Morphological Characteristics and Motor Abilities Differences: First and Second Montenegrin League Female Volleyball Players

Características Morfológicas y Diferencias en Habilidades Motoras de Jugadoras de Voleibol de la Primera y Segunda Liga Montenegrina

Danilo Bojanic[1]; Milovan Ljubojevic[1]; Pavle Malovic[1]; Aldijana Nokic[1] & Milica Vujovic[2]

SUMMARY: The aim of this study is to determine whether there is a statistically significant difference in morphological characteristics and motor abilities of the first and second league female volleyball players. The sample comprised of 20 players of the first and 20 players of the second league. Only those female volleyball players who completed the whole measurement program were included in the sample. Subjects underwent measurement of morphological characteristics (7 variables) and motor abilities (8 variables). Statistically significant differences were determined with t-test for independent samples. The results of the research show that there are no statistically significant differences in morphological characteristics and motor abilities of the first and second league female volleyball players. The difference was found only in the variable for assessing balance in favor of first league female volleyball players.

KEY WORDS: Morphological characteristics; Motor abilities; Volleyball; Differences.

INTRODUCTION

Volleyball is very popular nowadays, not only as a recreational activity but also as a professional sport, played by a large number of players of both genders (Bojanic *et al.*, 2020). Volleyball is one of the youngest ball games, and, therefore, one of the most popular sports in the world. This sport is said to be one of the most interesting ones, since it comprises fast and versatile body movements, such as jumps, rolls, and throws, with quick reactions to different situations. Volleyball is a dynamic and complex game, abounding in various forms of movement, so it could be defined as polystructural and acyclic (Jankovic & Marelic, 1995). The modern volleyball game requires a high level of basic and specific motor skills, as well as morphological characteristics, concerning the positions on the field, which is a significant component for achieving top results (Bojanic *et al.*, 2016). The optimal morphological characteristics of athletes largely depend on the chosen sport, however, it is often seen in the literature that better results are achieved by those whose body composition and somatotype are adapted to the requirements of a particular sport (Martín-Matillas *et al.*, 2014; Noutsos *et al.*, 2019; Ljubojevic *et al.*, 2020a).

Success in volleyball certainly depends on the morphological characteristics of the already formed athlete, based on body height and mass, and is valued according to their current age (Marelic *et al.*, 2008).

The very characterization of volleyball as a dynamic, fast and attractive game leads to the need to develop those abilities that can further use this characteristic to achieve the best possible sporting achievement. In addition to the speed and strength of volleyball elements and the explosive strength of the upper and lower limbs, other abilities such as agility, speed, reactivity, speed and strength of the hands are also extremely important, while other abilities, especially repetitive strength, shouldn't be neglected (Alic-Partic, 2002). The characteristics of volleyball are multiple and multidimensional, and in addition, some traits and abilities basically have to be above average if one wants to achieve a top sporting result (Jankovic & Marelic, 1995). The increasing number of players who perform in clubs creates an adequately larger base for selection and the formation of higher quality senior representative selections. It is evident

[1] Faculty for Sport and Physical Education, University of Montenegro, Niksic, Montenegro.
[2] First secondary vocational school, Niksic, Montenegro.

that the development of volleyball in the world has a tendency to progress, and that to achieve top results, the engagement of latent potentials is necessary, and they must be explored. A large number of authors researched the anthropological characteristics of volleyball players, morphological differences between teams, various playing positions, and different levels of competition, precisely because they are of great importance for achieving excellent results (Malousaris *et al.*, 2008; Sheppard *et al.*, 2008; Palao *et al.*, 2008). The quality selection and identification of the genuine talent are very demanding and complex process that requires a good knowledge of anthropometry and body composition that are strongly linked to high performance in sports (Srhoj *et al.*, 2006; Ljubojevic *et al.*, 2020b). Good situational performance can be evaluated by a combination of placements of the team in the competition and by the status of players within the team (Grgantov *et al.*, 2006). On a sample of a younger population of female volleyball players, it was determined that boosting situational efficiency produces better results in all applicable motor tests, especially in tests for the assessment of explosive strength, accuracy and agility (Grgantov *et al.*, 2006).

The aim of this research is to compare morphological characteristics and motor skills of the female volleyball players of the first and second Montenegrin volleyball leagues of two competition levels, in order to determine whether certain specificities can make a difference in the quality of the competition in which the players perform.

MATERIAL AND METHOD

Sample of subjects. The sample of respondents consisted of female volleyball players who play in the senior first and second Montenegrin volleyball leagues. The total number of respondents was 40. They have been divided into two subsamples: a subsample of female volleyball players in the first division (n=20) and a subsample of female volleyball players in the second division (n=20). Based on the type of research, the sample of respondents will include only volleyball players who complete the complete treatment of measurements and the complete treatment of testing. The volleyball players were tested after the 2021/22 season ended. All participants signed the consent form approved, formulated by the Declaration of Helsinki.

Sample of measures. Anthropometric characteristics measurements have been carried out concerning the basic rules and principles related to the selection of measuring instruments and measurement techniques standardized by the (IBP) guidelines. Eight morphological measures have

been taken for the purpose of this study: body height; body mass; arm span; hand length; chest circumference; hip circumference; upper leg circumference and 8 variables of the motor space: long jump from a standing position; high jump from a standing position; sprint 20 m; t-test; reach height; deep bend on the bench; stork test with closed eyes; lying down, sitting for 30 s.

Method of data processing. The data obtained through the research have been processed by descriptive and comparative statistical procedures SPSS 20.0, adjusted for use on personal computers. For each variable, central and dispersion parameters have been taken into consideration. Differences in morphological characteristics and motor abilities of the volleyball players in these two-level competitions were determined by using a discriminatory parametric procedure with a t-test for small independent samples, with a statistical significance of p<0.05.

RESULTS

This part of the paper provides a review of the basic statistical data related to the morphological characteristics and motor skills of subsamples of volleyball players of the first and second leagues. Certain deviations that these statistical sets had in terms of variables were pointed out, as well as a presentation of their homogeneity or heterogeneity. Furthermore, the authors discuss each variable deviation separately concerning the normality distributions, as well as the possible deviations from the standard Gaussian curve.

The analysis of the central and dispersion parameters of the morphological characteristics (Table I), comprising information on the basic statistical parameters of the variables of the morphological characteristics of the subsample of volleyball players of the first league, begins with an insight into the column of standardized coefficients of asymmetry of skewness distributions (Sk), which ensures the verification of the agreement of the distribution of empirical data with the theoretical ideal Gaussian distribution. It is seen that there are no significant deviations from the normal distribution of results for this parameter.

The parameters for evaluating the homogeneity of the group, as well as the coefficient of variation indicate that all parameters are within normal limits of homogeneity. With each variable, it is evident that there are indications of an exceptionally homogeneous set.

The analysis of Table II, providing information on the central and dispersion parameters of the morphological

Table I. Central and dispersion parameters of the morphological characteristics of subjects of the first league volleyball subsample (n=20).

	M	Min	Max	R	SD	KV	Se	Sk	Ku
ATV	173.60	162.00	181.00	19.00	4.92	2.84	1.10	-0.54	-0.08
ATM	64.15	51.00	79.00	28.00	7.56	11.79	1.69	0.15	-0.82
ARR	173.70	166.00	182.00	16.00	4.38	2.52	0.98	0.33	-0.77
ADS	19.02	18.00	20.50	2.50	0.73	3.86	0.16	0.24	-0.53
AOG	87.25	74.00	101.00	27.00	6.07	6.96	1.36	0.23	0.91
AOK	85.55	76.00	98.00	22.00	6.25	7.31	1.40	0.58	-0.73
AON	51.35	42.00	60.00	18.00	4.83	9.40	1.08	-0.42	-0.23

n – number of respondents; M – arithmetic mean; Min – minimum value; Max – maximum value; R – variation width; SD – standard deviation; KV – coefficient of variation; Se – standard error of the arithmetic mean; Sk – Skewness; Ku – Kurtosis.

Table II. Central and dispersion parameters of the morphological characteristics of the respondents of the second league volleyball subsample (n=20).

	M	Min	Max	R	SD	KV	Se	Sk	Ku
ATV	173.20	163.00	185.00	22.00	7.07	4.08	1.58	0.05	-1.33
ATM	61.40	51.00	78.00	27.00	7.83	12.75	1.75	0.57	-0.70
ARR	173.30	161.00	185.00	24.00	6.75	3.90	1.51	-0.23	-0.76
ADS	19.10	17.50	20.50	3.00	0.95	5.00	0.21	-0.01	-0.76
AOG	85.65	73.00	99.00	26.00	6.12	7.14	1.37	0.19	0.38
AOK	86.10	75.00	99.00	24.00	6.39	7.42	1.43	0.20	-0.40
AON	50.55	44.00	59.00	15.00	3.82	7.55	0.85	0.37	-0.01

n – number of respondents; M – arithmetic mean; Min – minimum value; Max – maximum value; R – variation width; SD – standard deviation; KV – coefficient of variation; Se – standard error of the arithmetic mean; Sk – Skewness; Ku – Kurtosis.

characteristics of the subsample of volleyball players of the second league, offers a precise overview of the columns for the valorization of the asymmetry and flattening of the Gaussian curve. There is no statistically significant violation of the normality of the distribution and frequencies of the results concerning the ideal Gaussian curve for each variable, which indicates that most of the values are around the ideal zero.

The coefficients of variation indicate that all variables are within the limits of marked homogeneity, while the variable for the assessment of hand span (ARR) has the highest homogeneity of results. Moreover, the relationship between the calculated values of the standard error of the arithmetic mean and the standard deviation indicates the minimum dispersion of the results.

The analysis of the central and dispersion parameters of motor skills presented in this part of the article resulted in an interpretation and tabular presentation of the results obtained by the method of descriptive statistics, in the case of variables for the assessment of motor skills in both subsamples. Table III contains information on the basic statistical parameters of the motor skills of the examinees of the first league volleyball subsample, especially the column of asymmetry and flattening of the results concerning the normal distribution. There is a significant deviation from the normal distribution of the results regarding one variable. It is a variable for evaluating vertical jumpiness (MSUV), where the value of skewness is Sk=1.56, and kurtosis Ku=4.21, which indicates the shift of the Gaussian curve to the right, while the positive curvature of the curve is visible. Therefore, it can be concluded that numerically higher results

Table III. Central and dispersion parameters of the motor skills of subjects of the first league volleyball subsample (n=20).

	M	Min	Max	R	SD	KV	Se	Sk	Ku
MSUD	178.30	150.00	217.00	67.00	20.39	11.43	4.56	0.62	-0.69
MSUV	36.05	30.00	50.00	20.00	4.45	12.36	1.00	1.56	4.21
MS20	3.64	3.34	3.90	0.56	0.17	4.72	0.04	-0.41	-0.69
MTTS	12.84	12.05	13.91	1.86	0.59	4.56	0.13	0.48	-0.85
MDVS	222.95	205.00	235.00	30.00	8.16	3.66	1.82	-0.21	-0.51
MDPK	9.88	0.00	20.00	20.00	5.94	60.15	1.33	0.43	-0.51
MSZO	20.53	10.08	54.80	44.72	12.92	62.93	2.89	1.81	2.48
ML30	18.70	15.00	23.00	8.00	2.00	10.71	0.45	-0.11	0.26

n – number of respondents; M – arithmetic mean; Min – minimum value; Max – maximum value; R – variation width; SD – standard deviation; KV – coefficient of variation; Se – standard error of the arithmetic mean; Sk – Skewness; Ku – Kurtosis

prevail concerning the arithmetic mean, while the results are, again, grouped around the mean value. The situation is similar to the MSZO variable (balance assessment variable).

The coefficient of variation shows that most of the variables are within the framework of an exceptionally homogeneous set, while the moderately heterogeneous set could be analyzed using the two variables: the one for assessing flexibility (MDPK, KV=60.15) and the other for balance (MSZO, KV=62.93). Therefore, the references to the results between the respondents were large. The reach height variable (MDVS) has the greatest homogeneity.

Table IV which comprising information on the basic statistical parameters of the variables for assessing the motor abilities of the examinees of the second league volleyball sub-sample, shows a non-significant deviation from normality in the variable for assessing the running speed. The value of kurtosis (Ku=2.78) and skewness (Sk=-1.25) indicates a shift of the curve to the left as well as a sharper peak. The results are numerically lower and grouped around the arithmetic mean. The values of the other variables are within normal limits.

The MDVS variable has the highest homogeneity, as was the case with the first league volleyball subsample, while the MSZO variable has the characteristics of moderate heterogeneity (KV=56.60).

Differences in morphological characteristics and motor skills between volleyball players of the first and second volleyball leagues are shown in Table V. The results of the t-test undoubtedly reveal that there is no statistically significant difference between the subsamples of volleyball players of the first and second leagues for any variable. With this, it is possible to conclude that no statistically significant difference in morphological characteristics was found between first and second-division volleyball players.

An overview of Table VI, which observes the differences in motor skills between subsamples of volleyball players from the first and second leagues, clearly shows that there is a statistically significant difference in only one variable. It is a variable for assessing balance, the Stork test with closed eyes (MSZO), where at the p=0.00 level of statistical significance, a difference was determined in favor of the subjects of the first league subsample, with a t-value of 3.17 differences. Female volleyball players from the first league achieved better results on this test by an average of 10.09 seconds compared to their colleagues from the second league.

A Figure display is often needed, when it comes to identifying differences, not only for the purpose of making a clearer picture of the significance of the differences, but also for the distribution of the results. Looking at Figure 1, it is clear that the differences in the mean values of the results for the variable MSZO are significant. With such a plastic display of differences it is possible to conclude that, when it comes to motor skills, differences exist in the balance assessment variable. There were no statistically significant differences in the other variables. Therefore, they will not be observed in this part of the article.

Table IV. Central and dispersion parameters of the motor skills of the examinees of the second league volleyball subsample (n=20)

	M	Min	Max	R	SD	KV	Se	Sk	Ku
MSUD	179.70	156.00	206.00	50.00	15.27	8.50	3.41	-0.04	-1.11
MSUV	34.75	26.00	43.00	17.00	3.80	10.92	0.85	-0.04	1.04
MS20	3.76	2.88	4.21	1.33	0.30	7.92	0.07	-1.25	2.78
MTTS	12.99	10.08	17.20	7.12	2.02	15.56	0.45	0.60	-0.77
MDVS	221.90	198.00	236.00	38.00	9.95	4.48	2.22	-0.60	0.09
MDPK	10.85	3.00	18.00	15.00	5.05	46.57	1.13	-0.32	-1.50
MSZO	10.44	3.20	24.00	20.80	5.91	56.60	1.32	0.74	-0.02
ML30	19.75	14.00	27.00	13.00	3.75	19.01	0.84	0.28	-0.92

n – number of respondents; M – arithmetic mean; Min – minimum value; Max – maximum value; R – variation width; SD – standard deviation; KV – coefficient of variation; Se – standard error of the arithmetic mean; Sk – Skewness; Ku – Kurtosis.

Varijabla	M – prva liga	M – druga liga	t – vrijednost	p
ATV	173.60	173.20	0.21	0.84
ATM	64.15	61.40	1.13	0.27
ARR	173.70	173.30	0.22	0.83
ADS	19.02	19.10	-0.28	0.78
AOG	87.25	85.65	0.83	0.41
AOK	85.55	86.10	-0.28	0.78
AON	51.35	50.55	0.58	0.56

Table V. Differences in morphological characteristics between subsamples of first and second division volleyball players (t-test).

M – arithmetic mean; t - value - strength of differences between groups; p – statistical significance of differences.

Table VI. Differences in motor abilities between subsamples of first and second division volleyball players (t-test).

Varijabla	M – prva liga	M – druga liga	t – vrijednost	p
MSUD	178.30	179.70	-0.25	0.81
MSUV	36.05	34.75	0.99	0.33
MS20	3.64	3.76	-1.44	0.16
MTTS	12.84	12.99	-0.33	0.74
MDVS	222.95	221.90	0.36	0.72
MDPK	9.88	10.85	-0.56	0.58
MSZO	20.53	10.44	3.17	0.00*
ML30	18.70	19.75	-1.10	0.28

M – arithmetic mean; t - value - strength of differences between groups; p – statistical significance of differences.
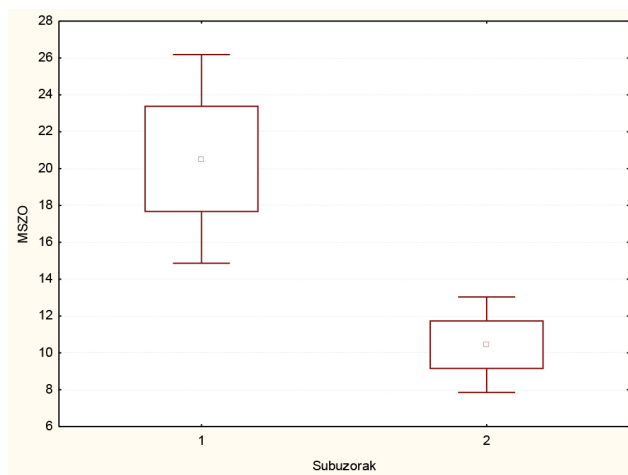

Fig. 1. Differences of the MSZO variable between subsamples.

DISCUSSION

Modern volleyball today is an extremely dynamic game that requires a high level of fitness, as well as technical and tactical efficiency in the game which is directly conditioned by the body composition and morphological characteristics that are said to be extremely important in top volleyball (Bojanic *et al*., 2020). According to previous research, especially (Marelic *et al*., 2008), it is clear that body height and mass make a clear distinction between volleyball players of a more advanced level of competition. In this case, such a thing was not shown, because it is evident that all the differences in the morphological space were absent, so the question of adequate selection of the female players can be raised.

This disputes with some authors who determined the differences between the two levels of volleyball players. Thus, the research of Iadreev *et al*. (2015), proves that in several segments of the motor area, especially in the field of explosive power, there is a significant difference in favor of better-trained volleyball players. A similar relationship was also expected in this research. A more detailed conclusion will be made in the further continuation of the work, as well as the valorization of the set hypotheses and the general goal of the research.

If we compare the average height of first and second-league female volleyball players in Montenegro, with the results of other scientific studies conducted on a similar sample of subjects (Nikolaidis *et al*., 2012) - 168.5 cm, Croatian volleyball league female players (Grgantov *et al*., 2006) whose average was 174.36 ± 6.57, researched by Malá *et al*. (2010) - 179.1 ± 6.73 cm, Martín-Matillas *et al*. (2014) - 179.8 ± 7.1 cm, Carvalho *et al*. (2020) - 176.35 ± 6.21, Noutsos *et al*. (2019) - 176.5 ± 5.7, Radu *et al*. (2015) - 167 ± 0.79 cm. Based on the results of a study by Almeida & Soares (2003), carried out on young Brazilian female volleyball players' where the mean height was 174.0 ± 6.0 cm, we can conclude that Montenegrin volleyball players deviate to a certain extent from the results when in terms of height of the players of quality European teams. Based on the above studies, we can conclude that Montenegrin female players, when it comes to height as one of the most important factors for achieving top results in volleyball, is at a very high level compared to the values of volleyball players in other national leagues.

Height is seen as an extremely important factor in achieving top results in volleyball. Therefore, we can consider that this is exactly the limiting factor for Montenegrin volleyball players when it comes to competitions and achieving more notable results in club volleyball. Also, another complicating aspect for Montenegrin women's volleyball and coaches is the very small base of players they have at their disposal, given that the women's league has only 10 clubs. Motor skills involved in the realization of all kinds of movement, in their basis the efficiency of organic systems, particularly the nervous-muscle, which is responsible for the intensity, duration and motion control, and the ability to provide powerful, fast, durable, precise and coordinated implementation of various motor tasks (Bartlett *et al*., 1991).

Today the practice accepts the following structure of basic motor abilities: coordination, strength, speed, endurance , flexibility, balance and precision, as the dominant abilities in the realization of the sport achievements, which are the subject of this paper. Problem of specific motor skills

is researched by many authors. Their findings are included mainly in the area of the structure of the rally in volleyball or volleyball players and solving motor tasks in situational training or volleyball competition (Stojanovic & Milenkoski, 2005; Nesic, 2006; Liahova & Strelnikova, 2007). As for the results when it comes to motor tests, a statistically significant difference was found in the variable for assessing balance in favor of first league female volleyball players, in the other tests no statistical significance was found. Cacic *et al.* (2020) also came to similar results in some tests, where the results are similar in the high jump and 20m running variables. In the research conducted by Pocek *et al.* (2020) also no significant statistical differences were found in the tested variables in relation to the player positions in the team.

It has already been highlighted that the selection in all age categories of female volleyball players in Montenegro is performed based on a few parameters, while other parameters have been rather neglected. As this kind of research is not common in Montenegro, the implementation of the results can be multiple. In particular, this type of research could improve work programs in all clubs in Montenegro, as well as work in national selections. The obtained data can influence the further implementation of training processes, especially the process of selecting players, which needs to be improved. The results of the research will undoubtedly help further research and the next researchers, who will want to build further on this topic or to expand this same topic through a larger number of variables or a larger sample of respondents. It is certainly recommended that this research be repeated with more clubs from more Montenegrin cities.

CONCLUSIONS

The very shortcomings of this research are reflected in the smaller number of the researched examinees and leave room for more significant progress in further research. Also, since the respondents are from one club, it is possible to expand the range of respondents, when it comes to volleyball, and make similar comparisons in several Montenegrin municipalities or regions. Since no statistically significant differences were found, it is not possible to create a hypothetical model that players must fulfill to play at a higher level.

BOJANIC, D.; LJUBOJEVIC, M.; MALOVIC, P.; NOKIC, A. & VUJOVIC, M. Características morfológicas y diferencias en habilidades motoras de jugadoras de voleibol de la primera y segunda liga montenegrina. *Int. J. Morphol., 41(1)*:181-187, 2023.

RESUMEN: El objetivo de este estudio fue determinar si existe una diferencia estadísticamente significativa en las características morfológicas y habilidades motoras de las jugadoras de voleibol de primera y segunda liga. La muestra estuvo conformada por 20 jugadores de primera y 20 jugadores de segunda liga. Solo se incluyeron en la muestra aquellas jugadoras de voleibol que completaron todo el programa de medición. Los sujetos se sometieron a la medición de las características morfológicas (7 variables) y habilidades motoras (8 variables). Las diferencias estadísticamente significativas se determinaron con la prueba t para muestras independientes. Los resultados de la investigación mostraron que no existían diferencias estadísticamente significativas en las características morfológicas y habilidades motrices de las jugadoras de voleibol de primera y segunda liga. La diferencia se encontró solo en la variable para evaluar el equilibrio a favor de las jugadoras de voleibol de primera división.

PALABRAS CLAVE: Características morfológicas; Habilidades motoras; Vóleibol; Diferencias.

REFERENCES

Alic-Partic, M. Odbojka – *Tehnika i Taktika Igre*. Tuzla, DOO Off set Tuzla, 2002.

Almeida, T. A. & Soares, E. A. Nutritional and anthropometric profile of adolescent volleyball athletes. *Rev. Bras. Med. Esporte, 9(4)*:198-203, 2003.

Bartlett, J.; Smith, L.; Davis, K. & Peel, J. Development of a valid volleyball skills test battery. *J. Phys. Educ. Recreat. Dance, 62(2)*:19-21, 1991.

Bojanic, D.; Bjelica, D. & Georgiev, G. Influence of the basic motor potential on the realization of specific motor skills of elite female volleyball players. *J. Phys. Educ. Sport, 16(2)*:500-4, 2016.

Bojanic, D.; Ljubojevic, M.; Krivokapic, D. & Bjelica, D. Morphological characteristics and body composition of elite volleyball players: three Montenegrin clubs with most trophies participating in European competitions. *Int. J. Morphol., 4(38)*:903-8, 2020.

Cacic, I.; Rupcic, T.; Dukaric, V.; Feng,L. & Cigrovski, V. Diferencess in motor abilities between female basketball and volleyball players. *Hrvat. Sportskomed. Vjesn. 35*:41-5, 2020.

Carvalho, A.; Roriz, P. & Duarte, D. Comparison of morphological profiles and performance variables between female volleyball players of the first and second division In Portugal. *J. Hum. Kinet., 71*:109-17, 2020.

Grgantov, Z.; Katic, R. & Jankovic, V. Morphological characteristics, technical and situation efficacy of young female volleyball players. *Coll. Antropol., 30(1)*:87-96, 2006.

Iadreev, V.; Cherkashin, I.; Vujkov, S. & Drid, P. Diffences in anthopometic, motoric and cognitive abilities between athletically traigned and untrained girls. *Biomed. Hum. Kinet., (7)*:73-7, 2015.

Jankovic, V. & Marelic, N. *Odbojka*. Zagreb, Fakultet za Fizicku Kulturu, 1995.

Ljubojevic, M.; Bojanic, D.; Bjelica, D.; Vasiljevic, I. & Vukotic, M. Differences in anthropometric characteristics between two elite female basketball national teams - Participants at Eurobasket 2019 in Latvia and Serbia. *Int. J. Morphol., 38(4)*:857-62, 2020.

Ljubojevic, M.; Bojanic, D.; Krivokapic, D.; Djukanovic, N. & Nokic, A. Differences in anthropometrics characteristics and body composition between two elite youth male basketball national teams – Participants at U18 European Championship 2019. *Int. J. Morphol., 38(6)*:1528-34, 2020.

Malá, L.; Maly, T.; Záhalka, F. & Bunc, V. The profile and comparasion of body composition of elite female volleyball players. *Kinesiology, 42(1)*:90-7, 2010.

Malousaris, G.; Bergeles, N.; Barzouka, K.; Bayos, I.; Nassis, G. & Koskolou, M. Somatotype, size and body composition of competitive female volleyball players. *J. Sci. Med. Sport, 11(3)*:337-44, 2008.

Marelic, N.; Durkovic, T. & Resetar, T. Razlike u kondicijskim sposobnostima I morfoloskim karakteristikama odbojkasica razlicitog statusa u ekipi. Hrvatski Sportskomed. *Vjesnik, 23(1)*:30-4, 2008.

Martín-Matillas, M.; Valadés, D.; Hernández-Hernández, E.; Olea-Serrano, F.; Sjöström, M.; Delgado-Fernandez, M. & Ortega, F. B. Anthropometric, body composition and somatotype characteristics of elite female volleyball players from the highest Spanish league. *J. Sports Sci., 32(2)*:137-48, 2014.

Nesic, G. *Structure Championship Activities in Women's Volleyball*. Doctoral Dissertation, Belgrade, Faculty of Sport and Physical Education, 2006.

Nikolaidis, P. T.; Ziv, G.; Arnon, M. & Lidor, R. Physical characteristics and physiological attributes of female volleyball players - The need for individual data. *J. Strength Cond. Res., 26(9)*:2547-57, 2012.

Noutsos, S. K.; Meletakos, G. P. & Bayios, A. I. Morphological characteristics of adolescent elite female handball and volleyball players. *J. Phys. Educ. Sport, 19(4)*:1502-7, 2019.

Palao, J. M.; Gutiérrez, D. & Frideres, J. E. Height, weight, Body Mass Index, and age in beach volleyball players in relation to level and position. *J. Sports Med. Phys. Fitness, 48(4)*:466-71, 2008.

Pocek, S.; Vukovic, J.; Jaksic, D.; Lakicevic, N.; Messina, G.; Bianco, A. & Drid, P. Fitness profile of young female volleyball players. *Med. Sport, 73(2)*:197-209, 2020.

Radu, L. E.; Popovici, I. M. & Puni, A. R. Comparison of anthropometric characteristics between athletes and non-athletes. *Procedia Soc. Behav. Sci., 191*:495-9, 2015.

Sheppard, J.; Borgeaud, R. & Strugnel, A. Influence of stature on movement speed and repeated efforts in elite volleyball players. *J. Aust. Strength Cond., 16(3)*:12-14, 2008.

Srhoj, V.; Rogulj, N.; Zagorac, N. & Katic, R. A new model of selection in women's handball. *Coll. Antropol., 30(3)*:601-5, 2006.

Stojanović´, T. & Milenkoski, J. Multivariate differences in variables to assess the situationalmotor skills between the six playoff games and play-out of the First Macedonian volleyball hierarchical structure of motor abilities. *Kineziologija, 5(1-2)*:7-81, 2005.

Corresponding author:
Danilo Bojanic, PhD
Assistant Professor
Faculty for Sport and Physical Education
University of Montenegro
81400, Niksic
MONTENEGRO

E-mail: danilo.bo@ucg.ac.me