ORIGINALNI ZNANSTVENI RAD
ORIGINAL SCIENTIFIC PAPER

Hrvat. Športskomed. Vjesn. 2020; 35:41-45

DIFFERENCES IN MOTOR ABILITIES BETWEEN FEMALE BASKETBALL AND VOLLEYBALL PLAYERS

RAZLIKE U MOTORIČKIM SPOSOBNOSTIMA IZMEĐU KOŠARKAŠICA I ODBOJKAŠICA

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SUMMARY

The research took place at the Faculty of Kinesiology in Zagreb. The goal of the research was to determine differences in motor skills, between the youth categories, of the female volleyball and basketball players. Sample size was comprised of 35 female athletes with an average age of 14,7 ± 0,8 years, average body height 176,9 ± 8,1 cm, and average body weight 65,4 ± 6,8 kg. Descriptive statistic was used to analyse the results, which had showed descriptive method indicators (Min, Max, Mean, Sd). The tests that were conducted for analysis in the research were: side steps (MAGKUS), countermovement jump (CMJ), single leg take-off from a step (Single_leg), two-legged take-off with one step approach (Parallel_jump) and 20 m running (Run_20m). For the purpose of determining the statistical significance of differences between groups of subjects, the independent samples t-test was used in the software package Statistica v13.5. A statistically significant difference was found in countermovement jump, two-legged take-off with one step approach and side steps, in which the group of volleyball players had significantly better results. Remaining variables did not show any significant results. This research will contribute to a better understanding of the similarities and differences between basketball and volleyball. With the presented tests and results, it is possible to continuously monitor athletes and use these values as reference points for comparing equal categories of female athletes.

Key words: volleyball, basketball, explosiveness, agility, speed, youth age categories

SAŽETAK

Istraživanjem provedenim na Kineziološkom fakultetu Sveučilišta u Zagrebu cilj je bio utvrditi razlike u nekim motoričkim sposobnostima između mlađe dobnih kategorija košarkašica i odbojkašica. U tu svrhu, uzorak ispitanika za istraživanje činilo je 35 sportašica prosječne starosti 14,7 ± 0,8 godina, tjelesne visine 176,9 ± 8,1 cm i tjelesne mase 65,4 ± 6,8. Izmjerenim rezultatima određeni su deskriptivni pokazatelji (Min, Maks, AS, SD). U istraživanju provedeni su testovi: koraci u stranu (MAGKUS), skok u vis iz mjesta (CMJ), skok u vis sunožnim odrazom iz jednog koraka (S_sun_korak), jednonožni skok u vis iz koraka (S_vis_jedn_korak) i trčanje 20 m (Trč_20m). Za potrebe određivanja statističke značajnosti razlika između grupa ispitanika koristio se t-test za nezavisne uzorke u programskom paketu Statistica v13.5. Statistički značajna razlika utvrđena je u testovima skoka u vis iz mjesta, skoka u vis sunožnim odrazom iz jednog koraka te koraka u stranu u kojima je skupina odbojkašica imala statistički bolje rezultate. U ostalim varijablama rezultati nisu pokazali značajne razlike. Ovo istraživanje doprinijet će boljem shvaćanju sličnosti i razlika između košarke i odbojke. Prikazanim testovima i rezultatima moguće je kontinuirano pratiti sportaše te koristiti ove vrijednosti kao referente za usporedbu jednakih kategorija sportašica.

Ključne riječi: košarka, odbojka, eksplozivnost, agilnost, brzina, mlađe dobne kategorije

INTRODUCTION

Basketball and volleyball belong to sports games that consist of numerous simple and complex motor movements whose efficiency depends on the level of development of the motor space. The challenges of today's sport requires athletes to have a higher level of motor skills and technical knowledge to achieve better results[4]. Although motor skills are genetically determined, the coefficient of innateness is different for certain motor skills, which means that some are more and some less susceptible to the influence of the training process. A feature of the impact on motor skills is that skills with a higher degree of innateness will be less affected by training and vice versa[1].

Given that sports training is a complex transformation process, for the purpose of its control, programming, adaptation, and optimization of methods, it is necessary to have an insight into the current state of athletes. Motor diagnostics provides data on the level of development of basic and specific motor skills. Basketball and volleyball as team ball sports (sports games) are characterized by similar movement structures as well as the great importance of individual motor skills. Comparing the body composition of different sports[6], it is concluded that in the variables (non-fat mass, fat mass, percentage of adipose tissue, body cell mass) basketball and volleyball athletes are the most similar. The most important motor skills that stand out in these two sports are: coordination, agility, explosive power, precision, and speed.

The most common tests of diagnostic procedures for assessing motor skills in team sports such as basketball and volleyball are aimed at defining the level of agility and explosiveness of athletes (jumping, speed). Based on the importance of the aforementioned skills, this research focuses on the measurement of young female basketball and volleyball players in tests used to assess lateral agility, jump-type explosiveness, and starting acceleration. Studying the impact of a 3-year specific training program for female basketball players (15.60 ± 1.34 years old) and female volleyball players (14.50 ± 0.97 years old) and analysing the data, it is concluded that female volleyball players achieved higher values in high jump with and without prior preparation[2]. Athletes who have better results in tests of speed-strength indicators (MAGKUS and CMJ) are categorized into a group of better-quality volleyball players compared to those with poorer results[3]. Studying the differences in the agility test between young female basketball and volleyball players (14-17 years old), it was found that there is no significant difference in the tests conducted between these two sports[5].

The aim of this research is to determine the differences in some motor skills of female basketball and volleyball players of the national team.

SUBJECTS AND METHODS

The study involved 35 active female athletes of the basketball and volleyball cadet national teams. The protocol and implementation of the research was approved by the Ethics Committee of the Faculty of Kinesiology, University of Zagreb. Instruments for conducting the testing were provided by the Laboratory for Sports Games. Since minors participated in the research, the parents'/guardians' consents were collected for the implementation of measurements and the use of data.

Anthropometric and morphological measures taken were body height (ALTV), body weight (AVTT), arm span (ALRR). For the purpose of determining differences in the motor test of lateral agility, the test 'Side steps'[8] was used. To define and compare the parameters of explosive power of the jump type, the basic test 'Countermovement jump'[7], and specific tests 'Two-legged take-off with one step approach'

Table 1. Basic descriptive indicators of age (g), height (cm), weight (kg) and arm span (cm) of female basketball and volleyball players

Tablica 1. Osnovni deskriptivni pokazatelji starosti (g), visine (cm), mase (kg) i raspona ruku (cm) košarkašica i odbojkašica

Variables	Group	Min	Max	AM	SD
Age (g)	Basketball	14,1	15,9	15,2	0,7
	Volleyball	13,6	16,4	15,2	0,9
Height (cm)	Basketball	163,6	194,9	178,8	8,5
	Volleyball	163,9	186,5	174,9	7,3
Weight (kg)	Basketball	56,5	82,5	68,6	7,1
	Volleyball	54,0	68,9	62,1	4,6
Arm span (cm)	Basketball	165,8	205,3	182,8	11,3
	Volleyball	163,2	186,7	175,5	7,7

Legend: Min = minimum result value, Max = maximum result value, AM = average result value, SD = standard result deviation.

and 'Single leg take-off from a step' were used. The ability to start and accelerate was determined by the '20 meters running' test.

MEASUREMENT PROTOCOL

The research was conducted in the large hall of the Faculty of Kinesiology (measurement of the volleyball national team) and in Vodice and Požega (measurement of the basketball national team). Measurements were performed during the preparation periods of the national teams. The selected measurement venues were suitable because of the size of the space required to perform the measurements. Before the start of the measurement, the subjects were introduced to the measurement protocol and motor tests were explained and demonstrated. In the initial part of the testing, the athletes were measured the required anthropometric characteristics (body height, body weight, arm span), after which a standardized warm-up protocol was performed, which consisted of straight running, athletic school, dynamic stretching in place, sprints and jumps. After warming up, the main part of the measurement begins with tests to assess the explosive power (lower extremities) of the jump type, using the Optojump optical system.

After the tests for the assessment of explosive power, the MAGKUS test for the assessment of lateral agility follows, and the Run_20 m test for the assessment of the starting speed. Witty photocells and Witty timer were used to perform these tests.

RESULTS

Table 2 shows the minimum, maximum and average values of the results as well as the standard deviation in the tests for each group of athletes. In the MAGKUS test, the female volleyball players had better values of average results. The maximum values of AS are contributed by the maximum result of basketball players, which is 1.52 seconds weaker compared to the maximum result of volleyball players (8.98 sec). In the CMJ test, female volleyball players achieved higher values of minimum, maximum and average results compared to female basketball players. The AM of the CMJ differs by 8.44 cm in favour of the volleyball players, while the difference of the arithmetic means in the two-legged take-off with one step approach test is 4.46 cm. The high maximum value of the volleyball players in the Parallel_jump test supports the difference in the average value shown. In the test Single_leg_L, by comparing the average results, we can conclude that the basketball players achieved better results. In contrast, in the Parallel_jump_R test, the volleyball players had higher values in the jump height results. In the Run_20m test, the athletes show almost equal values of the best or minimum results, while in the maximum values, the basketball players show much slower results. This trend of results is in favour of female volleyball players, which is also shown by the values of the AM, which are better for female volleyball players (3.57 vs. 3.63). The results of the average values of all tests, except in the single leg take-off from the left step, are better in young female volleyball players.

Table 2. Descriptive indicators of motor tests
Tablica 2. Deskriptivni pokazatelji motoričkih testova

Variables	Group	Min	Max	AM	SD
MAGKUS	Basketball	7,72	10,50	8,55	0,75
	Volleyball	7,38	8,98	7,94	0,46
CMJ	Basketball	29,0	41,5	33,90	3,83
	Volleyball	32,0	48,7	42,34	4,29
Parallel_jump	Basketball	31,6	44,7	37,84	3,39
	Volleyball	34,6	51,8	42,30	3,81
Single_leg_L	Basketball	21,1	37,2	29,62	4,68
	Volleyball	21,5	34,6	28,02	4,07
Single_leg_R	Basketball	19,7	38,0	27,16	5,29
	Volleyball	18,5	33,7	27,68	4,13
Run_20m	Basketball	3,40	4,07	3,63	0,15
	Volleyball	3,36	3,82	3,57	0,14

Legend: MAGKUS = side steps, CMJ = countermovement jump, Parallel_jump = two-legged take-off with one step approach, Single_leg = single leg take-off from a step, Run_20m = 20 meters running, Min = minimum value of results, Max = maximum value of results, AM = arithmetic mean = average result value, SD = standard deviation of results.

Table 3. T-test for independent samples
Tablica 3. T-test za nezavisne uzorke

Variables	N-1	N-2	t-value	df	p-value
CMJ	17	18	6,15	33,00	0,00*
Parallel_jump	17	18	3,66	33,00	0,00*
Single_leg_L	17	18	-1,08	33,00	0,29
Single_leg_R	17	18	0,32	33,00	0,75
MAGKUS	17	18	-2,88	33,00	0,01*
Run_20m	17	18	1,34	33,00	0,19

Legend: * - marked values show significant difference between groups, 1-female volleyball players, 2-female basketball players

DISCUSSION

The purpose of this research was to determine the differences in the motor skills of female basketball players and female volleyball players of the national team. Female volleyball players have better values of jump height compared to female basketball players where a statistically significant difference is observed in the results of CMJ and two feet jump from a single step. The values of single leg take-off from the left and right foot do not show a statistically significant difference. Given the specificity of the jump, which according to the structural analysis is more similar to the basketball elements, it was to be expected that the athletes from this sport would have better results. This can be attributed to both the situational game of basketball and the elements of the basketball game where female basketball players perform single leg jumps much more often when performing specific basketball elements, as opposed to female volleyball players who predominantly perform vertical two-legged jumps. Contrary to expectations, the distribution of results in the Single_leg_L test is in favour of the basketball players, while in the Single_leg_R test the volleyball players have better results. In the MAGKUS test, there is a statistically significant difference between the two groups of subjects. Volleyball players are significantly better in the lateral agility test. The specificity and representation of movement structures in volleyball are focused on lateral movements, which justifies this trend of results. Side steps test is equally represented in basketball diagnostics, but in practical terms, angular and rotational changes in the direction of movement are used more. The results of the 20-meter running test do not show a statistically significant difference. The manifestation of the results is in favour of volleyball players, which according to the representation of the movement structure and ability belongs more to basketball. Also, contrary to the measured results, the authors[9] studied the differences in the 20-meter running test and obtained a significant difference between basketball and volleyball players (3.8 sec vs. 4.0 sec).

CONCLUSION

Diagnosis of motor skills is an important factor in team sports to monitor the training process. Monitoring and development of young athletes is of great importance for later success in these sports. With diagnostics, it is possible to identify weaknesses in motor skills in a timely manner and to systematically act on the correction of technique and increase the level of the most important skills. The aim of this study was to determine the differences in some motor skills of female basketball and female volleyball players of the national team. The volleyball players had better values of jump height, which was statistically proven in the CMJ and S_sun_korak tests. A statistically significant difference is also present in the results between the two groups of female athletes in the MAGKUS test which shows that female volleyball players are significantly better in the lateral agility test. In the tests S_vis_jedn_korak_L, S_vis_jedn_korak_D and Trč_20m there is no statistically significant difference in the obtained results.

This research will contribute to a better understanding of the similarities and differences between basketball and volleyball. Given that only athletes from female national teams participated in this study, we can conclude that they are representatives of these sports. With the presented tests, it is possible to continuously monitor athletes and use these values as reference points for comparing equal categories of athletes. Also, consequently, through the test results, a quality effect can be made on the planning and programming of the training process.

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