Edin Mirvic[1], Alma Dizdar[2], Senad Bajric[3], Osmo Bajric[4]

EFFECT OF MOTOR CAPABILITIES ON SPEED OF SWIMMING WATER POLO CRAWL TECHIQUE

[1] *Faculty of Sports and Physical Education, University of Sarajevo, Bosnia and Herzegovina*
[2] *Olympic pool - Sarajevo, Bosnia and Herzegovina*
[3] *Pan-European University Apeiron, Banja Luka, Bosnia and Herzegovina*
[4] *Faculty of Education, University of Travnik, Bosnia and Herzegovina*

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Abstract
On a sample of a total of 70 young water polo players aged 14 ± 1 years, 170 ± 6, weights 70 ± 5, water polo clubs from Canton Sarajevo / Federation of Bosnia and Herzegovina, a survey was carried out to determine the significance and magnitude of the influence of basic motor skills on the swimming speed of the water polo edge technique on a 75-meter stretch. The study used 12 variables for assessing basic motor abilities that represented the prediction set of variables and one variable for evaluating the speed of swimming using water polo techniques as a criterion. The regression analysis found that the multiple correlation of the predictor system (basic motor abilities) with the criterion (swimming speed of the water polo crawl technique to 75 meters) is (R.772) with the explained total variability (R Square .596), at a statistically significant level p =. 000). This shows that the whole system of predictor variables is significant for predicting the results of swimming by water polo edge technique at 75 meters. From the set of applied basic motor variables, a significant influence on the criterion variable - swimming speed of the water polo crawl technique on a 75-meter section has the following predictor variables: the cost from the site, Beta = .410, which is significantly at the level p = 002; long-range jump, Beta = -.412, which is significant at p =, 010; agility in the air, Beta = .294, which is significant at the level p =, 026; vis in the fold, Beta = -, 461, which is significant at the level p =, 032; hull lifting in 30 seconds, Beta = .232, which is significant at p = 040; a deep precession on the bench, Beta = 258, which is significant at the level p =, 049. It can be noted that in order to achieve results in swimming water polo crawl by technique at 75 meters it is necessary to possess a high level of power capability in all its manifestations (explosive, static and repetitive), coordination ability and flexibility.
The results obtained in this study can serve as a significant factor in predicting the possible impact of some basic motor skills on the speed of swimming in water polo crawl technique in young water polo players, which can significantly contribute to better planning and programming of training contents in working with young water polo players as well as a more quality implementation process selection of young people for water polo sport.

Keywords: **swim speed, motor skills, water polo technique, regression analysis**

Introduction

According to Trumbic (2000), water polo is a water sports game, where players during the game, within the rules of a playground (30-22 m) with two goals, move in different directions, at different speeds and at different distances. The game is played in four quarters, the duration of which is 8 minutes of pure play. Water polo is not only a male sport but also a female, there are noticeable big and fast movements during one match, which is why water polo players have a high demand for motor skills, among which are the fundamental strength, speed and durability (Garbolewski and Starosta, 2013). Erikoglu et al (2015) found in his research that children involved in training processes are more successful in most parameters of motor skills than children who are not involved in sports activities. The duration of an attack in a water polo game is approximately 17.4 + 1.2 s, analysing through the game of the male team which speaks of the very fast transfer of the ball from its part of the playground to the opponent's part. (Smith, 1998). Similar research on this topic was done by authors: Dopsay and sar. 2007, Kondric and sar., 2012, Styrene 2010, Donev et al., 2009, Bampouras and Marrin 2009. In studies that determined the demand for water polo games for men (Polglaze et al., 2008), the high intensity of the repetitive technical elements of the player indicates the

precision, due to the specificity in which the activities (water environment) take place as a large specific motor ability of the toy. Ectalante et al. (2011) indicates changes to the water polo rules that occurred during the period 2005-2009, where FINA introduced new rules, all in the function of improving the attractiveness of water polo for men, as well as the latest and more demanding rules of the game, which are looking for a more gentle game (sharper trial criteria), and therefore water polo players have to swim more and more swiftly compared to what is said to be a new program for the development of motor skills.
The basic aim of this research is to determine the influence of basic motor skills on swimming speed of water polo crawl technique on a 75 m section in water polo players aged 13 to 15 years.

METHODS OF RESEARCH

Sample respondents

The population from which a sample of respondents was drawn out consisted of 70 young water polo players aged 14 ± 1 years, height 170 ± 6, weight 70 ± 5 males from water polo clubs of Canton Sarajevo / Federation of BiH. When selecting a sample of respondents, the following conditions were taken into consideration: that the respondents were at least three years of age in the systematic training process, that they performed for their teams in at least 50% of friendly and control matches, and at least one year of competition in the cantonal league. Only those respondents who were completely healthy included the survey (all those who were sick during the measurement and testing period were left out of the sample, but they also came to the training course). Prior to testing, respondents received a written consent from parents / carers in accordance with ethical principles for biomedical research in humans - Declaration of Helsinki (2013). after approval by parent / guardian, an assessment was made of the motor skills and speed of swimming performed during regular training with the appropriate conditions required for testing.

Sample variables

Sample predicate variables

Determination of the level of basic motor abilities was performed using the measuring instruments they recommend (Kurelić and associates, 1975) and (Eurofit batteries 1988):

a) Mechanism for structuring the movement:
   1. Agility in the air
   2. Taping your hand
   3. Taping your feet

b) Synergic regulation and tonus regulation:
   1. Deep precession on the bench
   2. Reach in the seat
   3. Cross-standing on the lower shaft

c) Excitation intensity regulation mechanism:
   1. Run 20m from high start
   2. Triple jump from the place
   3. Jump away from the place

d) Mechanism of regulating the duration of excitation:
   1. Hang in the hinge
   2. Hull lifting in 30 seconds
   3. Skirmishes at the breaking point

The criterium variable for estimating the speed of swimming by water polo technique was the technique speed of swimming at 75m water polo crawl techniques.
The instrument for measuring the speed of swimming at 75 m was a stopwatch. The task was carried out as follows: The test was performed at the Olympic Pool. The starter gave the mark to start by the rules of swimming competitions - “in their places”, and then the sound of the whistle is heard. The timer on the start signal includes a stopwatch and stops the timing when the respondent touches the swim wall at the 75th meter.
Evaluation: The result was the time it takes for the respondent to siphon the entire section, and measure it in tenths of a second.
Note: Each respondent had two attempts to get better in the list of results.

Data processing methods

For all applied variables, the following descriptive statistical parameters are calculated: Mean, Standard Deviation (Std. Dev.), Minimum Result (Min), Maximum Result (Max).
The testing of the frequency distribution frequency of the applied variables was carried out using the following measures: The Skewness coefficient and the coefficient of elongation or flattening (Kurtosis).
The statistical significance and the magnitude of the impact of the predictor system of variables (basic motor abilities) on the criterion variable (velocity of swimming by technique to 75 meters) was applied, the multiple regression analysis was applied using the statistical package SPSS 20 for windows.

RESULTS

Based on (Table 1) obtained results of the central and dispersive parameters of variables for estimating motor skills and speed of swimming by water polo to 75 meters, it can be concluded that the values of all variables are normally distributed and can be considered in further consideration in this research.
Observing the values of the calculated parameters, the multiple correlation between motor abilities as a predictor set and the swimming speed of the water polo crawl technique at 75 meters is seen as a criterion variable (tables 2 and 3). This connection of the predictor with the criterion variable is 77% ($R = 772$) and at a statistically significant level of .000 ($p = .000$), which explains the total variability with a criterion of 60%. By analysing the impact of individual motor variables (Table 4), it can be seen that the following variables have the biggest and most significant impact on the criterion: the cost

Table 1. Central and dispersive parameters of motor skills and swimming at 75 meters

	Mean	Median	Min	Max	Range	Varian	SD	SE	Skew	Kurt
Agility in the air	6.23	5.78	4.88	10.16	5.28	1.34	1.16	.15	.84	.67
Taping your hand	44.17	45	28	50	22	20.38	4.51	.57	-1.07	1.88
Taping your feet	25.25	25	19	31	12	6.85	2.62	.33	-.10	.53
Deep precession on the bench	2.87	.07	0	20	20	34.50	5.87	.75	2.06	3.09
Reach in the seat	36.01	36	12	58	46	123.79	11.13	1.41	-.23	-.19
Cross-standing on the lower shaft	10.18	9.3	5.04	21.56	16.52	14.99	3.87	.49	1.42	2.23
Run 20m from high start	3.26	3.09	2.81	3.84	1.03	.15	.38	.05	.26	-1.5
Triple jump from the place	590.45	625	401	647	246	4320.91	65.73	8.35	-1.75	2.40
Jump away from the place	199.61	212.25	122.5	226	103.5	734.27	27.10	3.44	-.79	-.65
Hang in the hinge	36.58	38.87	3	65.63	62.63	220.94	14.86	1.89	.65	.07
Hull lifting in 30 seconds	20.95	22	14	26	12	11.16	3.34	.42	-.50	-.99
Skirmishes at the breaking point	5.38	5	1	12	11	8.90	2.98	.38	1.16	.79
Swimming speed at 75 meters length	82.66	79.84	67.21	98.11	35.8	56.57	7.35	.92	.89	1.20

from the site (Beta = .410), the long jump from the place (Beta = -421) in the air (Beta = .294), the height in the hinge (Beta = -, 461), the hull lifting in 30 seconds (Beta = .232), the deep precession in the bench (Beta = 258).

Table 2. Regression analysis in predictive set of basic motor skills

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.772	.596	.497	.709

Table 3. Variance analysis

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	36.363	12	3.030	6.027	.000
	Residual	24.637	49	.503		
	Total	61.000	61			

Table 4. Individual impact of predictors on the criterion variable for assessing the swim speed with water polo crawl at distance of 75 m

	B	SE	Beta	t	Sig.
Agility in the air	.254	.110	.294	2.30	**.026**
Taping your hand	-.006	.033	-.026	-.17	.863
Taping your feet	-.097	.059	-.255	-1.63	.108
Deep precession on the bench	.044	.022	.258	2.02	**.049**
Reach in the seat	.006	.013	.066	.438	.663
Cross-standing on the lower shaft	.009	.032	.033	.267	.791
Run 20m from high start	-.377	.290	-.144	-1.3	.199
Triple jump from the place	.006	.002	.410	3.27	**.002**
Jump away from the place	-.015	.006	-.412	-2.66	**.010**
Hang in the hinge	-.031	.014	-.461	-2.2	**.032**
Hull lifting in 30 seconds	.069	.033	.232	2.11	**.040**
Skirmishes at the breaking point	.093	.071	.278	1.31	.196

Legend: R - multi-correlation coefficient between the criterion variable and the predictor variable system., Rsquare - the coefficient of explained variability, Std.Error of the Estimate - the standard error of forecasting the criterion variable based on the system of predictor variables, Regression-valid variance, Residual- unanswered variance, df - the degrees of freedom of the calculated F test, F - test determining the significance of the multiple correlation coefficient, t - the contribution of each predictor variable to that part of the criterion variance, which can be estimated from the whole system of variables, Sig. - the probability that a critical ratio occurs if the value of the standardized regression coefficient is 0, calculated on the basis of F distribution.

DISCUSSION

Throughout the history of water polo as a sport, there have been a few changes in water polo rules, so in the latest changes, for example, the shorter attack time is from 35 seconds to 30 seconds, and the time of attack with the player is more than 25 seconds per 20 seconds, etc. Because of these changes in the rules, there are faster and more dynamic games, as well as more explosively performed short sprints in the swinging of the field, as shown by the results in this research. What is stated about the changes in the duration of the attack speaks enough that water polo players, in addition to a high level of technical and tactical training, need a high level of motor skills, as experience shows that the team that is more engine-friendly is almost always winning.
This research was aimed at determining the influence of selected basic motor abilities as a predictor system of variables on the swimming speed of the water polo edge with a 75 m technique as a criterion. The results of the regression analysis indicate that the applied system of predictor variables (basic motor abilities) is statistically significant in the prediction of the criterion variable (swim speed at 75 m) at the significance level $p = 0.00$, which is also shown by the coefficient of multiple correlation, which is $R = .77$. The whole system of predictors explains 60% of the common variation of the criterion system (R Square).
Based on the results of this study, a general conclusion can be drawn that the motor tests used are influenced by the speed of swimming by water polo technique. In this study, the greatest influence on the speed of swimming with water polo crawl technique was achieved by the variables belonging to the mechanism of regulating the duration of excitation which, besides regulating the number of activated motor units, also controls the intensity of muscular action by regulating the frequency of activation of certain motor units (Marković, 2004). This regulation is of great importance in the generation of a force of explosive character, but also in the generation of the force of small muscle groups, for example, the muscles of the hand (Marković, 2004.) It follows from the above that the mechanism for regulating the excitation intensity regulates the strength and speed of force generation by 1) the number of activated motor units, 2) frequency of activation of motor units, and 3) synchronization of operation of motor units. This mechanism is called intramuscular or intramuscular coordination (Marković, 2004). A somewhat lower impact has the mechanism of synergistic regulation and tone regulation, as well as a mechanism for structuring the movement. It can be said that all the mechanisms in the package contribute to a better result of swimming speed water polo crawl technique in the age of 13 to 15 years. In her research, Kylie et al. (2006), they came to the realization that a lower level of motoric influences the realization of different technical elements that are performed, and thus also reduces the efficiency in the performance of technical elements (Wertheimer, V. and D. Zoretić, 2010). Also, in water polo many rapid changes in water movements for which coordination is needed, i.e. the agility of the body in the water that can be seen from the results obtained. However, the water polo edge is swimming without a ball, making it much easier than swimming with the ball (running the ball), which is Hayley B. et al. (2010) in his research and emphasized - swimming with the ball reduces swimming speed in male water polo. The development of motor skills must pay attention to the planning and programming of the training exercise in water polo. Garrido et al. (2010) proposed simple so-called. dry power techniques and power tests that are significantly related to sprinter swimming in young swimmers. Dizdar et al. (2014) states that water polo players with a higher (general) level of all applied basic motor abilities - explosive and static forces, agility, speed endurance in water polo fleet, and flexibility of the whole body - have a greater chance of achieving better results in speed swimming in water polo technique at 25 meters. According to Dizdar, A. and E. Mirlic (2015) it is not possible to perform any technical element in water polo without basic physical modification. Until then, activity and inactivity of the muscles have not been adjusted, so that during this period swimming takes place in anaerobic conditions and the development of motor abilities is not at the highest possible level. Falk et al. (2004) tested water polo players from 12-14 years old and obtained similar data as in the results of the research Dopsaj, Madić and Okičić (2007). This conclusion can also be confirmed by the results of this research, because without good general motor and specific motor skills, there is no efficient performance of water polo techniques without a ball and with a ball. This work can help all water polo experts pay special attention to the development of general motor and specific motor skills in order to achieve as much effect as possible in the performance of all elements in the water polo.

CONCLUSION

In order to determine the significance and magnitude of the influence of basic motor skills on the speed of swimming water polo crawl by the technique on a 75-meter section, an analysis was made of the results obtained in water polo players aged 13-15 years. In the space of motor skills, twelve tests were used, which are the basis of the motor capacities for success in water polo. Tests are taken from Eurofit battery tests that are standardized and used in the everyday work of professors and sports coaches and can be said to represent a representative sample of variables

that, according to their characteristics, correspond to the set objectives and tasks of this research work. The criterion variable is the speed of water polo steam technique on a 75-meter section. For the purpose of determining the significance and magnitude of the influence of basic motor skills on the speed of swimming in water polo with a technique of 75 meters, regression analysis in the manifest space was applied.

The obtained results of this research can contribute to better planning and programming of training work with young water polls and better implementation of the process of youth selection for water polo sport. Also, the results obtained can serve as a good basis for future research that addresses this and similar issues.

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Correspondence:
Edin Mirvic
Faculty of Sport and Physical Education,
University of Sarajevo
e-mail: emirvic@fasto.unsa.ba