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Simulation of Training Modes Exercises to Increase Energy Supply Capacity Sprinter Rowers on Kayaks

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Annotation: Develop training regimens aimed at increasing power energy supply of rower-sprinters, taking into account the differentiated impact on specific components of the reaction of the cardiorespiratory system and energy supply of work.

Key words: kayak sprinters, power supply, physical fitness, functionality.

METHODS AND ORGANIZATION OF RESEARCH. Research aimed at analyzing the reaction of cattle and the energy supply of work in process of specially selected modes training exercises carried out in a special preparatory period for the training of qualified kayakers who specialize in distances of 200 m and 500 m.

Research conducted in national water sports center in Tashkent (Uzbekistan) with the participation of specialists from OSSMM. The study involved qualified (male) rowers from Tashkent (n=22). The age of the athletes was in the range of 19-25 years. All kayakers were members of the national team kayaking and canoeing. Five athletes were members of the national team of China in kayaking, two of them won gold medals at the Asian Games 2022.

To register indicators of special performance and functionality of the rowers, a mobile gas analyzer Oxycon mobile (Jaeger) was used, sports tester "Po1ag", laboratory complex for determination of blood lactate Biosen S. line lab+. To standardize specific performance measurements, we used rowing ergometer "Dansprint".

In the process of performing test tasks and modeling of operating modes, indicators of ergometric power, cattle reaction and energy supply were recorded work.

RESEARCH RESULTS AND THEIR DISCUSSION. The research was carried out in two stages. On the first stage in the process of implementing anaerobic lactate, anaerobic lactate and aerobic energy supply was carried out analysis of quantitative and qualitative characteristics of energy capabilities sprint rowers. The task was to determine individual parameters of ergometric power, reaction indicators workover and power supply power, which formed the basis of individualization experimental training modes classes, as well as assessing their effectiveness. For this purpose, an analysis of quantitative and qualitative characteristics of the energy capabilities of sprint rowers registered under implementation conditions anaerobic alactate power (test 10 c), anaerobic lactate (glycolytic) power (30 s test) and anaerobic capacity (test 90 s) [1].

- test 1 – was used to assess short-term anaerobic work performance during the period of work output, performed primarily through the use of anaerobic alactic energy supply mechanism;
- test 2 – used to assess anaerobic work performance of average duration during the withdrawal period work performed primarily for account of anaerobic alactate and lactate (glycolytic) energy supply mechanisms;
- test 3 – used to assess long-term anaerobic work performance.

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The duration of the period between the execution of the first and second tests was 3 minutes, second and third – 10 minutes.

The contents of test sets, characteristics of energy supply and performance of rowers are presented in Table 1.

At the second stage, an experimental test of the response of the cardiorespiratory system and the energy supply of the work was carried out rowers in the process of repeated execution training regimes of predominantly anaerobic orientation. 12 sprint rowers took part, who had the result of overcoming a distance of 200 m - 37:75.2-38:35.3 s; 500 m – 1:31.1-1:33.2 s.

The purpose of this stage of work was to check the compliance of the achieved response levels with the model characteristics of the energy supply of kayakers. As a basis adopted four modes of training work, in which the reaction indicators of cattle and energy supply of work can reach maximum performance in the process of repeated interval interval segments work. Training work simulated a series of segments with a total duration four minutes. This period is tense work is characterized by the achievement of peak values of the reaction of anaerobic and aerobic energy supply to work, including under conditions of repeated performance of speed segments of various durations [3].

Depending on the duration of accelerations operating time on the segment was: in series I – 10 s, in series II – 20 s, in series III – 30 s, in series IV – 90 p. Number of segments in a series was: in series I - eight segments, in series II – six segments, in series III – four segments, in series IV – two. This part of the experiment involved 12 rowers who had the highest performance values at distances of 200 m and 500 m.

Table 1 – Indicators of energy supply of canoe sprinters

Indicators	X	S
10 s test		
average EMR in 10 s test	391,5	25,2
Recovery period 3 minutes		
30 s test		
l min – average indicator for the last 10 s work	2,9	0,6
l min – average indicator for the fi rst 10 s of recovery period	3,8	0,8
stand. un. – average indicator for the fi rst 30 s of recovery period	30,9	3,8
mmol l – the highest indicator for the 3rd and 7th minutes of recovery period	4,8	1,9
Wt – a period of achieving maximum glycolytic power	375,1	65,7
indicator of the power of both alactate volume and lactate energy supply in the 30 s test	388,8	66,1
Recovery period 3 minutes		
90 s test		
l min – average indicator for the last 10 s work	4,8	0,5
l min – average indicator for the last 10 s work	5,2	0,6
stand. un. – average indicator for the fi rst 30 s of recovery period	34,9	4,5
mmol l – the highest indicator for the 3rd and 7th minutes of recovery period	14,0	2,2
Wt - average EMR in 500 m test	295,2	37,2

The differences between the series were the differences in the ratio of intensity and duration load, as well as the time allotted for recovery of athletes in pauses between in series. The loads differed in the degree of mobilization of anaerobic metabolism. In various exercises, emphasis was placed for the development of power and anaerobic lactate energy supply (segments of 10 and 20 s), power and capacity of anaerobic lactate (glycolytic) energy supply (segments of 60 s and 90 s).

In the process of modeling training loads took into account special data literature on the influence of physiological stimulus response to the degree of activation neurogenic stimulus response, development hypoxia and hypercapnia, accumulation of anaerobic metabolism products. Influence stimulus response to the nature of the energy supply of work was analyzed on the basis of changes in the reaction of the respiratory system to CO_2 release immediately after training loads lasting 10, 20 and 30 s, as well as in the final phase of 90 s of work. The information content of this kind of characteristics functional support of special rowers' performance was confirmed in the process of implementing the first and second steps algorithm given above.

The body's reactions to repeated loads under the predominant influence of the neurogenic and hypoxic stimulus of reactions, with the level of metabolic acidosis growing.

The first load option (A) is aimed at realizing the power of anaerobic alactic energy supply. In progress exercises, the emphasis was placed on the ability to achieve and maintain for 3-4 strokes of maximum ergometric power of work. The rowers' ability to develop and maintain maximum rowing speed was important. This made it possible to enhance neurogenic influences (stimuli) on the kinetics Workover and the speed of deployment of energy body reactions. Duration of work at maximum intensity – 10 s, pause rest – 20 sec.

The second load option (B) solves the problem of implementing anaerobic alactic energy supply. In the second half of the segment begins anaerobic lactate energy supply is actively involved in the work, speed increases CO_2 release . The speed of these processes affects on the further nature of the energy supply for the work. During this period, the emphasis in the work of rowers are done to achieve the optimal ratio of the tempo-rhythm structure of work, achieving and maintaining ergometric power of work at the level of 80-90% of what was achieved at initial stage of work. With the ratio support and unsupported phases of the rowing locomotion cycle (rowing rhythm) 1.0 to 1.5 the strength component of rowers' special endurance develops to a greater extent [2].

Operating time at maximum intensity or accentuated maximum effort in the support phase of the stroke – 20 sec, rest pause – 10 sec.

The third load option (B) is aimed at development of the power of anaerobic glycolytic energy supply. In the process of load modeling, it was taken into account that the most rowers achieve high characteristics of anaerobic lactate (glycolytic) power at 25-30 seconds of work per segment. The condition for completing the load was achieving maximum (individual for the rower) indicators of ergometric power of work in the initial phase of performing the segment and mobilization of motor potential in for 25-30 s.

This period of work is accompanied by the development of load hypoxia, the severity of hypoxic changes and level of breathing response to their increase have a significant impact on speed deployment and structure of energy supply in the process of longer intense training and competitive work of rowers who specialize in distances of 200, 500 and 1000 m.

The duration of work at maximum intensity is 30 seconds, the rest pause is 30 seconds. The emphasis in the work was placed with the requirement of maximum implementation of ergometric power at 25-30 s of load.

The fourth load option (G) is aimed at development of aerobic energy supply capacity for work. This type of training work typical for skilled rowers. During the execution period of 90 s work segments rowers achieve and maintain levels of maximum O_2 deficiency, CO_2 release , anaerobic products actively accumulate metabolism in the process of realizing power and anaerobic energy supply capacity. At adaptation of the body to this type of stimulus athletes reach maximum level O_2 consumption. This creates the conditions for achieving VO_2 max in conditions of high-intensity training and competitive activity.

Operating time at maximum intensity – 90 s, rest pause – 60 s.

Indicators of cattle response and energy supply works were analyzed during the period of achievement stability of the reaction when performing the second segment in the series and at the end of the series. Indicators relationship between pulmonary ventilation and excretion CO_2 was analyzed during the recovery period after the last segment when working for 10, 29 and 30 s and during the last 30 s of work the last segments lasting 90 s. Blood lactate concentrations were analyzed after completing the last segment of the series at the 3rd and 5th minutes of recovery period. As performance criteria considered the levels of cattle reaction and energy supply that the rowers achieved when various training load options.

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