

**PROFESSIONAL ARTICLE****Goran Žakula<sup>1</sup>, Saša Jovanović<sup>2</sup>**<sup>1</sup> Fakulty of sport and physical education, University of Novi Sad, Srb<sup>2</sup> Fakulty of physical education and sport, University of Banja Luka, BiH**UDK: 796.322****796.012.1****DOI: 10.7251/SIZEN1802054Z****THE RELATION BETWEEN MOTOR SKILLS AND PERFORMANCE  
OF SPECIFIC TECHNICAL ELEMENTS IN HANDBALL****Abstract:**

*The aim of this research was to establish a relationship between motor skills and performance of specific elements in handball. A battery of 18 motor skills tests was assessed on the sample of 58 male subjects, students of Faculty of Physical Education and Sport, aged 21-23 years. Variables of coordination, figure eight running drill with bending under rope, lateral shuffle, agility on the floor, and agility in the air, all indicate to negative projection on the first isolated canonical factor, as do the two flexibility tests, shoulder and chest opener with rod and standing shoulder extension were applied as predictor variables and two tests dribbling around the cones (Metikoš and al. 1989) and throwing the ball against the wall (Rogulj and al. 1995). The overall results of the canonical correlation analysis indicated to the evaluation of the applied canonical model on motor tests in relation to the performance of specific handball elements, to the canonical correlation value of 0.765, with the Chi-Square test value of 320.101, and to statistically significant correlation of used variables on level  $p .008$ . Through further analysis, 4 canonical roots were extracted, out of which only the first one was statistically significant ( $p .008$ ). Through observation of data on the correlation between motor variables and canonical roots, it can be concluded that the MRCZTL (0.58) and MFEBML (0.56) variables have the highest projection on the canonical factor, and thus are also most significant in conditioning the results achieved. Also the MAGKUS (0.55), MBFTAP (0.51) and MBAUIZ (0.51) variables has statistically significant results in conditioning the results achieved. Results of this analysis are pointing to the fact that the subjects with lower degree of those motor skills have also had lower performance of specific handball elements, indicating the need for greater engagement of motor skills in performing the aforementioned elements.*

**Key words:** handball, accuracy, movement with the ball.

## **INTRODUCTION**

During his development, handball was constantly undergoing a transformation process to become more modern, more popular and more attractive to spectators. In this transformation process, nowadays, handball has become a complex game that adorns speed, explosiveness and ability to overcome individual and group specific situational conditions that emphasize accuracy as one of the dominant motor skills. Gabriječić (1977), Pavlin, Šimenc and Delija (1982) and Vuleta and al. (2003) named accuracy as one of the five situational-motor dimensions: accuracy, the speed of the player's movement with the ball, the speed of the player without the ball and the strength in throwing balls. The motor ability of accuracy is represented through the precision of the individual or group movement of the players, the mutual addition and at the end of the shot towards the goal in order to achieve as many goals as possible. Another important ability, the player's movement with the ball, is reflected in frequent situations when the players move with the ball overcoming the space and / or the opponent's, creating a better chance of passing the ball to other players or shooting to goal. Marković and Pivač (2005) have established a high degree of connection between some basic motor skills and a set of variables for assessing the specific situational-motor skills of handball players, with 55% of total variability explaining the players performance with ball and his speed of movement, while Vuleta et al. (2006) have established the connection between some motor skills and the precision of making the shot to goal. These two dimensions were the subject of this work by testing the relationship of motor skills with individual tests that presented accuracy and manipulation with the ball.

## **METHODOLOGY**

The aim of this research was to establish a relationship between motor skills and performance of specific elements in handball. A battery of 18 motor skills tests was assessed on the sample of 58 male subjects, students of Faculty of Physical Education and Sport, aged 21-23 years. The subjects regularly attended "Handball" classes where they acquired basic knowledge and specifically elements with or without the ball, passing and shooting on goal, and after which the testing of motor skills and two specifically test in handball estimation was conducted.

Predictor variables are presented through a set of 18 motor tests, which are considered to cover the area of performance of the apparatus elements which were standardized by Metikoš and al. 1989. The following tests were applied: push-ups (MRESKL), agility on the floor (MAGONT), crawling under barrier and jumping over it (MBKPOP), figure eight running drill with bending under rope (MAGOSS), lateral shuffle (MAGKUS), one leg stand facing along the beam with eyes closed (MBAU1Z), leg tapping against the wall (MBFTAZ), hand tapping (MBFTAP), leg tapping (MBFTAPN), shoulder and chest opener with rod (MFLISK), standing shoulder extension (MFLPRG), lateral arm raises (MFLONK), standing long jump (MFESDM), standing triple jump (MFETRO), lying medicine ball throw

(MFEBML), supinated pull-ups (MRAZGP), laying back extensions (MRCZTL). The sample of criterion variables consisted of the following elements: dribbling around the cones (Metikoš and al. 1989) and throwing the ball against the wall (Rogulj and al. 1995). All variables were also subjected to correlative analysis in order to determine the existence of relations, which was done in the statistical software SPSS 22.

## RESULTS AND DISCUSSION

In a further process of statistical analysis, the procedure of canonical correlative analysis was conducted so as to determine the relations between motor skills of the subjects and their performance of the specific handballelements: dribbling around the cones and throwing the ball against the wall. The overall results of the canonical correlation (Table 1) indicate to canonical correlation value 0.765, with the Chi-Square Test value 320.101, and to statistically significant connection of the used variables on level  $p = .008$ . Through further application of the analysis, 4 canonical roots were extracted, out of which only the first one was statistically significant ( $p = .008$ ).

Table 1. General results of canonical analysis

		N	R	R2	HI	DF	L	P
LS	64,8	1	0.765	0.812	301.101	243	0.000000	0.008
RS	100	2	0.544	0.808	206.877	212	0.000014	0.545
RVLS	29.114	3	0.210	0.564	132.121	169	0.000894	0.899
RVRS	66.230	4	0.113	0.224	102.002	140	0.002344	0.954
CR	.776							
HI	301.101							
DF	243							
P	.008							

In further analysis, as seen in Table 2, the excerpt from cross correlation matrix, the subjects showed statistically significant connection between strength tests, explosive strength tests, and variables concerning speed of individual movement, variables concerning flexibility of the shoulder zone with criterion variables, and a significantly lower number of connections between variables of coordination abilities and balance, which discriminated the subjects and their results in performance of elements and which indicated to a complex connection between strength and flexibility of the shoulder zone and other motor skills with the goal of better performance of specific handball elements. The data indicate a greater number of variables that are associated with the accuracy (all variables except MBFTAP), suggesting that the accuracy is affected by several factors, i.e., in this case, the level of more motor skills that are needed to accurately perform the task. As for the variables that did not have statistically significant level of interconnection, that does not necessarily mean that they have no share in the performance of the selected handball elements, but rather could indicate to certain ranking of required motor skill degrees in order for the demonstration of the given elements to be more successful.

Table 2. The excerpt from cross correlation matrix

	SLALOM	ORBLZ
MFEBML	0.27	<b>0.41</b>
MAGKUS	<b>0.53</b>	<b>0.36</b>
MRCZTL	0.28	<b>0.55</b>
MFLISK	0.12	<b>0.41</b>
MBAU1Z	0.25	<b>0.54</b>
MBFTAP	<b>0.44</b>	0.27

Regarding the correlation between the motor variables and canonical roots (Table 3), it can be concluded that the variables MRCZTL (0.58) and MFEBML (0.56), MAGKUS (0.55) and MBFTAP and MBAU1Z with a value of 0.51, have the highest projection on the canonical factor, and thus are also most significant in conditioning the results achieved. Interpreting the data, it can be said that those subjects who had their back muscles strong enough had a better body posture, and therefore better preconditions for more precise performance of the task itself. Shoulder strain as well as maintenance of the balance position is necessary and indispensable as a prerequisite for performing precise additions or shooting at goal. The steps to the side are indirectly related to precision, but directly with the slalom of the ball, with the speed of the individual hand movement showing extraordinary importance.

Table 3. Canonical factors of predictor and criterion variables

predictor set variables	1			critierion set variables	1
MRESKL	0.42	MBFTAZ	0.21	SLALOM	0.63
MFESDM	0.41	MRAZGP	0.22	ORBLZ	0.65
MFETRO	0.32	MRCZTL	0.58		
MBKPOP	0.24	MFEBML	0.56		
MAGOSS	0.20	MBAU1Z	0.51		
MAGKUS	0.55	MFLPRG	0.12		
MAGONT	0.19	MFLISK	0.29		
MKTOZ	0.28	MFLONK	0.15		
MBFTAP	0.51				
MBFTAPN	0.32				

Observing the results of a set of criterion variables, it can be said that both variables showed a connection with a higher statistical significance with the first root, than in the case of a connection with the set of predictor variables.

## CONCLUSION

An efficient individual player movement and good ball manipulation, which, for the final result, can display motoric ability of accuracyscoring the goal, directly affects the handball game result. The research has indicated that there are several factors that influence this efficiency in moving with the ball and accuracy. In this case, they were the motor skills that were treated, through the selected set of tests, in order to investigate the relationship with accuracy and manipulation of the ball. During the testing and further analysis of the results, MRCZTL (0.58) and MFEBML (0.56) have showed statistical significant results, which speaks in favor of the need for a high level of torso and shoulder strength as a factor of success in precisely performing tasks. The positive contribution was also given to the variables that represent the balance, the speed of the individual hand movement and the agility movement to the side, which confirmed the complexity of the handball movement in order to achieve the best possible outcome. It can be concluded that a greater number of motor skills affect the success of ball manipulation in player moves as well as in the accuracy of adding and / or shooting, and that these specific motor tasks in the handball, applied in the game itself, the more efficient they are, there is a need for a high level of silence abilities and their further treatment in the training process.

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