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MODELING OF INDICATORS OF TECHNICAL AND TACTICAL SKILLS OF HIGHLY QUALIFIED ATHLETES WHO SPECIALIZE IN SWIMMING AT THE DISTANCE OF 200 METERS BY BUTTERFLY STROKE

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Purpose: modeling of technical and tactical skills of highly qualified athletes who specialize in butterfly swimming at a distance of 200 meters.

Material and methods: analysis of literature sources, video recording, timing, methods of mathematical statistics. The contingent of the subjects consisted of athletes who specialize at the distance of 200 meters by butterfly stroke. The level of their sports qualification corresponded to the titles of Master of Sport of Ukraine and international Master of Sports of Ukraine. The total number of the surveyed is 16 swimmers.

Results: have been studied the dynamics of technical and tactical actions of highly qualified athletes during swimming the distance of 200 meters by butterfly stroke, have been determined the relationship between speed, pace, «step» of the cycle of rowing movements and sports result, have been developed the model characteristics of the most important parameters of technical and tactical skills of highly qualified athletes who specialize in butterfly swimming at the distance of 200 meters.

Conclusions: the length of the competitive distance leaves an imprint on the dynamics of technical and tactical skills of highly qualified athletes who specialize in butterfly swimming; the result at the distance of 200 meters by butterfly stroke is

predominantly influenced by the speed parameters on the segments «45 - 50 m», «50 m - emerge», «150 m – emerge» and «185 – 195 m», the pace of rowing movements at intervals «145 – 150 m» and «165 - 175 m», «step» of the cycle of rowing movements on the sections «45 - 50 m» and «185 - 195 m»; determining the compliance of technical and tactical actions of a particular athlete with model characteristics allows to predict areas of correction of the training process in order to achieve the highest sports results.

Keywords: highly skilled swimmers, butterfly, 200 meters, technical and tactical actions, dynamics, correlation, model characteristics.

Introduction

At the present stage of development of swimming one of the ways to improve sports results is a detailed study of competitive activities, both in a broad and in a narrower sense [3; 4].

Effective overcoming the distance is the result of quality overcoming of each of its components, which depends on many factors.

Experts have proved that success at distances of different lengths is largely due to the individual characteristics of athletes, which is manifested in differences in technical and tactical actions, levels of physical qualities and etc. [1, 7, 10, 11, 12; 13, 15, 16].

To date many studies have been conducted, thanks to which identified indicators that affect the effectiveness of competitive activities in different swimming style, identified the degree of relationship between them, characterized the importance of the parameters of competitive activities during swimming distances of different lengths [2, 6, 8, 9].

However, a number of aspects still require more in-depth study.

Thus, questions about the peculiarities of the passage of distances of different lengths in the style of swimming by crawl on the back, breaststroke and butterfly deserves the meticulous attention of experts, because they are insufficiently

considered compared to the freestyle swimming [5, 14].

The problem of modeling the structure of competitive activity and special preparedness of highly qualified athletes of different distance specializations needs attention.

In turn, the focus on the developed model characteristics of athletes who perform at distances of different lengths in different swimming style, allows to determine the priority areas of correction of the training process in order to improve competitive activities.

The purpose of the study – modeling of indicators of technical and tactical skills of highly qualified athletes who specialize in swimming butterfly at the distance of 200 meters.

Objectives of the study:

1. To research the dynamics of technical and tactical actions of highly qualified athletes during overcoming the distance of 200 meters by butterfly.
2. To identify the relationship between parameters of technical and tactical skills of highly qualified swimmers and sports results at the distance of 200 meters by butterfly stroke.

To develop the model characteristics of parameters of technical and tactical skills of athletes who specialize in butterfly swimming at the distance of 200 meters.

Material and Methods of research

The following methods were used to solve the tasks: analysis of literature sources, video recording, timing, methods of mathematical statistics.

Experimental data were collected at the Swimming Championships and Cups of Ukraine in the period from 2018 to 2020. The athletes who specialize on the distance of 200 meters by butterfly stroke the amount of 16 people took part in the study. The level of sports qualification of the surveyed contingent corresponded to the titles of Master of Sports of Ukraine and Master of Sports of Ukraine of Internatonal Class.

Results of the research

Technical and tactical actions of high-class athletes during swimming the distance of 200 meters by butterfly stroke were evaluated by the indicators of speed, pace and «step» of the cycle of rowing movements, which were recorded on the segments: «start – emerge», «emerge - 15 m», distance swimming areas («15 - 25 m», «25 - 35 m», «35 - 45 m», etc.), segments «turn – emerge» (after each turn), finish segment (195 - 200 m) (Fig. 1 – 3).

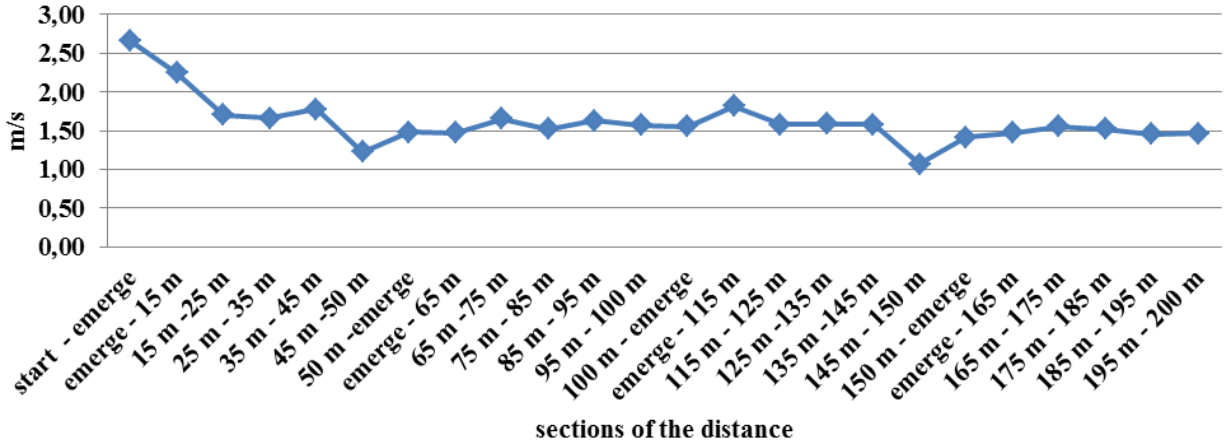

Fig. 1. Dynamics of speed indicators during swimming by high-class athletes the distance of 200 meters by butterfly stroke

As can be seen from Figure 1, the distance of 200 meters by butterfly stroke is generally overcome by athletes at a relatively uniform speed. A significant decrease occurs in the first 25 meters of the distance (from 2,66 to 1,70 m/s), as well as when swimming to the turntable. In the first case, this is due to the loss of speed achieved during the start jump, in the second - with the attempt to effectively perform the turn due to the most rational touch of the pool wall.

The highest rate of speed recorded on the segment «start – emerge» (V=2,66 m/s), the slowest athletes overcome the sections «45 - 50 m» (V=1,23 m/s) and «145 - 150 m» (V=1,07 m/s).

The increase in speed during swimming 200-meters distance occurs after the repulsion from the rotating shield, which is especially noticeable in the area «emerge - 115 m» (V=1,82 m/s).

It is noteworthy that there is no rapid decrease in the distance speed parameters

at the finish meters.

The dynamics of the indicators of the «step» of the cycle of rowing movements on the first two 50-meters segments of the competition distance is relatively similar, , namely, that during overcoming of distances part there is an increase in indicators of length of a rowe with the subsequent their decrease on a segment of swimming to a rotary board (Fig. 2).

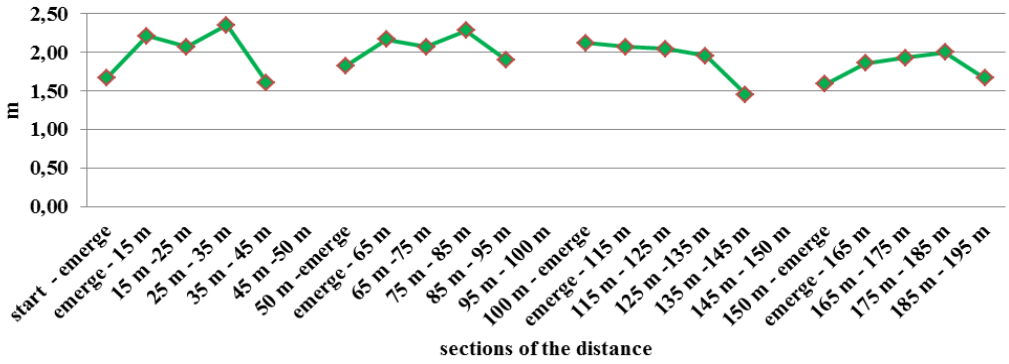

Fig. 2. Dynamics of indicators of «step» of a cycle of rowing movements during swimming by high-class athletes the distance of 200 meters by butterfly stroke

On the third 50-meter section there is a gradual decrease in the parameters of the «step», which due to the transition from anaerobic to aerobic energy supply mechanism.

In the last 50 meters of the distance, the length of the rowing movements increases, except for the segment «195 - 200 m», where observed a reduction of the «step», which is associated with progressive fatigue and the athletes' efforts to effectively do the finish touch.

In turn, each of the four 50-meter segments of the distance is overcome at different tempo modes (Fig. 3).

After a significant decrease of indicators of rowing movements at the beginning of the competition distance (from 78,64 to 46,65 cycles/min) is their relative stabilization.

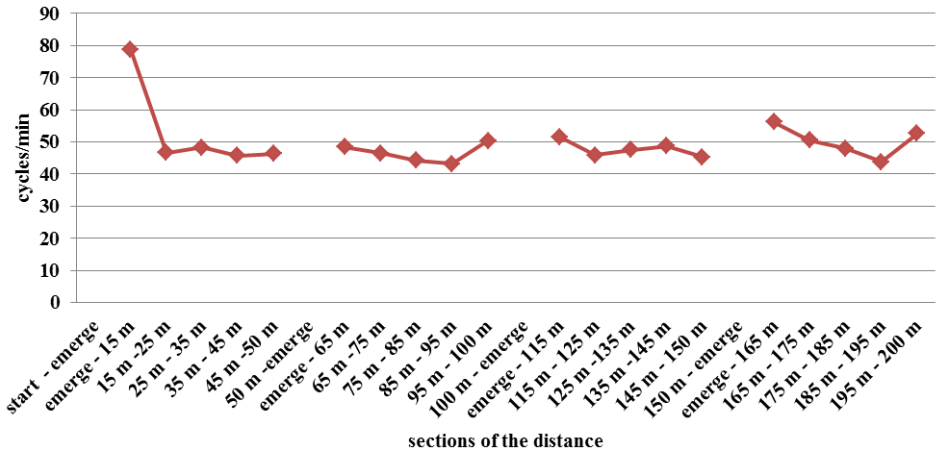

Fig. 3. Dynamics of indicators of pace of rowing movements during swimming by high-class athletes the distance of 200 meters by butterfly stroke

In process of overcoming the second interval of the distance there is a slight but stable decrease in the frequency of rowing (from 48,49 cycles/min to 44,23 cycles/min) with a rapid increase in pace when swimmer approach to the turntable (from 43,20 cycles/min to 50,34 cycle/min).

In the third 50 meters of the distance, the decrease of the frequency of rowing movements changes to increase this indicator with its subsequent decline when sportsmens swims to the turntable. The dynamics of the pace parameters on the fourth and second segments of the distance are generally similar, but in the last 50 meters the change in the values of the absolute frequency of rowing movements is more pronounced.

After studying the degree of influence of the parameters of technical and tactical skills on the result of overcoming by athletes of high class distance of 200 meters by butterfly, it was determined that a close correlation with the final result is observed in the speed indicators on the segments: «45 - 50 m» (r=-0,84), «50 m - emerge» (r=-0,78), «150 m - emerge» (r=-0,85), «185 – 195 m (r=-0,91).

A medium degree is on the segments: «25 - 35 m» (r=-0,62), «35 - 45 m» (r=0,62), «emerge – 65 m» (r=0,54), «85 – 95 m» (r=-0,61), «95 – 100 m» (r=-0,63), «100 m – emerge» (r=-0,63), «145 – 150 m» (r=-0,64), «165 – 175 m» (r=-0,63), «175 - 185 m» (r=-0,58), «195 - 200 m» (r=-0,62).

The most influential on the result are the rates of rowing movements at such

intervals as «145 - 150 m» (r=-0,78) and «165 – 175 m» (r=-0,89). The frequency of movements on the segments «15 - 25 m» (r=-0,64), «95 – 100 m» (r=-0,69), «185 – 195 m» also has a significant effect (r=-0,54).

Closely correlated with the final result of the «step» of the cycle of rowing movements in areas «45–50 m» (r=-0,76) and «185–195 m» (r=-0,91). The average degree of interconnection takes place on the segments «25–35m» (r=-0,67), «35–45 m» (r=0,53), «emerge – 65 m» (r=0,62) and «195 – 200 m» (r=-0,62).

Having identified the parameters that most significantly affect the final sports result on the distance of 200 meters, we have developed their model characteristics (Table 1).

Table 1

Model characteristics of indicators of technical and tactical skill of high-class athletes who specialize in swimming by butterfly stroke at the distance of 200 meters

№	Indicators	Model values
1.	Speed on the segment «25 m – 35 m», m/s	1,66±0,14
2.	Speed on the segment «35 m – 45 m», m/s	1,78±0,12
3.	Speed on the segment «45 m – 50 m», m/s	1,23±0,10
4.	Speed on the segment «50 m - emerge», m/s	1,48±0,31
5.	Speed on the segment «emerge – 65 m», m/s	1,47±0,20
6.	Speed on the segment «85 m – 95 m», m/s	1,63±0,14
7.	Speed on the segment «95 m – 100 m», m/s	1,57±0,21
8.	Speed on the segment «100 m - emerge», m/s	1,56±0,29
9.	Speed on the segment «145 m – 150 m», m/s	1,07±0,17
10.	Speed on the segment «150 m - emerge », m/s	1,42±0,21
11.	Speed on the segment «165 m – 175 m», m/s	1,56±0,10
12.	Speed on the segment «175 m – 185 m», m/s	1,52±0,12
13.	Speed on the segment «185 m – 195 m», m/s	1,46±0,09
14.	Speed on the segment «195 m – 200 m», m/s	1,46±0,29
15.	Pace of rowing movements on the segment «15 m – 25 m», cycles/min	46,65±6,10
16.	Pace of rowing movements on the segment «95 m -100 m», cycles/min	50,34±7,93
17.	Pace of rowing movements on the segment «145 m -150 m», cycles/min	45,30±11,29
18.	Pace of rowing movements on the segment «165 m -175 m», cycles/min	50,59±4,78
19.	Pace of rowing movements on the segment «185 m -195 m», cycles/min	43,74±2,60
20.	«Step» of the cycle of rowing movements on the segment «25 m - 35 m», m	2,07±0,19
21.	«Step» of the cycle of rowing movements on the segment «35 m -45 m», m	2,36±0,24
22.	«Step» of the cycle of rowing movements on the segment «45 m -50 m», m	1,61±0,16
23.	«Step» of the cycle of rowing movements on the segment «emerge-65 m», m	1,83±0,21
24.	«Step» of the cycle of rowing movements on the segment «185 m-195 m», m	2,00±0,01
25.	«Step» of the cycle of rowing movements on the segment «195 m-200 m», m	1,67±2,40

Determining the compliance of indicators of technical and tactical actions of a particular athlete with the developed model characteristics allows the coach to predict the direction of correction of the training process in order to achieve the highest sports results.

Conclusions / Discussion

The results of the study confirm the opinion of many experts that the length of the competitive distance leaves an imprint on the dynamics of technical and tactical skills of highly qualified swimmers. We determined that the distance of 200 meters by butterfly stroke is overcome by athletes with a relatively stable speed and pace of rowing movements. A significant reduction in speed occurs in the first 25 meters of the distance, as well as when atletes swim to the turntable. At the finish meters there is no significant deceleration of the distance speed due to the balance between the pace and the «step» of the rowing movements. It is determined that the speed on the segments «45 -50 m» (r=-0,84), «50 m – emerge» (r=-0,78),«150 m – emerge» (r= -0,85) and «185 – 195 m» (r=-0,91); the pace of rowing movements at such intervals as: «145 - 150 m» (r=-0,78) and «165 – 175 m» (r=-0,89); the «step» of the cycle of rowing movements in the areas «45 – 50 m» (r=-0,76) and «185 – 195 m» (r=-0,91) are most influential on the sports result at a distance of 200 meters by butterfly stroke among the indicators of technical and tactical skill. It can be argued that the comparison of individual characteristics of the structure of competitive activities and special preparedness of specifically athlete with model parameters provides an opportunity to most fully disclose his potential and rationally build a training process.

The prospect of further research is modeling of indicators of the structure of competitive activity and special preparedness of athletes who specialize in butterfly swimming at distances of 50 and 100 meters.

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