

Features of the formation of biochemical mechanisms of energy supply in the process of endurance development female athletes in sports aerobics

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The duration of the competitive program in sports aerobics is about 1.5 minutes, during which the athlete must perform high-intensity complex coordination movements that are combined with acrobatic elements. The implementation of these exercises is necessarily subject to musical accompaniment, which sets the pace of exercise. With the athlete advanced training, the competitive program acquires changes and is saturated with more complex elements. In this regard, the trainers are constantly faced with the task of selecting exercises that would be able to solve the problem of developing the optimal level of endurance, which will allow more technically complete the given exercises. Since sports aerobics is a young sport that is gaining its development, today the basis for many years of training athletes has not yet been formed theoretically. The issues of developing endurance also remain uncertain, and it does not allow coaches to more fully build the training process of their pupils.

Purpose: to find out the features of the formation of biochemical mechanisms of energy supply in the process of endurance development female athletes in sports aerobics.

Materials & Methods: the study was organized on the basis of the municipal out-of-school educational institution "Center for Children and Youth Creativity Dream" of the city of Kryvyi Rig, which was attended by 10 female athletes 14–15 years old, at the stage of basic sports training. In the process of the experiment, the following methods were used: theoretical analysis and generalization of scientific and methodological literature; study of documentary materials, video materials of competitions, pedagogical observation, pedagogical testing, methods of mathematical statistics.

Results: presented results of a study of the features of the formation of biochemical mechanisms of energy supply in the process of development of endurance athletes in sports aerobics. Experimental data indicate that in the process of developing endurance of athletes in sports aerobics, the efficiency of the glycolytic mechanism of ATP resistance increased, and a positive effect of the proposed funds on the adaptation processes in the test organism during the transition from creatine-phosphate mechanism of energy supply to glycolytic was revealed.

Conclusions: compositions in sports aerobics are marked by the complex coordination nature of the exercises, which must also be performed with great intensity and high pace throughout the competition program. Therefore, the development of such a physical quality as endurance is very important for athletes of this sport. The duration of the competitive program in sports aerobics determines the formation of the leading mechanisms of energy supply in the process of endurance development, namely: the efficiency of the glycolytic mechanism of ATP resistance, as well as adaptation processes in the body of athletes during the transition from creatine phosphate to glycolytic mechanisms, increase.

Keywords: sports aerobics, endurance, creatine phosphate mechanism of ATP resistance, glycolytic ATP resistance mechanism, energy supply mechanism.

Introduction

Sports aerobics is a new, modern sport, which in the direction of motor activity is classified as complex coordination, acyclic sports. The competitive program in sports aerobics is represented by a continuous and high-intensity complex of exercises for musical accompaniment with acrobatic and choreographic movements of varying complexity, as well as exercises for strength and flexibility, which requires appropriate physical preparedness [3; 14; 15].

This is a very complex sport, which is an example of extreme physical activity in the zone of mixed (aerobic-anaerobic) energy supply [18].

Despite the fact that compositions in sports aerobics are marked by a complex coordination character, they must also

be performed with great intensity and high pace throughout the entire competitive program. Therefore, when preparing athletes, the trainers are faced with the issue of selecting and including in the training process special exercises for the development of both general and special endurance of athletes.

The foundations of the physiological substantiation of the essence of endurance as the quality of motor activity and the identification of the features of its manifestation in various sports were laid in the works of Yu. V. Verkoshansky [7], V. M. Zatsiorsky [11], V. S. Keller [13] and others specialists. In close connection with the results of these studies, the general principles of endurance were developed, which served as the foundation for the development of various directions for the development of this quality in various sports. These are the works of V. M. Zatsiorsky [11], N. G. Ozolin [20], V. N. Pla-

tonov [21] and others.

According to V. N. Platonov [21], overall endurance should be defined as the ability to perform work of a nonspecific nature for a long and efficient time and creates a positive effect on the formation of specific components of sportsmanship due to increased adaptation to loads and the presence of "transfer" of training from non-specific specific activities. According to the same author, special endurance is the body's ability to perform work and overcome fatigue in conditions determined by the requirements of competitive activity in a particular sport.

The level of development of an athlete's endurance is determined by the energy potential of his body and how it meets the requirements of a particular sport. One of the most important factors affecting the development of endurance of athletes is the effectiveness of energy supply mechanisms, which are formed depending on the characteristics of competitive activity. The formation and dominance of various mechanisms is primarily affected by the duration and intensity of the competitive program.

Purpose of the study: to find out the features of the formation of biochemical mechanisms of energy supply in the process of endurance development female athletes in sports aerobics.

Objectives. 1. To analyze the data of scientific and methodological literature on the development of endurance in sports aerobics. 2. Given the features of the competitive program, investigate the leading mechanisms that affect the energy supply of the body of female athletes with the development of endurance, and determine the rationality of including funds for its development.

Material and Methods of the research

The study was organized on the basis of the municipal out-of-school educational institution "Center for Children and Youth Creativity" Dream "of the city of Krivyi Rig, in which 10 female athletes aged 14–15 years participated. In the process of the experiment, the following methods were used: theoretical analysis and generalization of scientific and methodological literature; study of documentary materials, video materials of competitions, pedagogical observation, pedagogical testing, methods of mathematical statistics.

For nine months, during the training sessions, athletes per-

formed sports aerobics exercises that contribute to the development of the studied quality. We used the following methods:

- 1) continuous exercise methods (continuous standardized exercise method, continuous variative exercise method, continuous progressive exercise method, continuous regressive exercise method);
- 2) methods of interval exercise (the method of interval standardized exercise, the method of interval variative exercise, the method of progressive interval exercise, the interval regression exercise method);
- 3) combined exercise methods (the method of continuous-interval standardized exercises, the method of interval-standard progressive exercises, the method of repeated-interval standardized exercises, the method of circular exercises).

Training sessions were held 3 times a week for 90 minutes each.

Results of the research

In the course of the study, the initial testing of the working capacity of the studied contingent by Ruffier samples and the Harvard step test was carried out, since these indicators are indicators of the development of endurance and reveal the athlete's ability to work of a different nature and form, the basis of which is endurance (Table 1).

According to the initial testing (Table 1), the results of the athletes were distributed by level. In both the IHST and the Ruffier Index, the average score in the study group indicates a good level. IHST=80,5 c. u., IR=6,8 c. u. A high level of uniformity of results can also be noted. (IHST v =5%; IR v =13%).

At the end of the experiment, re-testing was carried out and a comparative analysis of the results of the initial and repeated testing was done, which is reflected in tables 2 and 3.

Analyzing the data presented in Table 2, we can say that the average value of the Harvard step test index during repeated testing increased to an excellent level and amounts to 89,4 c. u. It can be noted that the IHST indicators increased in each athlete in the group. The significance of differences between the results of primary and repeated testing is also traced. $p < 0,01$ ($t=4,34$).

Table 1
Indicators endurance female athletes (n=10)

Functional tests	The sequence number of the investigated										\bar{X}	σ	$v, \%$
	1	2	3	4	5	6	7	8	9	10			
IHST, c. u.	72	81	78	83	78	87	82	82	84	78	80,5	3,96	5
Ruffier samples, c. u.	7,4	6,2	7,2	7,2	7,4	5,2	6,4	6,4	4,8	6,8	6,5	0,86	13

Table 2

Comparative analysis of endurance female athletes according to the results of the Harvard step test (n=10)

Test	The sequence number of the investigated										\bar{X}	σ	m	t	P
	1	2	3	4	5	6	7	8	9	10					
Initial testing	72	81	78	83	78	87	82	82	84	78	80,5	3,96	1,4	4,34	<0,01
Repeated testing	82	87	89	92	86	94	90	89	98	87	89,4	4,25	1,5		

Table 3
Comparative analysis of endurance indicators of female athletes according to the results of the Ruffier test (n=10)

Test	The sequence number of the investigated										\bar{X}	σ	m	t	P
	1	2	3	4	5	6	7	8	9	10					
Initial testing	7,4	6,2	7,2	7,2	7,4	5,2	6,4	6,4	4,8	6,8	6,5	0,86	0,3	2,85	<0,05
Repeated testing	5,8	5,4	5,2	5,8	5,8	4,8	5,4	6	4,2	6,2	5,46	0,57	0,2		

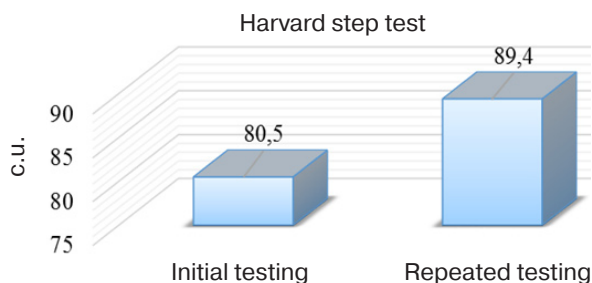


Fig. 1. IHST results during the experiment ($P \leq 0,01$)

Figure 1 graphically illustrates the increase in performance, Harvard step test.

Analyzing the results presented in table 3, we observe a decrease in the performance of the Ruffier index, which means an improvement in the results. The average index value is 5,46 c. u., which is interpreted as a good level. If we compare the individual results of athletes, we observe an improvement in the results in each of them. The indicators for this breakdown also have significant differences when $p < 0,05$ ($t = 2,85$).

Graphically, the improvement of the test results for the Ruffier test is presented in Figure 2.

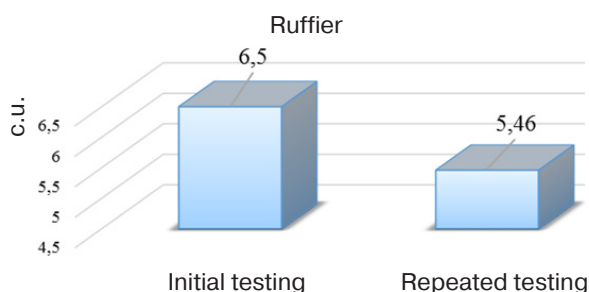


Fig. 2. Ruffier test results during the experiment ($P \leq 0,05$)

After conducting the experiment, we revealed a change in the test results of varying degrees of reliability (in IGST, changes in the results took place with a degree of reliability of 99%, and in the Ruffier test the reliability of the changes was 95%). This is due to the different nature, structure and timing of the exercises in sports aerobics, therefore, to various energy supply mechanisms. When performing the Harvard step test, the main mechanism of ATP resynthesis is glycolytic, during which muscle glycogen, as well as glucose, are used mainly from the blood. When performing the Ruffier test, energy supply occurs mainly due to the creatine phosphokinase mechanism (within 10–15 s), and then glycolytic is gradually connected. That is, at the beginning of the Ruffier test, ATP resynthesis occurs mainly due to creatine phosphate, and the effectiveness of this process depends on its muscle reserves and the economy of its use.

Conclusions / Discussion

From the analysis of scientific and methodological literature it was established that today there is too little information that related to the peculiarities of training athletes in sports aerobics in the process of many years of training. Not an exception is the question of a rational combination of means in the process of developing endurance.

It has been established that during exercises aimed at developing endurance in sports aerobics, the leading mechanism that affects the energy supply of the body is glycolytic ATP resynthesis, as well as adaptation processes in the transition from creatine phosphate to glycolytic mechanisms. Therefore, in the process of training for the development of endurance, it is preferable to select funds that affect the increase in the effectiveness of these processes.

Prospects for further research. Find out what methods can achieve the most effective impact on the formation of the leading mechanisms of energy supply to achieve a high level of development of special endurance of athletes in sports aerobics, taking into account the features of competitive activity.

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