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FEATURES OF FUNCTIONAL FITNESS OF FIFTH GRADE SCHOOLCHILDREN BASED ON INTERVAL TRAINING

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Key words: interval training, functional test, breath-holding test on inhale, breath-holding test on exhale, schoolchildren, physical education.

Annotation. Effectiveness of interval training is that there is a stimulation of lipid oxidation in the organism, as well as suspension of catabolism due to alternating exercise modes, which allows preserving muscle mass, gained as a result of training. The aim of this study was to justify the effectiveness of using interval training in the process of physical education for increasing functional capabilities of the cardiorespiratory system of fifth grade schoolchildren. Boys of the experimental group performed exercises of artistic gymnastics using the interval training method for 6 months on physical culture classes. Peers from the control group performed physical exercises on classes according to the traditional program. Results of the study demonstrated that implementation of the interval training method for 6 months in the process of physical education allowed fifth grade schoolchildren to improve indicators of the cardiorespiratory system.

Introduction. Implementation of modern types of fitness programs in the process of physical education for educational organizations becomes more and more popular, because it is a motivational basis of engaging in physical exercises that effectively influences physical and functional reserves of the organism [1-4]. Interval training is a new type of physical activity that takes one of leading positions in fitness. Interval training program is based on maximally active muscle work, which contributes to perfect loads on the functional state of the organism. The main principle of interval training is alternation between high-activity exercises and exercises at a light and average pace of the same duration. Such approach gives a possibility to burn as many calories in about 20 minutes as it would be possible to burn in an hour of continuous training at an average pace. A stimulation of lipid oxidation in the organism occurs, as well as suspension of catabolism due to alternating exercise modes, which allows preserving muscle mass, gained as a result of training, and develop functional capabilities and muscle strength [5-7]. At the

same time, it is important to note the fact that this type of training, despite having many benefits, is not widely used in the process of physical training of fifth grade schoolchildren. The aim of this study was to justify the effectiveness of using interval training in the process of physical education for increasing functional capabilities of the cardiorespiratory system of fifth grade schoolchildren.

Methods and organization. The pedagogical experiment involved fifth grade boys. They were divided into two groups – the experimental (EG) and control (CG) groups, 12 boys each. The preliminary study of the cardiorespiratory system of all participants demonstrated that boys of EG and CG did not have any significant differences. Evaluation of the cardiorespiratory system was carried out according to following parameters: the Martinet-Kushelevskij test (functional test (FT)) with heart rate (HR) registration; breath-holding tests on inhale and exhale. Test for standard distribution of measured variables was carried out according to the Shapiro-Wilk test. In case of normal distribution, we used the Student's t-test for checking statistical hypotheses.

The pedagogical experiment is that the EG boys performed exercises of artistic gymnastics using the interval training method on one of the parts (preparatory and partially main parts) of a physical culture class (for example, they perform 20 squats for 30 seconds, rest for 10 seconds, then perform 20 squats again, 5-10 minutes in a row. A total volume of such loads did not exceed more than 20 minutes for a class) for 6 months. The CG boys engaged in physical culture according to the traditional program for fifth grade schoolchildren.

Results and discussion. Results of the effect made by the interval training method on the functional state of the cardiovascular (CVS) and respiratory systems of fifth grade schoolchildren are shown in the table below.

Table

Indicators of functional tests of fifth grade boys during the experiment

№	Tests	Initial data				6 months after			
		EG (n=12)	CG (n=12)	Δ,%	p	EG (n=12)	CG (n=12)	Δ,%	p
1	HR 1 minute before 20 squats for 30 s, beats/min	66,8±0,9	66,4±0,8	0,6	>0,05	64,7±0,7	65,9±0,8	-1,9	>0,05
2	HR immediately after 20 squats for 30 s, beats/min	125,8±2,3	126,3±1,5	0,4	>0,05	107,9±1,4*	123,5±1,2	-14,5	<0,01
3	Δ between 1st and 2nd HR registration	59,0±1,5	59,9±1,6	-1,5	>0,05	43,2±1,3	57,6±2,4	-33,3	<0,01
4	Breath-holding test on inhale, s	34,7±0,7	35,2±0,8	1,4	>0,05	49,6±1,4*	37,1±0,9	+33,6	<0,01
5	Breath-holding test on exhale, s	27,5±0,5	28,1±0,6	2,2	>0,05	35,2±1,2*	29,3±0,9	+20,1	<0,01

Note: * – indicators of intragroup changes p<0,001 according to the Student's t-test

Results of the study demonstrated that HR in children of the EG before the FT on the first test were 66,8±0,9 beats/min, in children of the CG – 66,4±0,8 beats/min. Six months after, HR in children of the EG was 64,7±0,7 beats/min, in the CG – 65,9±0,8 beats/min.

Results of registering HR in fifth grade schoolchildren immediately after the FT on the first test were 125,8±2,3 beats/min in children of the EG, in the CG – 126,3±1,5 beats/min. Six months after, HR was 107,9±1,4 beats/min in children of the EG and 123,5±1,2 beats/min in children of the CG ($p<0,01$). If in the first case a relative indicator of differences in HR between groups was 0,4%, then in the second case – 14,5%.

Differences between the first and final HR registration before the experiment were 59,0±1,5 beats/min in EG schoolchildren, six months after – 43,2±1,3 beats/min ($p<0,001$), in CG schoolchildren – 59,9±1,6 and 57,6±2,4 beats/min respectively. 6 months after, a relative indicator of differences in HR was 36,5% in EG schoolchildren and 4,0% in CG schoolchildren.

When carrying out the breath-holding test on inhale on the first trial, EG schoolchildren showed results of 34,7±0,7 s, on the final trial – 49,6±1,4 s, which is by 42,8% higher than on the first trial ($p<0,001$). CG schoolchildren revealed following results – 35,2±0,8 s and 37,1±0,9 s respectively, which is by 5,4% higher than initial data.

When carrying out the breath-holding test on inhale, EG schoolchildren demonstrated following results: on the first test– 27,5±0,5 s, six months after (on the final test) – 35,2±1,2 s ($p<0,001$), CG schoolchildren – 28,1±0,6 s and 29,3±0,9 s ($p>0,05$) respectively.

Conclusion. Therefore, due to implementing interval power training on physical culture classes, fifth grade schoolchildren demonstrated a growth rate of functional capabilities of the external breathing system. More economical work of the heart when performing functional tests was registered, i.e. an increase of functional capabilities of the cardiorespiratory system occurred.

References

1. Dvorkin L.S. Forming physical, moral and volitional qualities in young men of specialized universities with bodybuilding classes / L.S. Dvorkin, N.I. Dvorkina, O.S. Trofimova, P.V. Golovko // Theory and Practice of Physical Culture. – 2021. – №6. – P. 15-17.

2. Dvorkina N.I. Effect of BODY PAMP sessions on the physical fitness of 15-16-year old handball players / N.I. Dvorkina, I.A. Pronina // Collection: Physical Culture and Sports in in the XXI Century: Relevant Problems and Their Solution.

Materials of the All-Russian Scientific and Practical Conference with International Participation. – 2020. – P. 277-278.

3. Trofimova O.S. Features of changes in the functional state of young women who do gymnastic exercises with Haṭha yoga elements / O.S. Trofimova // Scientific Notes of the P.F. Lesgaft University. – 2019. – № 8 (174). – Part 2. – P.231-234.

4. Koryagina Yu.V. Comparative analysis of physical development of primary school children from Russia with children from other countries // Yu.V. Koryagina, S.V. Nopin, G.N. Ter-Akopov, A.N. Kopanev, S.M. Abutalimova // Resort Medicine. – 2020. – № 3. – P. 126-131.

5. Dvorkin L.S. Onto-kinesiological approach to continuous registration of pulse rate in 13-14 year old adolescents when performing the functional stress with static stress / L.S. Dvorkin, N.I. Dvorkina // Collection: Integration of Socio-Humanistic and Scientific Knowledge in the Context of Onto-Kinesiological Method of Sports Science. Material of the Scientific Symposium, dedicated to the memory of V.K. Bal'sevich. – Moscow. – 2021. – P. 136-142.

6. Koryagina Yu.V. Morphological features of athletes as a result of adaptation to sessions of different power sports / Yu.V. Koryagina, S.V. Matuk // Omsk Scientific Bulletin. – 2010. – № 4 (89). – P. 140-142.

7. Zamchij T.P. Morphofunctional aspects of adaptation to power sports / T.P. Zamchij, Yu.V. Koryagina // Omsk. – 2012. – 156 p.

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