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Determination of the bioenergy profile typology of swimmers at the training stage of preparation

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Abstract: Using the typology of athletes' bioenergetics in their training helps to estimate adaptive changes and reflects readiness to fulfill physical load. In order to define bioenergy groups of athletes we created methodical recommendations concerning the training and competitive loads fulfillment. They help to build the training process rationally and provide quick rehabilitation of athletes. ***Material***. The typology of bioenergy profile determination among the swimmers at the training stage of preparation using multifactorial express-diagnostics according to the methodology of professor S.A. Dushanin, modified and improved by professor V.P. Karlenko. ***Research methods.*** Information sources and methodical literature analysis and summarizing, the methodology of express-diagnostics using hardware and software complex "D&K-Test" by professor S.A. Dushanin, modified and improved by professor V.P. Karlenko. ***Results.*** The article presents the results of bioenergy types determination and characteristic among the swimmers at the training stage of preparation, received with the help of multifactorial express-diagnostics according to the methodology of Professor S.A. Dushanin, improved by professor V.P. Karlenko. ***Conclusion.*** The results of the held research help to come to the conclusion that a timely determination of bioenergy profile typology at the training stage and taking it into consideration in further training would increase the effectiveness of training and the effectiveness of athletes.
Keywords: monitoring of swimmers, training stage, methodology of professor S.A. Dushanin, express-diagnostics «D&K-Test», bioenergy profile.

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Introduction

The effectiveness of the Russian swimmers depends on the quality of mastering the program of sports training, their adaptation to the increased loads, stabilization of the main team of athletes, complex approach use in case of balance of all sides of training. The held by the authors analysis shows that there are some problems of swimmers training on the training stage of their initial specialization. This stage is the key stage, as it forms the base of swimmers' sports longevity and at this stage we see the greatest amount of swimmers. They leave the sport.

In this case great attention should be paid to the typology of swimmers' bioenergetics determination. It would help to use effectively the existing energy resources of an organism at the initial stage of specialization and broaden them in further training.

The use of athletes' bioenergetics typology in their training helps to estimate adaptive changes and reflects readiness to fulfill physical load. In order to define bioenergy groups of athletes we created methodical recommendations concerning the training and competitive loads fulfillment. They help to build the training process rationally and provide quick rehabilitation of athletes [1, 2, 4, 5, 11].

The necessity to use the presented approach is conditioned by the fact that a traditional planning of sports training is effective only when the age of the athletes is no more than 12 years-old. The offered methodology helped to extend boundaries of bioenergetics typology use in training swimmers. An individual approach use in swimmers formation

would help to increase the effectiveness of their training and increase their longevity in sports sphere.

The aim of the research: swimmers' physical qualities improvement at the training stage of preparation on the basis of taking into account bioenergy profile.

An objective: to reveal the typology of bioenergy profile of swimmers at the training stage of preparation using multifactorial express-diagnostics according to the methodology of Professor S.A. Dushanin, improved by professor V.P. Karlenko.

Materials and methods

In order to create the experimental methodology during the research we revealed bioenergy profiles of energy supplying system of swimmers' organisms at the training stage of preparation.

The base of the research forms the methodology of express-diagnostics using hardware and software complex "D&K-Test" by professor S.A. Dushanin, modified and improved by professor V.P. Karlenko. This methodology helps to define the functional state and the types of organism energy supply of the swimmers at the training stage of preparation, in particular: aerobic, aerobic- glycolytic, aerobic-anaerobic, anaerobic-aerobic, anaerobic-maximal.

64 swimmers (boys at the age of 9-10) at the training stage of preparation of the 1st year of study took part in the research.

Results and discussion

The results of traditional "Swimming" program analysis, created in accordance with the Federal law, December, 4, 2007 № 329-FL "On physical culture and sport in the Russian Federation", helped to continue the creation of the author's methodology. At the same time the demands of the Federal standard of sports training in swimming (the order of the Ministry for Sport of Russia, January, 19, 2018 № 41) were taken into consideration.

There is no concretizing of the training tasks (volume and intensity) of the functional development of growing athlete's organism reserve and adaptive capacities in a traditional program, as the basic foundation of the increasing loads at further stages of training.

Many sports specialists and military teachers were interested in the problem of bioenergetics typology determination and estimation among athletes. They are engaged in different kinds of sport. In this context it is necessary to define the results of bioenergy types study among biathletes and racing skiers, received by I.G. Gibadullin scientific school. These results include different approaches in sports training planning and organization [2, 3, 8, 9, 10].

The interest in this problem is conditioned by the fact that taking into account the typology of athletes helps to plan physical loads successfully, organize monitoring of their realization and control the sources of muscle activity energy supply. Realness of the functional training optimization effectiveness prediction among the swimmers at the training stage of preparation depends on adequacy of the used energetic evaluation criteria of physical working capacity parts.

Taking into account the results of the works by professor S.A. Dushanin and earlier held research works [1-4, 8], bioenergetics presents the process of different energy sources creation and realization for an effective fulfillment of any physical work.

It is known that the notion "bioenergetics" itself consists of two components – life and action, which include organism functioning and the work of the mechanism of their energy supply. In sports science this notion is considered as studying the process of organism functional sphere and the source of its energy supply. A competent use and development of energetic systems of athletes' organism during the process of physical loads fulfillment in different zones of intensity helps to gain fitness effectively and show stable results during a long-term training.

In order to define swimmers' bioenergy types we organized monitoring using «D&K-Test» express diagnostics [6, 7].

The table presents the results of the monitoring among the swimmers of the training stage of the 1st year of study (64 boys at the age of 9-10).

Table

The results of swimmers' distribution at the training stage of the 1st year of study according to bioenergy profile

№	Bioenergy profile	Bioenergy group	Amount of swimmers	percentage from general amount of swimmers
1	Aerobic	1 (first)	20	31%
2	Aerobic- glycolytic	2 (second)	11	17%
3	Aerobic-anaerobic	3 (third)	18	28%
4	Anaerobic-aerobic	4 (fourth)	7	11%

5	Anaerobic -maximal	5 (fifth)	8	13%
			Total 64	100%

The presented results show that in the group of swimmers of the training stage of preparation we see all five genetically planned bioenergy profiles.

Fig. 1 and 2 present the ratio of bioenergy types of athletes of the 1st year of training in a bioenergy profile and group.

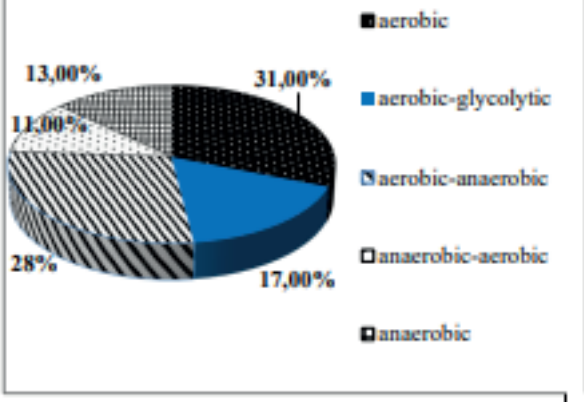

Fig. 1. Results of swimmers' belonging determination

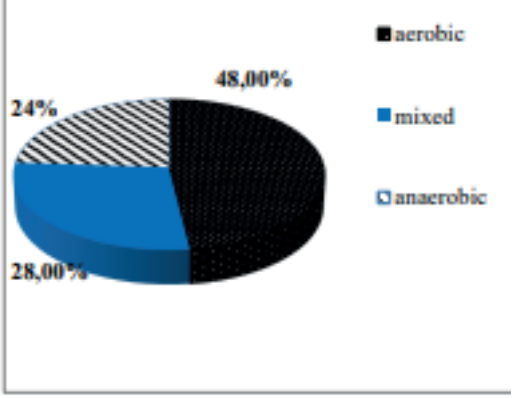

Fig. 2. Percentage of different bioenergetics typology among swimmers during inclusion into the training group 1

Fig. 1 shows that all kinds of bioenergy profile exist in the group of swimmers- aerobic (31%), aerobic-glycolytic (17%), aerobic-anaerobic (28%), anaerobic-aerobic (11%) and anaerobic-maximal (13%). In order to create the training programs for swimmers, taking into account the typology of bioenergetics we combined the swimmers into three groups – aerobic type (48%), anaerobic type (28%) and mixed type (24%) [1].

Fig. 2 presents the ratio of three bioenergy groups of swimmers at the training stage of the 1st year of preparation for an experimental methodology creation: aerobic type (48,00%); mixed type (28,00%); anaerobic type (24,00%).

Swimmers physical and functional abilities realization depends on correct training process organization. Generally adopted methodology for swimmers at the training stage of preparation is based on wave-like use of different training loads during the whole training. Training means realization happens taking into account the demands of typical program of training according to Federal State Educational Standards in swimming.

We mention below the characteristic of bioenergetics status of swimmers at the training stage of the 1st year of preparation, included into experimental program.

The swimmers, who are included into the 1st bioenergy group, have aerobic profile with aerobic type of muscle activity energy supply. They have high level of aerobic abilities, genetic level of power and low level of anaerobic abilities. They have low indices of power demonstration in terms of low level of special strength oriented endurance preservation. We underline instability of strength oriented abilities. It demands constant improvement. For this group it is more reasonable to use the principle of wave-like volume and intensity of physical loads alternation in an annual cycle of training.

Swimmers, who are included into the 2nd bioenergy group, have aerobic- glycolytic profile and type of energy supply. It is characterized by high level of mechanisms efficiency and reliability. We underline a low level of anaerobic abilities in terms of insufficient level of power creatine phosphate source and low indices of special strength oriented endurance. We revealed the necessity to plan special strength oriented endurance means for this profile in order to support this quality on ar adequate level. For this purpose it is necessary to include regularly 2 or 3 trainings of this orientation into microcycles. Quick decrease, which can lead to absolute values in tests decrease. It is necessary to model weekly and monthly trainings in an annual cycle of training taking into account the advantages and disadvantages of energy supplying mechanism of this group of swimmers. We organize wave-like inclusion into the microcycles of training depending on the objectives of the periods and stages of physical loads training in the 1st, 2nd, 3rd zones and the 4th and the 5th zones of intensity.

An optimal ratio of physical load at the stages of sports improvement and an annual cycle according to the laws of intensity is 75-80% (the 1st-3rd zone),

20-25% (the 4th-5th zone).

The swimmers, who are included into the 3rd bioenergy group, have aerobic and anaerobic profile and type of energy supply. This typology of swimmers is characterized by the mechanisms of energy supply of the mixed character at an optimal level of demonstration. In this typology of swimmers we see good level of functional state and effectiveness of competitive activity. We underline stability of results. Nevertheless, there is instable performance during competitions, own abilities over-estimation. It is necessary to realize balanced distribution of physical load volume and intensity in an annual cycle of training taking into account efficiency of functional abilities and cardiovascular system state. The third group is characterized by stability of the results and demands gradual physical loads increase depending on the ability of an organism to fulfill the increasing loads.

The swimmers of the 4th bioenergy group are characterized by anaerobic and aerobic profile and type of energy supply. High level of anaerobic abilities of an organism is connected with genetic predisposition. Taking into account physical loads realization according to intensity zones during sports training planning of this group of swimmers provides individual model values of functional state indices achievement according to express-diagnostics. Depending on age of the swimmers from this group the planned index, which is wave-like distributed in the structural components in an annual cycle of training, is almost 80-85% out of general volume of the planned for the training group of the first year of studying. In an annual cycle of swimmers training, taking into account the group, it is necessary to distribute the ratio of physical load parameters according to zones of intensity. It should happen within the range from 65 to 70% in the 1st and the 3rd zones, and then from 30 to 35% the parameters of physical load are switched in the 4th and the 5th zones. In this group it is necessary to distribute the ratio of physical loads according to microcycles using the pendulum action and impact character. During impact character physical loads use we provide their aproximation to competitive speed with the regulating rehabilitation microcycles inclusion. Before the competitions it is recommended to organize an impact microcycle, in which maximal volume of physical loads is fulfilled (taking into account the fitness level) in the 3rd-4th zones of intensity. Then goes a regulating microcycle, in which the intensity of the load and general volume decrease, till 60-70 and till 40-50% with two-three repetitions. In the final precompetitive microcycle it is necessary to recover working capacity. Before the important competitions it is necessary to organize control training with the volume till 70% of the competitive exercise.

The swimmers, who are included into the 5th bioenergy group, are characterized by maximal abilities of anaerobic profile and type of energy supply. This group is characterized by maximally high level of a functional component of an anaerobic mechanism. Nevertheless, this group has minimal level of efficiency on the background of maximal power. Efficiency of a functional component demonstration is decreased in terms of high level of their display. The swimmers with this typology are recommended an optimal ratio of physical load parameters of an annual cycle according to the zones of intensity. The load in the 1st and the 3rd zones is from 60 to 65 %, in the 4th and the 5th zones within the range from 35 to 40%. It is necessary to use two-cycle training taking into account the absence of the possibility to keep the gained physical working capacity for a long time.

A long-term training organization and physical load planning at the stages of an annual cycle were realized using pendulum action. It provides contrast alternation of “specialized” and “regulating” microcycles.

At the stage of direct training for the competitions we sequentially alternated (three-five weeks or other accepted in training duration) mentioned microcycles. At the same time in a “specialized” microcycle physical load was maximally close to competitive one according to the structure and content. In “regulating” microcycles we used the load of the rehabilitating character. This stage is recommended to start from a “specialized” microcycle with one week duration, where maximally possible volumes of physical loads should be fulfilled in the 3rd -4th zones of intensity, which by 5-7% exceed possible ones. Then goes a regulating microcycle – one week, where the intensity and the volume of physical load decrease by 70-75% and 50-60%. This cycle is repeated two-three times. In the final precompetitive weekly microcycle an athlete should recover strength (training taking into account health state and desire, under obligatory control of a doctor). Two days before the important competitions it is necessary to organize the control training with the volume till 70% of the main competitive exercise. 3-4 hours before the start it is necessary to organize the involving training. In the microcycles of the preparatory period it is necessary to organize 2-3 trainings for flexibility development and a training lesson for strength oriented endurance improvement. In the microcycles of the competitive period it is reasonable to organize two trainings for the level of flexibility support. It was achieved during preparation. Technical training during the training lesson should be realized in the competitive regimens after complete organism involvement into work. A coach sets the definite tasks or aims for the realized fulfillment of the separate elements of

the technique or an integral competitive exercise (programs) before the training lesson, during which it is unreasonable to make any changes.

Conclusion

The results of the held research help to come to the conclusion that a timely determination of bioenergy profile typology at the training stage and taking it into consideration in further training would increase the effectiveness of training and the effectiveness of athletes.

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