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An interconnection between morphological and functional development of highly trained swimmers and a result of overcoming different length distances by means of the butterfly stroke

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Purpose: *to investigate the influence of indicators of morpho-functional development of highly trained swimmers on the result of overcoming different length distances by means of the butterfly stroke.*

Material & Methods: *analysis of scientific and methodical literature, timing, measurement of morphological and functional indicators using individual techniques, methods of mathematical statistics. Contingent surveyed accounted for athletes who specialize in the distances of 50, 100 and 200 meters by means of the butterfly stroke and had a level of sports qualification: master of sports, international class master of sports.*

Results: *the authors determined the relationship between the degree of correlation of morphological and functional performance highly trained swimmers and sports results at distances of 50, 100 and 200 meters by means butterfly stroke; investigated the significance of morpho-functional indicators, depending on the length of the competitive distance.*

Conclusion: *significance of the indicators of anthropometric development and the functional state of athletes who specialize in swimming by means butterfly stroke differs depending on the length of the competitive distance. The definition of distance specialization of athletes by means butterfly stroke should be carried out taking into account the indicators of morpho-functional development, which most significantly affect the result of overcoming the distances of 50, 100 and 200 meters.*

Keywords: *butterfly stroke*, *athletes*, *distance*, *morphological and functional indicators*, *results*, *interconnection.*

Introduction

The problem of sports selection and orientation in the system of training highly trained athletes is one of the most important [2; 8; 10; 13].

The likelihood that the process of sports improvement unfolds in the optimal version depends largely on the stage at which the individual age development manifests a propensity for progress in a particular sport and, in accordance with it, the formation of the mainstream focus of sports activity, the selection of promising ways for its implementation [6; 11]. These circumstances, as well as the changes that occur in modern sports, have made the relevance of the problem of sports selection and orientation in its research and organizational and practical aspects.

Analysis of the literature sources made it possible to conclude that in the field of sport swimming considerable attention is paid to selection and sports orientation on the basis of taking into account individual features of the swimmers body structure [1; 3; 7].

Specialists proved that representatives of different constitutional types have different range of skills in the motor area, which are responsible for the success in every swimming styles and on every swimming race [3; 10]. In this regard, the morpho-functional characteristics of athletes are studied in depth and in a variety of ways, model characteristics are developed that serve as a guide for selection and orientation in sport swimming [4; 5; 9; 12].

At the same time, the practice of sport of higher achievements in the conditions of intensification of training and competitive activity has undergone a number of significant changes in recent years, which could not but leave an imprint on the morpho-functional characteristics of modern swimmers. Expanding the program of competitions, increasing the number of starts per year, the need for a combination of basic and additional distances – all this requires a more clear and scientifically sound definition of the athlete's distance specialization. So there is a need to conduct scientific research in this field with a view to further correction.

The relationship of research with scientific programs, plans, themes

The research was carried out in accordance with the theme of the Master Plan of Research in the field of physical culture and sports for 2011–2015: "Modeling of technical and tactical actions of qualified athletes in swimming and speed-strength disciplines of track and field athletics».

The purpose of the research

To investigate the influence of indicators of morpho-function-

al development of highly trained swimmers on the result of overcoming different length distances by means of the butterfly stroke.

Objectives of the study:

1. Determine the degree of correlation correlation between the morpho-functional indicators of swimmers of high qualification and the athletic result at distances of 50, 100 and 200 meters by means of the butterfly stroke.

2. To study the importance of morpho-functional indicators depending on the length of the race distance by means of the butterfly stroke.

3. To identify the most significant parameters of the morpho-functional development of athletes who specialize in swimming by means of the butterfly stroke at distances of 50, 100 and 200 meters.

Material and Methods of the research

To achieve the objectives were used: analysis of scientific and methodical literature, timekeeping; measurement of morpho-functional indicators using private techniques; methods of mathematical statistics.

The research was carried out during the championships and National Swimming Cups of Ukraine in the period from 2014 to 2016.

The contingents of the surveyed were athletes who specialized in distances of 50, 100 and 200 meters by means of the butterfly stroke. The total number of surveyed – 24 swimmers. Level of sports qualification: master of sports, international class master of sports.

Results of the research and their discussion

The conducted correlation analysis made it possible to reveal the degree of interrelation between the indicators of the morpho-functional development of swimmers with the sports result at distances of different length by means of the butterfly stroke.

Among the investigated parameters that significantly affect the result of overcoming the distance of 50 meters, such contact indicators were defined as VC and heart rate at rest (R equal to 0,62 and 0,60 respectively) (Fig. 1). Less important for this distance are such parameters as the downward slope, the weight of the athlete's body, the width of the shoulders, the girth of the ankle, the arm circumference in the stressed state, the linear dimensions of the thigh and the trunk.

The result of swimming distance of 100 meters by means of the butterfly stroke is significantly affected by the ankle's circumference (R=–0,76). The average degree of correlation relationship observed in parameters such as the width of the hip and VC (R is respectively –0,55 and –0,52). To a lesser extent the result affect coverage shin and knee, shoulder width, the heart rate after exercise, at rest and after sleep, arm length, and lower leg, arm span, the width of the foot and hand, shoulder girth under tension (Fig. 2).

The most significant at a distance of 200 meters are the parameters of chest circumference (on exhalation, on inspiration, at rest), heart rate after sleep, shoulder width, waist circumference, shoulder and foot length (R values fluctuate within – 0,91–0,79). Average influence on the result is such parameters as body weight, circumferential sizes of the but-

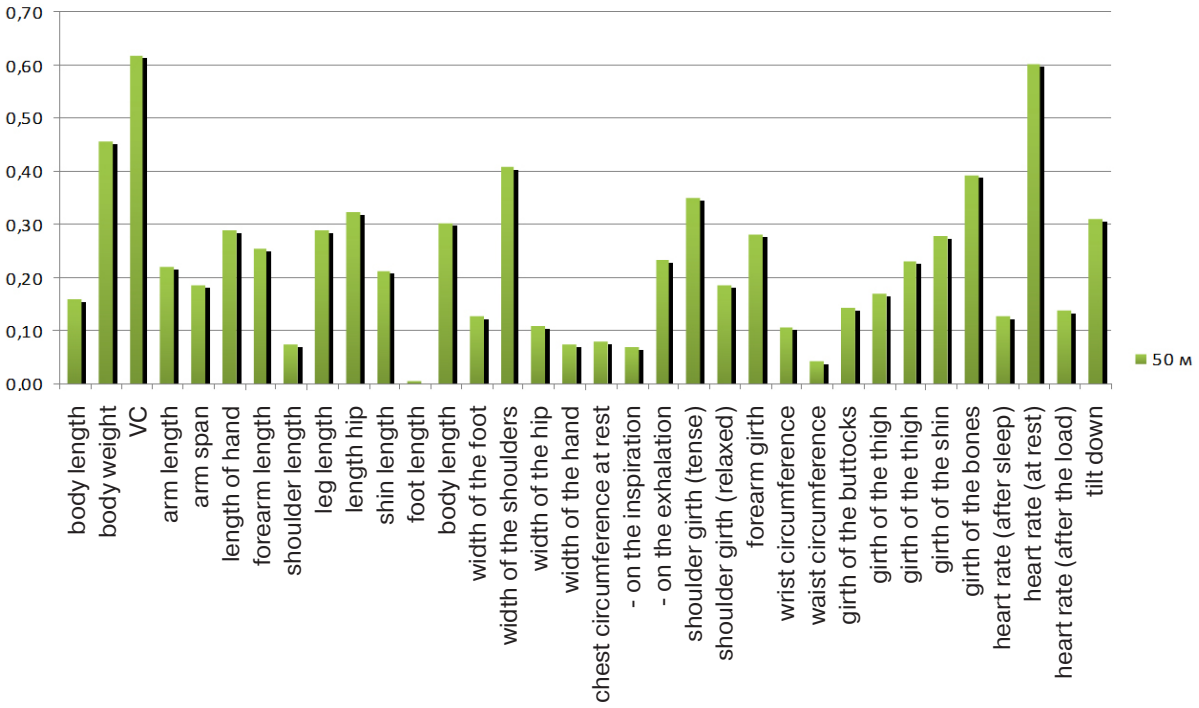

Fig. 1. The degree of the correlation relationship between the morpho-functional performance swimmers and sports results at a distance of 50 meters by means of the butterfly stroke

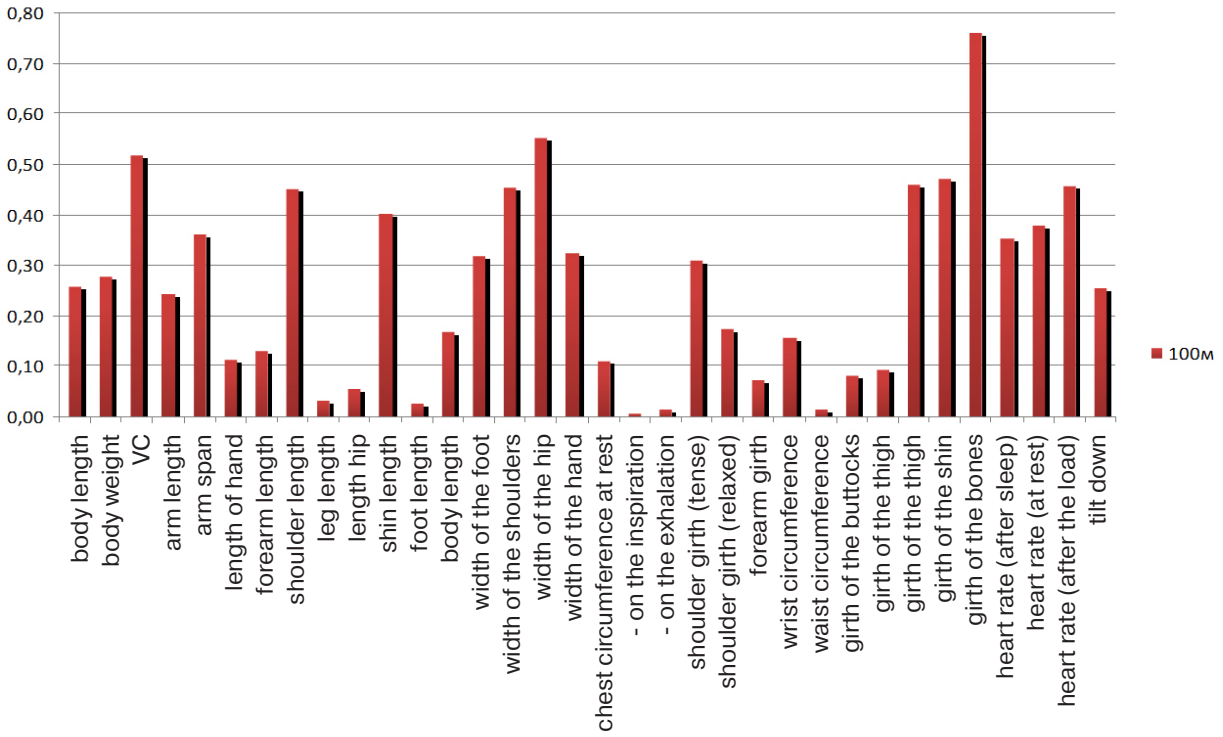

Fig. 2. The degree of the correlation relationship between the morpho-functional performance swimmers and sports results at a distance of 100 meters by means of the butterfly stroke

tocks and shin, VC and the body length (the R values are equal, respectively –0,67, –0,62, –0,59, –0,55, 0,52). To a small extent, the linear dimensions of the hip, arms, legs, legs and trunk, forearm, shoulder (in tension and relaxed states), knee and ankle, as well as the width of the pelvis, hand and foot (fig. 3).

Thus, it can be argued that in the by means of the butterfly stroke the significance of the indicators of anthropometric development and functional condition of athletes differs depending on the length of the race distance.

Attention is drawn to the fact that as the length of the distance increases, the number of indicators that significantly affect the athletic result increases.

Considering the influence of significant morpho-functional parameters on the result of swimming distances of 50, 100 and 200 meters, it became possible to divide them into several groups:

– indicators are equally important at all distances, regardless of their length;
– indicators, the importance of which decreases with increasing distance length;
– indicators, whose influence increases simultaneously with the increase in the competitive distance;
– indicators that have a close degree of correlation relationship with the sports result only at separate distances (tab. 1).

As can be seen from table 1, such an indicator as VC equally affects the result of overcoming distances by means of the butterfly stroke regardless of their length.

Table 1

Degree of correlation relationship between morpho-functional indicators of swimmers of high qualification and sporting result at distances of different length by means of the butterfly stroke

№ c/u	Indicators	Value of the correlation coefficient		
		50 m	100 m	200 m
1.	Body length	–0,16	0,26	0,52
2.	Body weight	–0,46	–0,28	–0,67
3.	VC	–0,62	–0,52	–0,55
4.	Arm span	–0,19	0,36	–0,69
5.	Shoulder length	0,07	0,45	–0,82
6.	Foot length	0,01	0,03	–0,79
7.	Width of the shoulders	0,41	0,45	–0,85
8.	Width of the hip	–0,11	–0,55	–0,49
9.	Chest circumference	–0,08	0,11	–0,84
10.	Waist circumference	–0,04	–0,01	–0,83
11.	girth of the buttocks	0,14	0,08	–0,62
12.	girth of the shin	–0,28	–0,47	–0,59
13.	Girth of the ankle	–0,39	–0,76	–0,32
14.	Heart rate (after sleep)	–0,13	–0,35	–0,87
15.	Heart rate (at rest)	0,60	–0,38	–0,28
16.	Heart rate (after the load)	0,14	–0,46	0,05

The importance of the parameter «Heart rate at rest» decreases with the length of the distance.

Influence on the athletic result of such indicators as body length, the range of the arms, the length of the shoulder and foot, the width of the shoulders, the circumference of the shank and chest at rest, and the values of the heart rate after sleep increases along with the length of the distance.

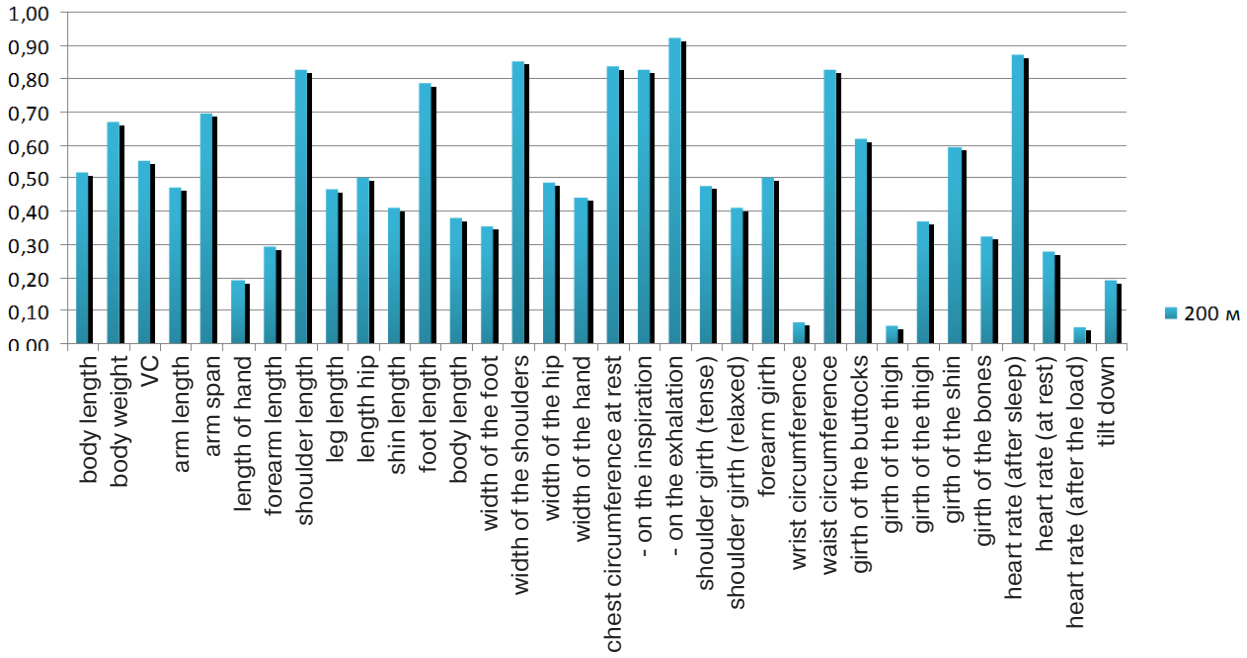

Fig. 3. The degree of the correlation relationship between the morpho-functional performance swimmers and sports results at a distance of 200 meters by means of the butterfly stroke

In turn, such a parameter as body weight predominantly affects only the result of overcoming the 50 and 200-meter segments; hip width and shin girth important for distances of 100 and 200 meters; girth of the waist and buttocks closely correlate with the result of the swimming of the 200-meter stretch; «heart rate after load» index is only relevant for a distance of 100 meters by means of the butterfly stroke.

Thus, when choosing a swimmer's distance specialization by means of the butterfly stroke, the trainer needs to pay attention to various indicators of the anthropometric development and functional state of the athlete, giving preference to the fact that they are most closely correlated with the result of overcoming the distances of 50, 100 or 200 meters

Conclusions

1. Result in swimming is closely related to the indicators of anthropometric development and functional condition of athlete.

2. Degree of correlation correlation between the morpho-functional indicators and result by means of the butterfly stroke differs significantly depending on the distance of the race distance.

3. Importance of morpho-functional parameters varies depending on the length of the race distance.

4. On the results of overcoming the distance of 50 meters are most influenced by parameters such as VC and heart rate at rest (R is equal to 0,62 and 0,62, respectively 0,60). At a distance of 100 meters important is the girth of the ankle (R=–0,76). The most significant at a distance of 200 meters are the parameters of chest coverage, heart rate after sleep, shoulder width, waist circumference, shoulder length and foot (R values vary within 0,91–0,79).

5. Definition of the distance specialization of an athlete by means of the butterfly stroke should be carried out taking into account the indicators of morpho-functional development, most significantly affecting the result of overcoming the distances of 50, 100 and 200 meters.

Prospects for further research in development of model characteristics of the structure of competitive activities and the special preparedness of highly qualified athletes specializing by means of the butterfly stroke at various lengths distances.

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