

## IMPACT OF PLAN AND PROGRAM ON MOTOR ABILITIES ON WATER POLO PLAYERS AND SWIMMERS

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### Abstract:

In order to determine the level of influence of the plan and program on the motor skills of water polo players and swimmers aged 12 to 14 years. Twelve tests were applied in the field of motor skills, which represent the basis of motor skills in water polo and swimming. The tests are taken from the Eurofit battery of tests, which are standardized and used in the daily work of professors and sports coaches and can be said to represent a representative sample of variables, which by their characteristics correspond to the set goals and objectives of this research work. Mechanism for structuring movement (Agility, Taping by hand, Taping by foot), Mechanism of synergistic and tone control (Deep bow on bench, Reach in sitting, Crossing on low beam), Mechanism of regulation of excitation intensity (Running 20m from high start, Tripping from place, Long jump from place), Mechanism for regulating the duration of excitation (Hang in the joint, Lifting torso in 30 seconds, Triceps dips). As a method to determine the impact of the plan and program on the motor skills of the water polo players, a T test for dependent samples was used. It can be concluded that there was an influence of the program on motor skills on swimmers and water polo players, which is expected, since the influence of aquatic activities on the human body is well known.

**Keywords:** water polo, T - test, motor skills

### INTRODUCTION

Water polo is a sport in which two teams of seven players compete on marked terrain, which is prescribed in advance by rules (30m x 25m). Within a certain amount of time, which is also determined by the rules of the game (4 x 8min, with breaks between quarters), the goal of the team is to score a goal, and to prevent the opposing team from doing the same. (Garbolewski and Starosta, 2013) The duration of one attack in a water polo game is approximately 17.4 + 1.2 s, analyzing through the play of the men's team what is the proof of very fast transfer of the ball from their part of the court to the opponent's part. It is only possible to distinguish players in water by the equipment they wear, ie. by the caps that are on the player's head a can be blue or white depending on whether the team is host or away at the game. The main feature of this sport is that it is played in water, and therefore it is classified into water sports along with swimming, artistic swimming, water jumps and so on. When we compare water polo with some of the "land" sports, we could say that it is most similar to today's handball. In water polo, all motor skills develop harmoniously, but above all strength and endurance. The influence and importance of motoric ability - coordination in water polo is still quite unexplored, but it is quite clear that coordination is essential for the best performance of all technical and tactical elements of the game (Modrić et al., 2011). Similar research on this topic has been done by the authors: Dopsaj et al. 2007, Kondric et al., 2012, Stirn 2010, Donev et al., 2009, Bampouras and Marrin 2009. (Mirvic, E., Dizdar, A., Bajric, S., Bajric, O. 2018). A study was conducted to determine the significance and magnitude of the influence of basic motor skills on swimming speed of the water polo crawl technique at the 75 meter section. They came to the conclusion that in order to achieve swimming results in water polo crawl technique at 75 meters, it is necessary to have a high level of strength in all its manifestations

(explosive, static and repetitive), coordination skills and flexibility. The main objective of this research is to determine the level of influence of the plan and program on the motor abilities of water polo players and swimmers from 12 to 14 years.

### METHODS

#### Subjects

The sample of subjects included water polo players and swimmers from Bosnia and Herzegovina, aged 12 - 14, male, a total of 35 from P.V.K. "Dabar" Sarajevo. The study included only those subjects who were completely healthy (all who were ill during the measurement and testing period, and who came to the training in addition, were excluded from the sample).

The research was conducted on a regular basis with the appropriate conditions required for testing in this research.

#### Procedures

The sample of variables consists of 12 tests to assess motor skills in a water polo game.

A sample of variables for assessing motor skills

The determination of the level of basic motor skills was performed using measuring instruments recommended by Kurelić et al. (1975) and Eurofit battery tests.

#### a) Movement Structuring Mechanism:

1. Agility in the air
2. Taping by hand
3. Taping by foot

#### b) Mechanism of synergistic and tone regulation:

1. A deep bow on the bench
2. Retrieve in a sitting
3. Crossing on a low beam

#### c) Mechanism of regulation of excitation intensity:

1. Run 20m from a high start
2. Tripping out of place
3. Long jump from place

d) Mechanism of regulation of the duration of excitation:

1. Hang in the joint
2. Torso lift in 30 seconds
3. Triceps dips

### Description of the research

To ensure the regularity of this research process, approvals from relevant institutions and individuals were used in planning:

- Certificate of swimming water polo club Dabar Sarajevo for testing;
- all subjects were tested under the same conditions (air temperature ranged from 26 to 30 ° C, water temperature ranged from 24 to 26 degrees Celsius and the entire survey was conducted in the complex of Olympic pool Otoka Sarajevo);
- the research was conducted in such a way that motor skills were measured in the subjects;
- about all subjects prior to the measurement and testing process, explained in an acceptable way what was expected of them during the research period and what was required of them in this research, and the main motive was, curiosity and understanding of testing as an opportunity to test their own knowledge and knowledge about their motor skills;
- implemented a 3-month program (same program for swimmers and water polo players);
- the training process is based on raising the swimming ability and is identical for swimmers and water polo players;
- performed the same measurement again;
- measurements were made in groups of 10 subjects each due to the limited space and time required for successful testing;
- one meter and one recorder worked on each measurement;
- during the measurement the subjects wore the proper testing equipment;
- after the test data were collected, the measurement lists were completed and the

- data were processed by appropriate methods for this research work.

### Methods for data processing

The data obtained was processed at the univariate level. As a method to determine the impact of the plan and program on the motor skills of the water polo player, a T test for dependent samples was used.

### RESULTS

#### Analysis of the results of the T-test of the initial and final state of motor skills

By analyzing the T-test in table no. 1 for dependent specimens, the motor skills influenced by the water polo player's plan and program were evaluated. The results indicate positive and statistically significant differences in the transformation of functional abilities.

Significant changes were observed between the initial and final states in the tests Agility in air Initially – Agility in air Final  $t(34) = 3.260$ ,  $p = .003$ . The average decrease in value in this test was, 68657, while the 95% confidence interval ranges from, 25863 to 1.11451, the ETA coefficient shows the value is .23.

Significant changes were also observed between the initial and final testing in the Taping by Hand Initial - Taping by Hand final  $t(34) = -2.989$ ,  $p = .005$ . The average decrease in value in this test was -3.77143, while the 95% confidence interval extends from -6.33539 to -1.20746, the ETA coefficient shows the value is .20.

Significant differences between the initial and final testing are also found in the Taping by Foot tests initially – Taping by Foot Finals  $t(34) = -2.169$ ,  $p = .037$ . The average increase in value in this test was -1.57143, while the 95% confidence interval extends from -3.04372 to -, 09914, the ETA coefficient shows the value is .12

**Table 1.** Results of T-test of initial and final state of motor abilities

Paired Samples Test									
		Paired Differences					t	df	Sig. (2-tailed)
		Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
					Lower	Upper			
Pair 1	Agility in air Initial – Agility in air Final	.686	1.245	.210	.258	1.114	3.260	34	.003
Pair 2	Taping by Hand Initial - Taping by Hand final	-3.771	7.463	1.261	-6.335	-1.207	-2.989	34	.005
Pair 3	Taping by Foot tests initial – Taping by Foot Final	-1.571	4.285	.724	-3.043	-.099	-2.169	34	.037

Pair 4	tests Deep bow on the bench initial - Deep bow on the bench final	2.595	6.361	1.075	.410	4.781	2.414	34	.021
Pair 5	Retrieval in Sitting Initial - Retrieval in Sitting Final	4.353	11.615	1.963	-8.343	-.363	2.217	34	.033
Pair 6	Low beam cross-beam tests initial - Low beam cross - beam tests final	4.211	4.340	.733	-5.702	-2.720	5.740	34	.000
Pair 7	Run 20m from high start initially - Run 20m from high start final	.181	.469	.079	.019	.342	2.284	34	.029
Pair 8	Triple jump from place initial - Triple jump from place final	51.714	110.458	18.670	13.770	89.658	2.770	34	.009
Pair 9	Long jump from place initial - Long jump from place final	13.771	32.687	5.525	-24.999	-2.543	2.493	34	.018
Pair 10	in Hang in joint tests initial – Hang in joint joint final	9.459	21.682	3.664	-16.907	-2.011	2.581	34	.014
Pair 11	Torso lifting in 30 seconds initial - Torso lifting in 30 seconds final	1.685	3.990	.674	-3.056	-.314	2.499	34	.017
Pair 12	Triceps dips initial – Triceps dips final	3.342	4.702	.794	-4.958	-1.727	4.205	34	.000

Also, significant differences between initial and final testing in the tests Deep bow on the bench initially - Deep bow on the bench final  $t(34) = 2,414$ ,  $p = ,021$ . The average decrease in value in this test was 2.59571, while the 95% confidence interval extends from, 41035 to 4.78107, the ETA coefficient shows a value of .14.

Significant changes between initial and final testing and in tests Retrieval in Sitting Initially - Retrieval in Sitting Final  $t(34) = -2,217$ ,  $p = ,033$ . The average decrease in value in this test was -4.35314, while the 95% confidence interval extends from -8.34313 to -, 36316, the ETA coefficient shows the value is .12.

Differences between initial and final testing are also statistically significant in the low beam cross-beam tests initially - the low beam cross - beam tests final  $t(34) = -5.740$ ,  $p = ,000$ . The average decrease in the value in this test was -4.21143, while the 95% confidence interval ranges from -5.70252 to -2,72033, the ETA coefficient shows the value is .49. Differences between initial and final testing are also statistically significant in the tests Run 20m from high start initially - Run 20m from high start final  $t(34) = 2.284$ ,  $p = ,029$ . The average decrease in value in this test was, 18114, while the 95% confidence interval extends from, 01993 to, 34235, the ETA coefficient shows the value is .13.

Differences between initial and final testing are also statistically significant in the Triple jump from place initial - Triple jump from place final  $t(34) = 2.770$ ,  $p = ,009$ . The average decrease in value in this test was 51.71429, while the 95% confidence interval ranges from 13.77044 to 89.65813, the ETA coefficient shows the value is .18.

Differences between initial and final testing are also statistically significant in tests Long jump from place initially - Long jump from place final  $t(34) = -2,493$ ,  $p = ,018$ . The average decrease in value in this test was -13.77143, while the 95% confidence

interval extends from -24.99984 to -2.54302 ETA coefficient shows the value is .15.

Differences between initial and final testing are also statistically significant in Hang in joint tests initially – Hang in joint joint final  $t(34) = -2.581$ ,  $p = ,014$ . The average decrease in value in this test was -9.45914, while the 95% confidence interval extended from -16.90729 to -2.01100 ETA coefficient showing the value is .16.

Differences between initial and final testing are also statistically significant in tests Torso lifting in 30 seconds initially - Torso lifting in 30 seconds final  $t(34) = -2,499$ ,  $p = ,017$ . The average value decrease in this test was -1.68571, while the 95% confidence interval extended from -3.05666 to -, the 31477 ETA coefficient shows the value is .15.

Differences between initial and final testing are also statistically significant in the tests Triceps dips initially – Triceps dips final  $t(34) = -4,205$ ,  $p = ,000$ . The average value decrease in this test was -3.34286, while the 95% confidence interval extends from -4.95825 to -1.72746 ETA coefficient shows the value is .34.

## DISCUSSION

Based on the results above, we can see that there was an impact of the program on motor skills in swimmers and water polo players, which is expected, since the influence of aquatic activities on the human body is known. The body is in a horizontal position when swimming, which is a facilitating moment for the cardiovascular system. The heart pumps blood easier to all parts of the body, so that carbon dioxide and oxygen are exchanged easier (Ribeiro, J P. et al. 1990). The biggest influence was the variable transverse standing on a low beam, in which motoric ability coordination is most important. This result could be expected because in the match water polo player has to make quick and effective decisions as to why the intellectual abilities are needed, and it is known that we develop the intelligence with the

coordination. Proper swimming skills can decide who is the winner of the race, and this requires good coordination. In our research we have proven that this program has a positive effect on the motor skills of young water polo players and swimmers. The largest statistical difference between the initial and final measurements was obtained for the low beam transverse position and the triceps dips, the mean difference for the variables agility in the air, arm-tapping and trip-off, other variables were low, but there was a significant difference. (Dizdar, A. and E. Mirvic 2014) concluded in their research that the higher the level of readiness in the motor level, the faster the swimming speed at 25 meters is, and the work should be done to improve mechanisms for structuring movement (agility in the air, taping by hand, taping your foot). The same authors recommended that young cadets should include the basic motor skills that are done on land, in the halls when planning and programming the training process. It should be emphasized that in water polo there are constant changes of movement in water and in order to be more efficient it is necessary to have developed coordination, ie. body agility in water as can be seen from the results obtained (Dizdar, A. and E. Mirvic 2014). However, water polo crawl is swimming without the ball and is therefore much easier than swimming with the ball, which is Hayley B. et al. (2010) in his research emphasized that swimming with the ball reduces the speed of swimming in men's water polo and we need as much motor readiness as possible. According to Dizdar, A. and E., Mirvić (2015) it is not possible to perform any technical element in water polo without basic physical training. Because of this, new research and experiments should be done to arrive at the best plans and programs, and therefore more efficient water polo players.

## CONCLUSION

In order to determine the level of influence of the plan and program on the motor skills of water polo players and swimmers from 12 to 14 years. Twelve tests were applied in the area of motor skills, which represent the basis of motor skills in water polo and swimming. The tests are taken from the Eurofit battery of tests, which are standardized and used in the daily work of professors and sports coaches and can be said to represent a representative sample of variables, which by their characteristics correspond to the set goals and objectives of this research work. As a method to determine the impact of the plan and program on the motor skills of the water polo player, a T test for dependent samples was used. It can be concluded that there was an influence of the program on motor skills in swimmers and water polo players, which is expected, since the influence of aquatic activities on the human body is known. This paper may recommend that all water polo and swim coaches also include basic motor skills which are done on land in the halls. The introductory part of the training should be planned and not formal, as is the

case with most, as in these parts of the training motor performance can be raised to a higher level.

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