

Swimming lessons for boys aged 7-9 years in swimming pools of various depth

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Abstract. *The purpose of the article is to consider the effect of swimming on the functional changes in the boys of primary school age. Materials and methods: 7–9-year-old boys from the Aquamarine Swimming Center of the Youth Sports School No. 7 in Chelyabinsk participated in the study, 13 people in each group. The first group was developing swimming skills in a deep swimming pool, the second group - in the shallow swimming pool. The following methods have been used for the study: pedagogical tests; physiometry: Ruffier test, heart rate (HR), blood pressure (BP), pulse blood pressure (PBP) measurements; mathematical statistics.*

Results: *A comparative analysis of the time of acquiring swimming skills revealed that the boys from both groups, swimming both in the deep and shallow swimming pool, mastered gliding in the water on the chest and back by the 8th lesson, and gliding in the water on the chest and back with leg work similar to crawl swimming by the 24th lesson. By the 36th lesson, children mastered front crawl swimming, but boys acquired better the technique of back crawl, practicing swimming in a deep swimming pool.*

Conclusion. *During the study, it was revealed that, while swimming in a deep swimming pool, boys acquire swimming skills better and improve faster their physiological parameters.*

Keywords - *swimming pool depth, glide, functional status, swimming fitness, swimming, skill*

I. INTRODUCTION

An analysis of scientific and methodological literature indicates attempts to scientifically substantiate swimming lessons, both in shallow and deep swimming pools. However, a comparative analysis of the effectiveness of various teaching methods has not been performed sufficiently. We did not reveal a consensus on the acceptable depth of the pool used for swimming lessons for children

aged 7–9 years. In our opinion, the study of the dependence of the success of swimming training on the depth of the swimming pool is relevant for acquiring swimming skills.

II. MATERIALS AND METHODS

The study was conducted on the premises of the Planet Ariant swimming pool in Chelyabinsk.

Boys aged 7–9 years from the Aquamarine Swimming Center of the Youth Sports School No. 7 (Chelyabinsk) participated in the study, 13 people in each group. The first group was developing swimming skills in a deep swimming pool, the second - in the shallow swimming pool. Classes were held 2 times a week. Children learned swimming movements and improved their skills. Both groups were trained according to the parallel-sequential method [1, 3, 4].

The following methods have been used for the study: analysis and synthesis of scientific and methodological literature; pedagogical observation; pedagogical tests; physiometry: Ruffier test, heart rate (HR), blood pressure (BP), pulse blood pressure (PBP) measurements; methods of mathematical statistics [2].

Pedagogical observation was carried out to obtain information about the degree of fatigue by external signs and to improve the content of classes.

To study the degree of acquiring swimming movements, the following control exercises were used: gliding on the chest (meters); gliding on the back (meters); gliding on the chest with leg work similar to crawl swimming (meters); gliding on the back with leg work similar to crawl swimming (meters); front crawl swimming with coordination of the arms, legs and breathing (points); back crawl swimming with coordination of the arms and legs (points).

The results of pedagogical observations were recorded in individual cards, which were filled after each lesson throughout the study. In individual cards, the numbers of lessons and exercises that children mastered were indicated. Their skills were evaluated on a five-point scale.

At the same time, two examinations of the functional status of boys aged 7–9 years were performed in two groups. To determine the effect of swimming on the functional status of the boys, the Ruffier test was used. The Ruffier index was calculated using the formula modified by A. Pustozorov and V. Vorobyov [6, 7].

In the second examination, during the Ruffier test, the subjects' blood pressure (BP) before and after the standard load was measured. Then the pulse arterial pressure (PAP) was calculated and the cardiac performance for each subject was found using the formula. The obtained indicators were evaluated from 0 to 15 [5].

As a result of the analysis of the Ruffier test, the adaptation of the cardiovascular system was obtained and the reserve capabilities of the children were determined by the difference in the initial and final results.

III. RESULTS AND DISCUSSION

Based on the study, the following data were obtained: heart rate (HR) before a standard load; heart rate after a standard load; heart rate after 1 minute of rest; systolic blood pressure before a standard load; diastolic blood pressure before a standard load; systolic blood pressure after a standard load; diastolic blood pressure after a standard load; PAP before a standard load; PAP after a standard load; Ruffier index.

The results were processed using the methods of mathematical statistics. The significance of differences in the indicators of swimming fitness in children studying in shallow and deep swimming pools were compared with the Student's t-criterion.

At the beginning of the study, the children from both groups did not know how to swim. By the eighth lesson, the children learned to glide on the chest and back ($P > 0.05$).

At the 24th lesson, we tested the skill of gliding on the chest and on the back with leg work similar to crawl swimming. There are no significant differences in these indicators.

By the 36th lesson, the children from both groups acquired front and back crawl swimming. However, boys who were trained in the deep swimming pool showed a better technique of back crawl swimming (Table 1).

TABLE I. INDICATORS OF ACQUIRING SWIMMING SKILLS IN THE SHALLOW AND DEEP SWIMMING POOL IN BOYS AGED 7-9 YEARS

Parameter	X		t_{cr}	p
	Shallow swimming pool	Deep swimming pool		
Gliding on the chest	3.73	3.73	0	>0.05
	3.0 – 4.5	2.5 – 5.0		
Gliding on the back	3.84	3.96	-0.576	>0.05
	3.0 – 4.5	3.0 – 5.0		
Gliding on the chest with leg work similar to crawl swimming	4.26	4.19	0.397	>0.05
	3.0 – 5.5	3.0 – 5.0		
Gliding on the back with leg work similar to crawl swimming	4.34	4.19	0.509	>0.05
	3.5 – 5.0	3.0 – 5.0		
Front crawl with coordination	3.8	4.0	-0.847	>0.05
	3.0 – 5.0	3.0 – 5.0		
Back crawl with coordination	3.65	4.11	-4.048	<0.001

After training, the following results were obtained: Tables 2 and 3 show that the reserve capabilities of the first and second groups, according to the results of the Ruffier test, did not change. Thus, we can assume that the desire of children to engage in swimming is determined not by the amount of physical exertion, but only by overcoming the fear of water.

TABLE II. ASSESSMENT OF FUNCTIONAL STATUS OF THE CARDIOVASCULAR SYSTEM IN BOYS AGED 7-9 YEARS

Parameter	1 group				2 group			
	Before the training course		After the training course		Before the training course		After the training course	
	M	±m	M	±m	M	±m	M	±m
Heart rate before load (15 s)	23.8	0.8	22.5	0.68	23.5	0.5	22.5	0.8
Heart rate after load (15 s)	38.8	0.9	34.5	1.9	34.5	0.6	34.8	0.97
Heart rate in 1 min (15 s)	27.3	1.7	27.5	1.4	26	0.95	25.5	0.95
Systolic blood pressure before load	98.5	3.1	102.5	3.4	100.8	4.2	100.8	5.45
Diastolic blood pressure before load	68.3	3.4	64.3	3.9	65.8	4.4	63.3	4.9
Systolic blood pressure after load	120	3.2	112.8	4.7	115.8	6.3	123	4
Diastolic blood pressure after load	59.2	4.8	60	6.3	55.8	6.2	58.3	4.7
Pulse arterial pressure before load	30	5.5	38.3	1.9	35	4.8	37	6.9
Pulse arterial pressure after load	62.5	6	52.5	3.1	60	8.2	65	3.5
Ruffier Index	15.9	1.3	13.8	2.11	13.6	1.13	13.1	3.5

Heart performance in both groups was mostly characterized by higher values but in some cases remained at the same level. On average, satisfactory heart performance was found in children according to the evaluation table.

TABLE III. COMPARISON OF THE FUNCTIONAL STATUS OF THE CARDIOVASCULAR SYSTEM IN BOYS AGED 7-9 YEARS

Parameter	Before and after the training course				Before		After pca	
	1 group		2 group		1 and 2 groups		1 and 2 groups	
	t _{cr}	p	t _{cr}	p	t _{cr}	p	t _{cr}	p
Heart rate before load (15 s)	1.1	>0.05	1.05	>0.05	0.45	>0.05	1.15	>0.05
Heart rate after load (15 s)	2.8	<0.05	0.28	>0.05	4.23	<0.01	0.97	>0.05
Heart rate in 1 min (15 s)	0.096	>0.05	0.36	>0.05	0.7	>0.05	0.95	>0.05
Systolic blood pressure before load	2.8	<0.05	0.77	>0.05	1.8	>0.05	5.45	<0.01
Diastolic blood pressure before load	2.7	<0.05	1.46	>0.05	1.3	>0.05	4.9	<0.01
Systolic blood pressure after load	4.6	<0.01	3.83	<0.05	2.18	>0.05	4	<0.05
Diastolic blood pressure after load	0.44	>0.05	1.25	>0.05	1.07	>0.05	4.7	<0.05
Pulse arterial pressure before load	4.98	<0.01	1.2	>0.05	26	>0.05	6.9	<0.001
Pulse arterial pressure after load	5.49	<0.01	2.55	<0.05	0.92	<0.05	3.5	<0.05
Ruffier Index	1.87	>0.05	0.55	>0.05	2.4	<0.05	0.67	>0.05

Comparison of the results obtained in the first and second groups before the training course using Student's t-criterion (Table 3) showed significant differences in the change in heart rate after load (P <0.01), PAP before load (P <0.05) and the Ruffier index (P <0.05).

Differences between the groups after the training course were also revealed in the following indicators: systolic (P <0.01) and diastolic blood pressure (P <0.01) before load, systolic and diastolic blood pressure after load (P <0.005), PAP before (P <0.001) and after load (P <0.05).

Comparing the indicators of boys from the first group before and after the training course (Table 3), differences were revealed in the following indicators: systolic blood pressure after load (P <0.05) and PAP after load (P <0.05).

Based on the results obtained, it can be assumed that there is a slight improvement in the physiological parameters of boys aged 7–9 years during the four-month swimming training course.

III. CONCLUSION

Based on the data obtained, the following conclusions can be drawn:

1. Boys aged 7–9 years are able to acquire the technique of front and back crawl by the 36th lesson.

2. A comparative analysis of the time of acquiring swimming techniques revealed that the boys of both groups, practicing swimming both in the deep and shallow swimming pools, mastered gliding on the chest and back in the water by the 8th lesson, and gliding on the chest and back with leg work similar to crawl swimming by the 24th lesson. By the 36th lesson, children acquired the technique of front crawl, but boys better mastered the technique of back crawl in a deep swimming pool.

3. It can be assumed that the development of swimming skills is the same both in the deep and in the shallow swimming pools.

4. According to the Ruffier index, there were no significant differences between the boys of both groups, with the exception of their physiological parameters before the training course ($P < 0.05$). There is a tendency towards the improvement of physiological parameters during swimming,

which indicates a positive effect of swimming on the boys of primary school age.

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