Philippines Elite volleyball players have a body mass index of 22.25(kg/m²); the Greek elite volleyball players have a body mass index of 21.3(kg/m²) [6]. The body mass index of female volleyball players qualified for 2006 Olympiad ranged between 19.2 and 21.1 [5]. Other anthropometric parameters of Kosovo elite female volleyball players demonstrated to be in conformity with the body height, body weight, and body mass index. More specifically: chest girth averaging 87.54±4.08cm, arm girth averaging 26.13±2.31cm, thigh girth averaging 53.34±4.53cm and calf girth averaging 35.03±2.43cm. Skinfold parameters were measured in 5 places of female volleyball players' bodies including: (supraspinale, abdominal, arm, thigh and calf skinfold). The results obtained are in line with the body construction of female volleyball players whose supraspinale

skinfold average was 13.03±4.13mm, abdominal skinfold 13.35±4.11mm, arm skinfold 13.59±4.15mm, thigh skinfold 11.68±5.38mm and calf skinfold 11.62±3.34mm.

4. Conclusions

In general, the results from this study show that Kosovo elite female volleyball players have a somatotype that prevails among them, who have an endomorph body type that is characterized by average body height and height of other limbs. These results should be taken into consideration when starting to select volleyball players who are to achieve high performance levels in Kosovo Championship, and in order to have a competitive team in the region and beyond. Longitudinal skeletal size is highly important among volleyball players because of the height of the net, complexity of technical elements such as hit, blocking, etc. [8]. This study has successfully managed to determine the average body height, body weight, girth measurement, measure skinfold, and establish the body mass index of Kosovo elite female volleyball players. We, the authors of this research, consider that further research is needed to analyze the characteristics of Kosovo elite female volleyball players for each team separately and for the role that each individual player plays in the team.

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