

A STATISTICAL COMPARATIVE ANALYSIS OF ANTHROPOMETRIC PROFILE BETWEEN TWO VOLLEYBALL PLAYER'S TEAMS

O ANALIZĂ STATISTICĂ COMPARATIVĂ A PROFILULUI ANTROPOMETRIC ÎNTRE DOUĂ ECHIBE DE VOLEI FEMININ

CHIRUȚĂ C.¹, GORBAN C.F.^{1*}

*Corresponding author e-mail: cgorban@uaiasi.ro

Abstract. *In this work, a comparison from a mathematical and statistical point of view of the somatic qualities is attempted of volleyball players from two female teams aged between 12 and 16 years. It highlights the similarities or differences in the values recorded following the anthropometric measurements. Currently, the execution speed, explosive force and reaction speed are increasing during the volleyball game and it is necessary to train specific anatomical segments required for the execution of the technical elements necessary to perform the attack during the volleyball game. It is important to compare the height, height with raised arms or the arm span in players from two teams who want to achieve performances in the volleyball competitions organized by Romania Volleyball Federation. Fisher and Student tests will be used for comparative analysis of the somatic qualities of the players. The findings of the present study indicate that the anthropometric profile of players from Team CVH Junior Iasi is significantly better than that of the team CSS Botoșani.*

Key words: volleyball players, statistical comparison, height, the height with the arms raised, the span of the arms

Rezumat. *În această lucrare se încearcă o comparație din punct de vedere matematic și statistic a calităților somatice ale jucătorilor de volei din două echipe feminine cu vârsta cuprinsă între 12 și 16 ani. Evidențiază asemănările sau diferențele dintre valorile înregistrate în urma măsurătorilor antropometrice. În prezent, viteza de execuție, forța explozivă și viteza de reacție sunt în creștere în timpul jocului de volei și este necesară antrenarea unor segmente anatomice specifice necesare executării elementelor tehnice necesare efectuării atacului în timpul jocului de volei. Este important să comparăm înălțimea, înălțimea cu brațele ridicate sau anvergura brațelor la jucătoarele din două echipe care doresc să obțină performanțe în competițiile de volei organizate de Federația Română de Volei. Testele Fisher și Student vor fi folosite pentru analiza comparativă a calităților somatice ale jucătorilor. Concluziile prezentului studiu indică faptul că profilul antropometric al jucătorilor de la echipa CVH Junior Iași este semnificativ mai bun decât cel al echipei CSS Botoșani.*

Cuvinte cheie: jucători de volei, comparație statistică, înălțime, înălțime cu brațele ridicate, anvergura brațelor

¹“Ion Ionescu de la Brad” University of Life Sciences, Iasi, Romania

INTRODUCTION

The current game of volleyball is characterized by an increase in execution speed, an increase in explosive force, and implicitly in reaction speed, which requires faster training in the effort of the segments required for the technical elements and of the body as a whole for resistance during the game phases (Cojocaru *et. al.*, 2013). The complexity and variety of technical-tactical actions also increased, which led to shorter breaks between game phases, increased effort intensity, and reduced player recovery time.

In order to learn and consolidate all the procedures in the volleyball match, the players need minimum baggage of motor and basic skills, but over time these are learned, consolidated, and perfected after many hours of training. The technical process is closely related to basic motor skills and especially to those specific to the game of volleyball. Also, the morpho-functional peculiarities of each player have a decisive importance in the game of volleyball, athletes with native skills will always be more technical in performing spectacular procedures and will perform at the competitions they participate in.

Khanna A. and Koley S. studied the differences that exist between Indian inter-university male, and female volleyball players and a reference group in terms of anthropometry and hand grip strength (Khanna and Koley, 2020).

To identify a model of a volleyball player in Romania Voinea F. *et. al.* determined the level of physical characteristics of the 31 teams in the Romania Volleyball Federation. The model was compared with the characteristics of 23 teams from National College Nicolae Titulescu (NCNT) from Craiova in Romania (Voinea *et. al.*, 2019).

Yener A., and Seydi A.A. compared the sprint, reaction time, and anaerobic power of football and volleyball players and wrestlers. (Yener and Seydi, 2017).

Ciccarone, G. *et. al.* compared anthropometric parameters and jumping ability for 36 elite male volleyball players from the First and Second Division Championship in relation to technical skills required by player's positions (Ciccarone. *et. al.*, 2008).

Piatti M., *et. al.* measured and compared jump load and dynamic performance in elite volleyball athletes under varied conditions over an entire season of practices and games, (Piatti *et. al.*, 2022).

Colona S. and Ricciardi F. compared the strength during isokinetic evaluation (by means of the Technogym REV) of the knee in a group of 11 athletes practicing volleyball while performing jump tests (Colona and Ricciardi 1998).

In carrying out this study, we will develop constative type research, evaluating the bio-motor characteristics of female volleyball players.

MATERIAL AND METHOD

The study was carried out on a set of 41 young female volleyball players aged between 12 and 16 who are members of two sports clubs from the Municipality of Iași and the Municipality of Botoșani, respectively CHV Junior Iași (20 players) and CSS

Botoșani (21 players). The two clubs are active with their teams in the "HOPE" and "CADETS" championships organized by the Romanian Volleyball Federation.

Participants in this research study were informed about the research protocol and the potential risks of this preliminary study, allowing them to withdraw at any time without giving any explanation to the research team. The volleyball players (subjects) together with their parents, gave written consent that they accept to be part of these two groups subject to the present research.

Subjects with the following inclusion criteria were selected for the study:1. Young female volleyball players in the age group of 12–16 years.2. Playing experience of 1 or more years.3. Apparently healthy players not suffering from any medical or musculoskeletal conditions.

Table 1

CSS BOTOSANI Team – the anthropometric profile

	Age (years)	Weight (kg)	Height (cm)	Height with arms raised (cm)	Arm span (cm)	Foot (cm)	Palm span (cm)
Minimum	12.00	41.00	152.00	192.50	148.00	23.00	18.00
Maximum	13.00	73.70	172.00	224.00	184.00	27.00	22.00
Mean	12.62	54.84	162.81	204.81	168.62	24.88	20.06

The measurements were performed with the MYOTEST PRO device and anthropometric measurements were recorded to analyse the growth and development of their morpho-functional structure, such as weight, height, bust, height with arms raised, arm and palm span, and foot.

The data were analyzed using MS. Excel 2019 professional. Fisher and Student's t-test was applied for the comparison of data between teams. Statistical significance ($p < 0.05$) was indicated using a 5% level of probability (Chiruță, 2019).

Table 2

CHV Junior IASI Team – the anthropometric profile

	Age (years)	Weight (kg)	Height (cm)	Height with arms raised (cm)	Arm span (cm)	Foot (cm)	Palm span (cm)
Minimum	12.00	42.80	157.40	192.50	157.50	22.50	19.50
Maximum	16.00	79.00	179.50	224.00	182.00	27.00	23.00
Mean	14.30	60.27	168.43	205.15	170.30	25.38	21.36

RESULTS AND DISCUSSIONS

The measurements were entered into tables after which the data were analysed and compared. For the age parameter, the data were grouped by years. The CSS Botoșani team consists of only 12-year-old (38% of the total) and 13-year-old (62%) players. The CHV Junior Iași team consists of

14-year-old (30%), 16-year-old (25%), and 13-year-old (25%) players, respectively a smaller number of 12- or 15-year-old players. (Fig. 1)

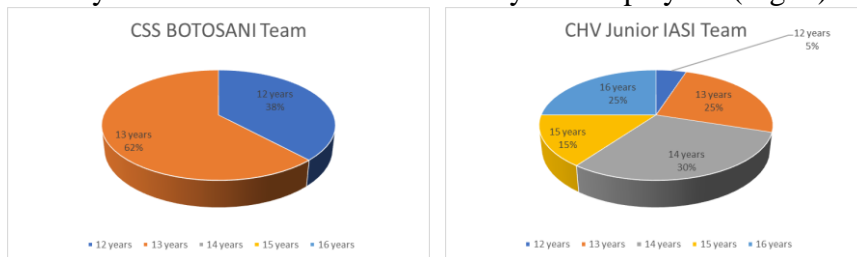


Fig. 1. Age

Weight ranges were used for the weight parameter. Thus, at CSS Botoșani, 38% of the players are in the 40-50 kg range, and only 5% in the 70-80 kg range. The HV Junior club from Iași consists of players with a weight between 60-70 kg in a proportion of 40% and only 15% in the ranges of 70-80 kg or 40-50 kg. (Fig. 2).

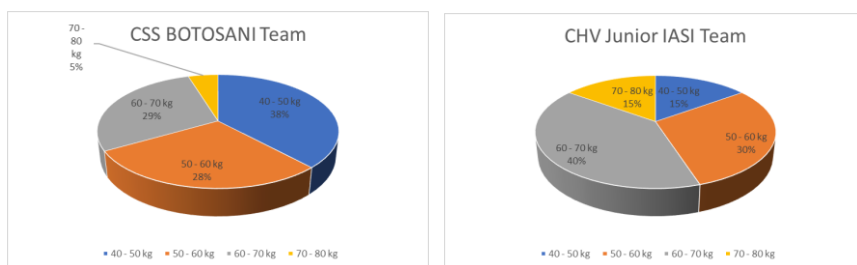


Fig. 2. Weight

The average values recorded at the height were 162.81 cm at the club in Botoșani and 168.43 cm at the club in Iași. These values can bring an advantage to the team from Iași in a direct confrontation between the teams. The analysis of the height with the arms raised and the arms span is in favor of the Junior Iași team with averages of 205.15 cm and 170.30 cm respectively compared to the team from Botoșani where the averages of 204.81 cm and 168.62 cm were calculated (Fig. 3).

Standard descriptive statistics (min, max, mean) were determined for directly measured variables. Data were analyzed using MS EXCEL 2019 professional. A normality test was performed using and the data were found be well within the normality range. For determining the homogeneity of measures, a Chi-Squared Test for Homogeneity was applied and it was found that the measures were non-homogeneous.

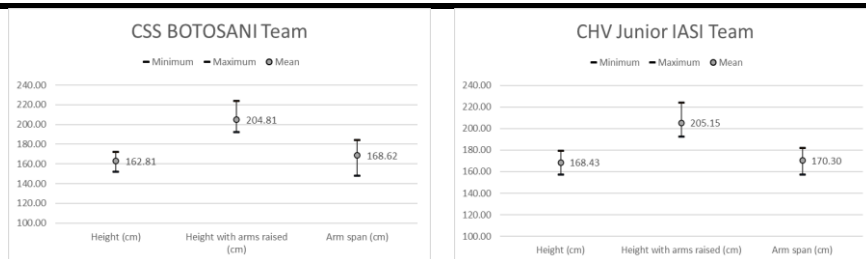


Fig. 3. Height, Height with arms raised, Arm span

Fischer test and Student’s t-test were applied for the comparison of data between teams’ players.

The components analyze were arm span, arm height, and weight. Table 3 shows that there are significant differences only between the values of the arm span of the players from the two teams (p-value < 0.05). All other measurements are similarly distributed among the players on the two teams and have significantly equal means.

Table 3

	Arm span	Height with arms raised	Weight
p-value Fischer test	0.0296	0.4679	0.3321
p-value Student’s t-test	0.4792	0.8802	0.0682

Following the results of these statistical tests, the analysis of the correlation between the height of the volleyball players from the two teams and the span of their arms was continued. For the team from Botoșani, the regression equation is

$$y = 0.1576x + 136.24 \text{ having } R^2=0.0755$$

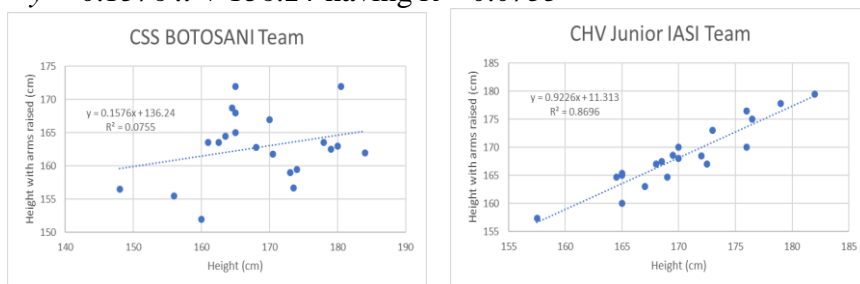


Fig. 4. Arm span according to waist

which means that the span of the arms is determined by the height in this team only in proportion to 7.55%. For the team from Iași, the regression equation is

$$y = 0.9226x + 11.313 \text{ having } R^2=0.8696$$

which means that when the height increases by one unit (1 cm) the span of the arms increases by 0.9226 of one unit (cm) and the latter are determined by the height within this team in a proportion of 86.96%. (Fig. 4).

CONCLUSIONS

The findings of the present study indicate that the anthropometric profile of players from Team CVH Junior Iasi is significantly better than that of the team CSS Botoșani.

Following the comparisons, it can be seen that the young volleyball players from the team from Iași are older, heavier, have a higher average height, have a greater arm span, and have greater height with raised arms. This study is important both theoretically and from an applied point of view because the coach and the management, knowing the analysed anthropometric characteristics, can make decisions in order to improve the strategy, the team's game, and the training program from Iasi, respectively from Botoșani.

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