Increasing students' performance by the method of regulated breath control

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Abstract

Objective of the study was experimental confirmation of the effectiveness of using the method of regulated breathing control to improve the performance of students.

Methods and structure of the study. The experiment involved 40 students of St. Petersburg State University aged 18-20, mastering "Elective disciplines in physical culture and sports." The students were divided into control (CG) and experimental (EG) groups of 20 people each. To determine the effectiveness of using the experimental method (regulated breathing control) in physical education classes, the following research methods were chosen: mental performance and stress resistance test (TMPSR), sustainable performance test (TST), VO2max test, 12-minute Cooper test.

Results and conclusions. It has been experimentally proven that the regulated control of breathing allows you to use not only the muscles of the chest, shoulders, but also the muscles of the abdomen, as well as the diaphragm, which helps to restore the breathing technique and increase the performance of the bronchopulmonary apparatus.

Keywords: *students, working capacity, physical culture, regulated breathing control, breathing exercises.*

Introduction. The constantly increasing amount of information, the increase in its volume and complexity, the increasing requirements for the future specialist not only in the field of professional knowledge and skills, but also in the level of health, as well as physical fitness, lead to changes in the functioning of the entire human body, as a result, to a decrease in its efficiency, and most importantly - the quality of the work performed [7, p. 83; 9, p. 10].

As non-drug methods to increase mental performance, a number of researchers point to the use of autogenic training, color and sound effects that have a beneficial effect, toning the body through alternating mental work with physical. According to K.N. Dementieva, N.S. Leshevoi, I.S. Moskalenko, L.V. Yarchikovskaya the best results are obtained by the inclusion of light aerobic physical activity in the middle or after the end of mental work and V.I. Grigoriev, T.I. Koval and others confirm with their research the benefits of purposeful inclusion of breathing exercises in the program [1, p. 68; 3, p. 41; 4, p. 36; 5, p. 217; 8, p. 12; 11, p. 307]. Various arbitrary breathing modes as a methodical technique can be used in training, both to create oxygen deficiency and to increase aerobic capacity, as well as to adapt the respiratory apparatus to work in a variety of breathing modes. An analysis of the special literature allowed us to assume that not only the way of performing exercises, the nature of the load, but also the purposeful use of breathing exercises in a relatively short period will increase the performance of students [2, p.110; 10, p. 28].

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Dynamics of the studied indicators at the beginning (before) and at the end (after) of the study

Indicators	EG (n=20)		CG (n=20)	
	before	after	before	after
VO_{2max} test				
% O_2	4,08±0,59	3,88±0,40	3,80±0,44	3,68±0,37
RR, breath/min	46,4±10,8	50,3±9,2	55,3±7,8	55,5±5,3
RV, л	2,12±0,37	2,19±0,30	2,03±0,28	1,97±0,21
Time of onset of VO_2max, s	308±70	395±89	345±77	386±55
Tests for health research				
TMPSR, number of errors	32,3±9,2	21,4±2,8	29,8±8,6	26,6±10,4
TST, number of errors	26,5±8,2	16,7±4,2	25,7±6,9	16,7±4,2
12-minute Cooper test, km	1,8±0,25	2,3±0,26	1,9±0,41	2,1±0,52

physical culture and sports." The students were divided into control (CG) and experimental (EG) groups of 20 people each. To determine the effectiveness of the use of the experimental method (regulated control of breathing) in physical education lessons, the following research methods were chosen:

1. Test of mental performance and stress resistance (TMPSR). TMPSR is a time-limited attention test, with 88 tasks given 14 minutes. The test consists of four blocks:

- counting figures, 40 questions at a pace of no more than 5 seconds per task;
- counting figures of various shapes, 40 questions at a pace of no more than 4 seconds per task;
- search for mechanical errors in an excerpt of a literary text, four tasks at a pace of no more than 60 seconds per task;
- search for mechanical errors in a passage of text on professional topics, four tasks at a pace of no more than 60 seconds per task.

2. The Sustainability Test (TST) consists of three parts that are performed during one testing session:

- game block to determine the integral indicator "accuracy-speed" of actions in a situation of choice in conditions of time pressure;
- psychological questionnaire;
- intelligence test.

3. VO2max test: % O2, respiratory rate (RR), respiratory volume (RV), time to VO2max.

4. 12-minute Cooper test.

Results of the study and their discussion. For the EG and CG, a single program of 36 academic hours was compiled. The students from the EG used the method of regulated breathing control in all exercises, except for the complexes in the preparatory part. The CG followed the same program as the EG, but performed identical work without an emphasis on breath control.

The method of regulated breathing control consisted in the purposeful use of the abdominal type of breathing, involving the diaphragm, to train the muscles of the respiratory system apparatus. Milodan V.A. (2009) argued that the use of this type of breathing, creating resistance to inhalation by the muscles of the larynx and bronchi, allows you to increase air pressure and improve ventilation of the lower zones of the lungs [6, p. 88]. In the main part of the lesson, while performing running tasks, the students from the EG were recommended to use the abdominal type of breathing with resistance during inhalation. The final part of the lesson included yoga exercises, with an emphasis on one of the breathing options - "inhale - hold the breath - exhale" at a pace of 4:16:8.

The selected research methods made it possible to consider what changes occurred in both groups as a result of the application of the experimental method (see table). At the beginning (before) and at the end (after) the study, the students from the EG showed significant differences in the studied indicators, in the CG the indicators did not change significantly.

The results of the test of mental performance and stress resistance and sustainability test at the end of the study indicate an increase in mental performance, as well as an increase in its efficiency. So, in the initial testing, students made a large number of mistakes and often did not have time to complete several tasks in the allotted time period. According to the subjective assessment of the students from the EG, it was noted that even a five-minute breathing exercises used in physical education classes allowed them to reduce the level of anxiety before performing complex tasks and increase their concentration, which had a positive effect on their results.

Control measurements of the time to overcome the 2 km distance showed that the use of the method of regulated breathing control during cyclic work allowed the students from the EG to increase the lag in the CG by 22.7 ± 5.4 s, which can also be tracked by the results of the 12-minute Cooper test.

Conclusions. The experimental method of breathing control allows you to use not only the muscles of the chest, shoulders, but also the abdomen, as well as the diaphragm, which helps to restore the breathing technique and increase the performance of the

bronchopulmonary apparatus. Thus, training under conditions of artificially created hypoxia by the method of regulated respiration control increases working capacity not only during cyclic exercises by increasing the power of both aerobic and anaerobic energy supply systems, but also contributes to longer and more efficient mental work.

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