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Determination of the most significant indicators of the preparedness of young men, representatives of various methods of swimming, which limit their sporting achievements

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Purpose: *the establishment of the most significant selection criteria for swimmers aged 14–16 years specializing in various swimming methods, which limit their sporting achievements.*

Material & Methods: *analysis and synthesis of scientific and methodical literature, pedagogical observation, testing, anthropometric measurements, methods of mathematical statistics.*

Results: *the scientific knowledge about modern model characteristics of a constitution and physical preparedness of the young swimmers specializing in various ways of swimming is added. Established significant selection criteria, allowing to identify the most gifted athletes, to orient their training for a specific competitive distance.*

Conclusion: *obtained results can be recommended for use in the work of swimming coaches to improve the quality of selection and sports orientation of young athletes on the choice of swimming and assess their prospects.*

Keywords: *swimmers, swimming methods, body build, fitness, sports orientation.*

Introduction

The urgency of the problem of selecting promising athletes and the orientation of their preparation for performances at various distances is determined by the high level of sporting achievements and requirements placed on the leaders of modern world swimming.

Success in one way or another of swimming is determined by the specific features of body build and physical preparedness, which together limit the level of athletic performance. Moreover, most of these indicators are genetically determined and therefore are of particular value as criteria for selecting and determining the athletic orientation of athletes [1–13]. Therefore, the determination of the specialization of swimmers in accordance with the characteristics of body build and physical preparedness is one of the urgent problems of sports selection.

The search for talented athletes requires an organized, evidence-based approach. This direction received a sufficiently detailed justification as in the general theoretical works [8; 9; 10; 11, etc.], So in the studies conducted on the material of various sports, in particular, sports swimming [1–7; 12; 13]. However, in the special literature there is presented disparate data, and the software and normative materials regulating work in the age groups of Children and Youth Sports School and Specialized Children and Youth Sports School of the Olympic Reserve in swimming, developed more than 20–30 years ago [1; 8; 10]. As a result, it is especially important to improve these provisions on the development of quantitative criteria for the selection of young swimmers, depending on the swimming specialization. The question of selection and orientation is particularly acute at the stage of specialized basic training in the formation of a potential closest reserve for national teams and the determination of promising opportunities for athletes to achieve high sports results.

Based on the above, the relevance of this work is determined by the need to complement modern scientific knowledge on the development of model characteristics that include a certain set of indicators of body constitution and physical fitness of young swimmers aged 14–16 years specializing in various swimming methods.

Purpose of the study: the establishment of the most significant selection criteria for swimmers aged 14–16 years specializing in various swimming methods, which limit their sporting achievements.

Objectives of the study:

1. To reveal the features of the morphological and functional parameters of young swimmers aged 14–16 years, representatives of various swimming methods.
2. To determine the differences in the level of physical preparedness of young swimmers, representatives of different specializations.
3. To establish the most significant criteria for the selection of young athletes who specialize in various methods of swimming, limiting their athletic achievements.

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Material and Methods of the research

The work investigated the morpho-functional parameters, their ratio, as well as the testing of physical preparedness of athletes. The data collection was carried out during training and training fees, in the framework of the Interdisciplinary Research Team, the Swimming Federation of Ukraine. The study involved 50 qualified young swimmers aged 14–16 years who were at the stage of specialized basic training (qualification at the level of I grade, CMS, MS). Sports experience swimmers was 6–9 years. Athletes were divided into 4 groups on swimming specialization.

Research methods: analysis and generalization of scientific and methodological literature, pedagogical observation, testing, anthropometric measurements, methods of mathematical statistics.

Results of the research

On the basis of the conducted studies, the features of the morphological and functional parameters of young swimmers aged 14–16 years specializing in various swimming methods (Table 1) were established.

So, when comparing the total and out-going body sizes, it was found that the highest average values were recorded for athletes who specialize in swimming with the front crawl. Slightly inferior to the young men who specialize in swimming in the way of the butterfly and the back crawl. The smallest values are fixed for young men who specialize in swimming in the way of breaststroke.

The analysis of indicators of the respiratory function of athletes showed that the highest indicators of chest capacity

Table 1

Model characteristics of the physical development of young swimmers 14–16 years old, specializing in different ways of swimming

No. i/o	Parameters	F/c (n=20)		Butt. (n=9)		B/c (n=5)		Breas (n=16)		$\bar{X}$
		$\bar{X}$	±σ	$\bar{X}$	±σ	$\bar{X}$	±σ	$\bar{X}$	±σ	
1.	Body length, cm	184,45	8,00	180,72	5,42	180,63	8,54	177,81	4,35	180,90
2.	Body weight, kg	72,54	7,15	66,27	8,73	68,73	10,70	65,42	7,08	68,24
3.	Arm span, cm	189,40	3,35	185,11	9,55	184,38	8,26	182,97	4,65	185,47
4.	Arm length, cm	83,10	7,37	81,17	3,17	80,38	2,69	79,78	2,18	81,11
5.	Brush length, cm	21,13	0,96	21,11	1,43	19,63	0,75	20,97	0,81	20,71
6.	Forearm length, cm	26,45	1,95	25,22	2,09	26,25	1,55	25,19	1,11	25,78
7.	Shoulder length, cm	33,23	3,05	32,61	1,58	33,13	2,43	32,50	1,37	32,87
8.	Limb length, cm	96,38	6,57	93,83	5,71	91,13	6,64	93,34	5,34	93,67
9.	Shin length, cm	43,44	2,97	42,22	1,39	41,63	3,30	41,97	2,06	42,32
10.	Foot length, cm	27,93	1,15	27,89	1,47	27,50	1,91	27,59	1,14	27,73
11.	Torso length, cm	60,80	3,72	60,00	5,27	57,63	3,50	57,88	3,28	59,08
12.	Shoulder width, cm	40,73	2,09	40,06	2,83	41,00	2,16	39,91	1,75	40,43
13.	Width of the pelvis, cm	27,30	1,46	26,56	1,76	26,00	2,45	26,47	1,63	26,58
14.	Brush width, cm	9,33	0,34	9,06	0,53	9,25	0,65	9,09	0,33	9,18
15.	CC in rest, cm	96,43	4,42	93,06	4,45	96,50	4,49	93,34	4,80	94,83
16.	CC on inhale, cm	102,43	4,64	99,67	4,38	101,13	3,79	99,59	4,97	100,71
17.	CC on expiration, cm	92,03	4,60	89,50	5,44	92,50	3,70	89,06	5,06	90,77
18.	Shoulder girth (tension)	32,33	2,01	30,61	2,64	31,25	1,71	30,81	2,80	31,25
19.	Shoulder girth (relaxed)	29,35	1,86	27,89	2,00	27,50	1,47	27,94	2,95	28,17
20.	Girth forearms, cm	25,85	1,61	24,72	1,79	24,50	2,08	25,03	1,77	25,03
21.	Wrist girth, cm	16,93	0,71	16,39	0,74	16,00	1,35	16,38	0,92	16,43
22.	Waist girth, cm	73,90	3,35	73,67	3,81	72,50	3,87	71,97	4,56	73,01
23.	Girth of the buttocks, cm	93,35	3,82	89,56	6,02	90,25	5,50	90,44	4,97	90,90
24.	Hip girth, cm	51,30	2,76	50,17	5,31	49,25	2,72	48,72	3,79	49,86
25.	Knee girth, cm	36,53	1,64	35,56	1,59	36,00	1,68	35,88	1,58	35,99
26.	Girth of a shin, cm	35,88	2,00	35,39	2,63	35,50	2,48	34,75	2,04	35,38
27.	Ankle girth, cm	22,93	1,29	22,00	1,41	22,25	1,50	22,84	1,11	22,51
28.	Excursion of the chest, cm	10,41	1,87	10,17	1,44	8,63	1,25	10,53	1,89	9,94
29.	VC, l	5,94	0,79	5,68	0,65	5,72	0,58	5,15	0,77	5,62
30.	VC, ml□kg^{-1}	81,85	6,78	86,04	5,76	84,09	9,87	79,32	12,49	82,83
31.	Arm / body length, c. u.	0,45	0,01	0,45	0,01	0,45	0,01	0,45	0,01	0,45
32.	Legs / body length, c. u.	0,52	0,02	0,52	0,02	0,50	0,02	0,52	0,02	0,52
33.	Width of the shoulders / pelvis, c. u.	1,50	0,11	1,51	0,11	1,58	0,07	1,51	0,10	1,53
34.	CC / body length. c. u.	0,52	0,03	0,51	0,02	0,53	0,02	0,53	0,03	0,52
35.	Quetelet index, kg ml	21,32	1,61	20,21	1,82	20,96	1,60	20,68	1,97	20,79
36.	Broca's index, c. u.	11,91	6,30	14,46	4,99	11,90	4,34	12,39	6,32	12,67
37.	Absol. body surface area, ml	1,97	0,14	1,87	0,14	1,89	0,19	1,83	0,10	1,89

(CC) at rest (96,43 – 96,50 cm), during inspiration (102,43 – 101,13 cm) and expiration (92,03 – 92,50 cm, respectively) belong to representatives of the swimming crawl on chest and back. Almost the same figures recorded in representatives of the swimming way of the butterfly and breaststroke. For athletes – representatives of the way of swimming the butterfly, the crawl on the chest and on the back, are characterized by large indicators of VC, which range from 5,68 to 5,94 liters.

The study of physical preparedness was carried out with the help of testing the level of development of individual motor abilities. To study the structure of power readiness, the maximum thrust force on land and thrust force in water on a harness were measured, on the basis of which the relative thrust force to body mass (RTF) was calculated, as well as the utilization rate of thrust force capabilities (URTF). To assess the speed capabilities, we analyzed the results of swimming the distances of 25, 75 and 100 meters with a maximum speed using various swimming methods.

The study of various aspects of special physical preparedness shows that the level of development of the athletic qualities of athletes, representatives of various methods of swimming, is somewhat different (Table 2).

The boys who specialize in backstroke and butterfly stroke have the best results of mobility in the shoulder joints, which is due to the structure of the technique for performing movements in the water. Representatives of the breaststroke occupy the last place, which reflects the specifics of swimming in this way.

The structure of strength training in swimmers, depending on the method of swimming is also different. The best results of the thrust force on land were found in the representatives of the crawl swimming on the chest and on the back. However, the greatest indicators of thrust in the water when swimming in various ways are found in young men who specialize in swimming as a crawl on chest and breaststroke.

With the help of the correlation analysis, the most significant criteria for the selection of athletes specializing in various methods of swimming, limiting their sporting achievements, were established.

For representatives of various swimming methods, the connection level of swimming speed at a distance of 100 meters with some anthropometric features and physical preparedness indicators has been revealed (Figure 1–4).

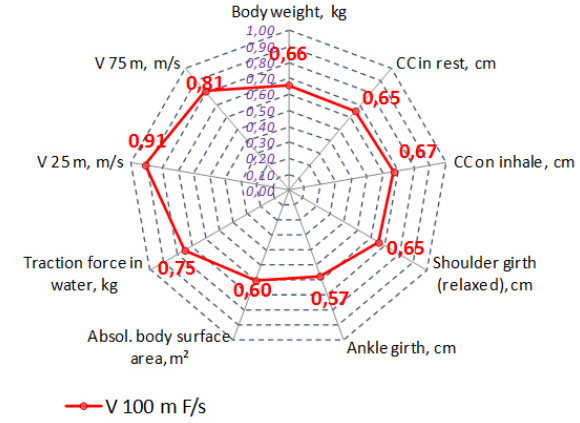

Fig. 1. Most significant indicators of athletes, representatives of swimming by way of front crawl, limiting sporting achievements

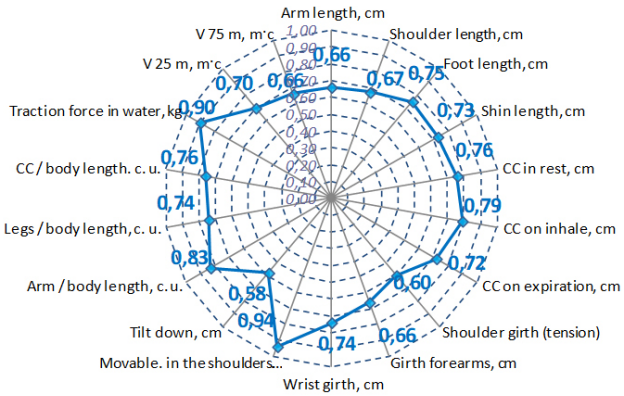

Fig. 2. Most significant indicators of athletes, representatives of swimming by way of butterfly, limiting sporting achievements

Table 2

Evaluation of the special physical preparedness of athletes 14–16 years old, specializing in different ways of swimming

Parameters	F/c (n=20)		Butt. (n=9)		B/c (n=5)		Breas (n=16)		$\bar{X}$
	$\bar{X}$	±σ	$\bar{X}$	±σ	$\bar{X}$	±σ	$\bar{X}$	±σ	
Movable. in the shoulders. joint, cm	41,85	17,78	36,11	22,55	9,50	14,71	45,78	13,02	33,31
Tilt down, cm	15,59	6,71	14,57	8,12	20,88	7,19	17,65	6,15	17,17
Traction force in land, kg	37,21	5,83	35,11	5,09	37,00	3,56	33,00	4,27	35,58
RTF in land, F·kg^{-1}	0,51	0,06	0,53	0,07	0,54	0,05	0,51	0,06	0,52
Traction force in water, kg	16,53	2,04	13,89	2,52	14,75	2,06	16,25	1,77	15,36
RTF in water, F·kg^{-1}	0,23	0,02	0,21	0,04	0,21	0,01	0,25	0,03	0,23
URTF, c. u.	0,45	0,07	0,40	0,10	0,40	0,05	0,50	0,08	0,44
V 25 m, m·c^{-1}	1,99	0,11	1,86	0,08	1,83	0,05	1,58	0,07	1,82
V 75 m, m·c^{-1}	1,77	0,10	1,65	0,11	1,63	0,06	1,40	0,06	1,61
ICB (AH) V75/V25	0,89	0,03	0,82	0,21	0,88	0,02	0,89	0,04	0,87
V 100 m, m·c^{-1}	1,83	0,07	1,64	0,11	1,67	0,04	1,46	0,05	1,65

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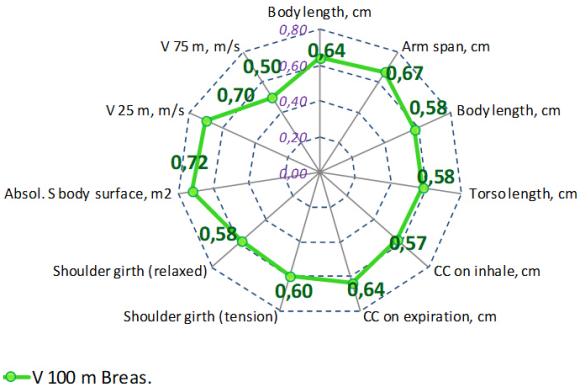

Fig. 3. Most significant indicators of athletes, representatives of the breaststroke swimming, limiting sporting achievements

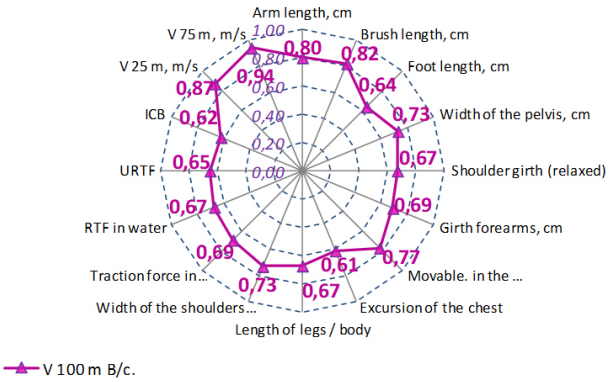

Fig. 4. Most significant indicators of athletes, representatives of the crawl on the back, limiting athletic performance

The study identified the criteria for selecting young swimmers aged 14–16 years, representatives of various specializations, based on a comprehensive study of a wide range of indicators characterizing functional capabilities, special motor skills and morphological fitness of athletes.

Thus, the type of constitution determines the swimmer's power abilities, where specialization leaves an imprint on its morphological structure, thereby affecting the level of physical development. The manifestation of speed qualities are closely related to the level of development of power. The speed capabilities of swimmers is a factor limiting the sporting result at all distances.

So, the objective conduct of sports orientation in swimming depends on the use of certain morpho-functional and pedagogical criteria that reveal a tendency to one or another method of swimming.

Conclusions / Discussion

The results of the conducted research supplement the theoretical positions formulated in the works of N. Zh. Bulgakova [1], V. Yu. Davydova, V. B. Avdeenko [2], V. M. Platonova [9], I. V. Chebotareva [10], that the sports results of swimmers are largely dependent on the characteristics of the body physique. The proportions of the body, which determine the hydrodynamic qualities and indicate the strength (body size of the body) and functional (VC, the ratio of the VC to the weight of the body) capabilities of the swimmers, also have great importance on the result. An important role is played by mobility in the joints, allowing you to most effectively implement the power capabilities, speed, endurance, to master the modern swimming technique.

Data on the physique, the prospects for improving the functional systems of the body are especially needed in the second stage of selection, when the future specialization of the young athlete is determined, and the multi-year preparation process is oriented.

The results confirm the findings of experts [1; 2; 9; 10] that morpho-functional indicators, according to which swimmers significantly differ from each other, determine success in a particular method of swimming. It should be noted that the transitional model characteristics of young athletes, previously presented in the literature, are somewhat outdated today. In addition, in the program for children's sports schools and sports schools [8], tests with control and transitional standards are given without quantitative indicators that could help the coach to choose the swimming specialization correctly, evaluate the quality of testing for effective selection and orientation of swimmers at the stage of specialized basic training. Therefore, the addition of scientific knowledge about the characteristics of constitution and physical preparedness of young swimmers 14–16 years old of various swimming specializations in accordance with modern trends in the development of sports swimming can improve the efficiency of selection and orientation of the most promising athletes.

Prospects for further research are associated with the establishment of the most significant criteria for the selection of young girls, representatives of different swimming methods, limiting their athletic achievements.

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