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Effect of the Exercise Classics for the Development of Memory in Children at Lessons of Physical Culture

*Polevoy G.G[1]

[1]Candidate of Pedagogical Sciences, Associate Professor, Department of Physical Education, Moscow Aviation Institute (National Research University), Moscow, Russia.

Abstract

Background

A physical education lesson at school allows comprehensive physical development of children at school. The present study was aimed at studying the effect of physical exercise on the memory of schoolchildren in general education schools in Russia. We aimed to determine the impact of exercise Classics on the development of memory in children 9-10 years old.

Materials and Methods

A pedagogical study was conducted in Kirov (Russia) in 2020, at secondary school No. 60. The control group was engaged in a standard program of physical culture. The children in the experimental group additionally used the exercise Classics in each lesson. The study was conducted over a period of 9 months, in which forty 9-10-year-olds took part. Physical education classes were held 2 times a week for 40 minutes each lesson. The level of development of coordination abilities was assessed by the Shuttle run test, and the children's memory indicators were assessed by the Jacobs Method test. Data were analyzed using Bio-stat 2009, Microsoft excel 2016 programs.

Results

In control group, in the Shuttle run test, the indicators improved by 2.9% ($P>0.05$), and in the test for the level of memory development, the indicators improved from 5.7±0.6 to 5.9±0.4 ($P>0.05$). In experimental group, in the Shuttle run 3x10 m test, performance improved by 14.1% ($P<0.05$), and in the Jacobs Method test, performance improved from 5.4±0.3 to 6.5±0.4 ($P<0.05$).

Conclusion

These results indicate the effectiveness of using Classical exercises in physical education lessons when working with younger schoolchildren.

Key Words: Classics, Coordination abilities, Memory development, Schoolchildren, Physical culture.

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Corresponding Author:

Polevoy G.G, Candidate of Pedagogical Sciences, Associate Professor, Department of Physical Education, Moscow Aviation Institute (National Research University), Moscow, Russia.

Email: g.g.polevoy@gmail.com

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1- INTRODUCTION

Problems of health, physical education and sports are relevant, especially at school age (1-2). In recent years, quite often studies have characterized the low level of physical development of children before school and in school. Severe diseases are being observed in younger children and there is a lack of motor activity in them. There are problems with obesity in primary school children, and with the cardiovascular system. Often children have certain abnormalities in their health. Of course, the lack of motor activity significantly worsens the health of the growing human body, weakens its defenses, and does not provide full physical development.

A healthy lifestyle, including sufficient motor activity – is a sure path to a long and fulfilling life. This is facilitated by a physical education lesson at school, which usually lasts 40 minutes, 2-3 times a week. In physical education classes, the schoolchildren receive new knowledge, skills and abilities that are necessary for them in everyday life and sports. The main goal of physical education is a comprehensive harmonious development of the individual (3-4). Modern physical education programs at school impose certain requirements not only for teachers and schoolchildren, but also for the material base (5). In many schools in Russia, there are no large gyms, there is not enough inventory, there is a large crowding of schoolchildren, and the density of classes is decreased. What should be done in this case? Some authors offer more modern methods instead of the standard program (6-7). But in this case, the creative thought and enthusiasm of the teacher come to the fore. Nevertheless, it is necessary to develop and implement a physical exercise that does not require expensive equipment, is not difficult to perform, and does not affect the content of the physical education program at school. At the same time, the exercise should arouse the interest of schoolchildren and increase the motor density of the lesson. One of these exercises is the Classics. Exercise Classics proved its effectiveness (8). The differentiated approach is fully implemented when performing exercise Classics, the teachers are able to dose the load themselves when performing the exercise, it is important that each schoolchild can fully realize their motor needs in a physical education lesson (9-10). Separately, we should note the effectiveness of exercise Classics for the development of coordination abilities. Coordination abilities – a set of properties of the human body, are manifested in the process of solving motor tasks that determine the success of motor control actions. The value of coordination abilities for a person is very high.

A sufficient level of development of such abilities allows a person to cope with a certain task without any difficulties. Coordination abilities correlate at a high level with the technical actions of athletes (11, 12). Natural growth of coordination abilities in primary school age has maximum values, so the age of 9-10 years is the most favorable for the development of these abilities (13). Physical culture and sports have a positive impact on the mental processes of schoolchildren, there are several studies on this (14, 15). Taking into account such data, it is necessary to determine the value of exercise Classics for the development of memory in primary school children. So we aimed to determine the impact of exercise Classics on the development of memory in children 9-10 years old.

2- MATERIALS AND METHODS

2-1. Study design and population

The pedagogical experiment was conducted in the city of Kirov (Russia) for 9 months (September-May) 2019-2020. The study involved students from 3A and

3B classes who were ready for health reasons to engage in physical education without restrictions. Forty boys and girls took part in the pedagogical experiment. The children were in grade 3 at a normal school in Russia. All schoolchildren aged 9-10 were healthy and able to engage in physical culture and sports.

2-2. Methods

During the school year (56 lessons) from September to May (9 months), physical education classes were held twice a week for 40 minutes each lesson. Before starting the study, two groups were identified: control (CG), and experimental (EG). Children from class 3A (20 schoolchildren) who were engaged in the standard program for secondary schools in physical culture were allotted to CG (5). Children from class 3B (20 schoolchildren), who were engaged in the same program and who additionally performed the exercise Classics in each physical education lesson, which is shown in **Table.1**.

Table-1: Exercise Classic's.

4	8	5		9	6	7		1	4	5
3	7	1		5	2	3		7	9	2
9	2	6		1	4	8		8	3	6
Square 1				Square 2				Square 3		

2-2-1. Exercise Classics

In the gym, there are three large squares on the floor. The side of one square is 180 cm; inside each large square there are nine small squares, the side of the small square is 60 cm; inside each small square are numbers from 1 to 9.

Task: the child must use jumps from square to square to get from number 1 to number 2, then to number 3, and so on, to number 9. After that, he should jump on the same squares in reverse order (from number 9 to number 1). The squares can be moved around in any way (from one leg to the other, jump on one leg or on two). If the child makes a mistake, he/she returns to the previous square. During the lesson, each child must overcome three large squares. The numbers in the squares must be changed by the teacher before each lesson. The exercise can be performed in any part of the lesson.

Before and after the pedagogical experiment all schoolchildren took control tests:

1. Shuttle run 3x10 m (indicator of coordination abilities) (16).
2. The Jacobs Method (indicator of memory) (17).

The method consists of four similar squares. Each square has numbers in any order, and the number of digits in a row is ascending (**Table.2**).

Table-2: Material for determining short-term memory.

First square	**Second square**
3524	4106
29602	29934
154063	656086
5742389	7201570
85682538	92744525
738374623	615843413
8323845207	3524836897
Third square	**Fourth square**
8372	6106
54805	79934
325318	356086
7759438	8201570
92186355	92744525
332697843	315843413
1445287167	5524836897

The teacher calls all the numbers with a pause of one second. After he has read a whole line, the children must put the numbers on the paper in the same order.

Memory indicators are calculated using the formula: A+C/4

A. Longest line length that was played correctly;

C. Number of correctly reproduced rows greater than A.

2-3. Measuring tools: validity and reliability

Exercise Classics were held in the gym at school in physical education class. Test Shuttle run 3x10 m was conducted in the gym at the school at the beginning and end of the experiment. On the floor, two parallel lines are drawn at a distance of 10 meters (the start line and the finish line). The child is positioned behind the starting line. At the command "March!" he runs to the finish line, touches it with the fingers of one hand and returns to the start line, repeats the movement of the hand and runs again to the finish line. The result: the better of two attempts is taken into account with an accuracy of 0.01 s. Jacobs Method was conducted in the classroom at the study desk at the beginning and end of the experiment.

2.4-Ethical consideration

All procedures met the ethical standards of the 1964 Declaration of Helsinki. Informed consent was obtained from all parents of the schoolchildren included in the study.

2-5. Data Analyses

The pedagogical experiment used mathematical and statistical analysis of the results. Microsoft excel 2016 allowed us to determine the average value of indicators in tests, the Biostatistics 2009 program allowed using the t-student criterion the reliability of results (significance $P<0.05$) (18-19).

3- RESULTS

At the beginning of the study the age of students from 3A and 3B classes was 9.4±0.7, by the end of the experiment the age of students was 10.2±0.8 year-old. Before the start of the study, all children from CG and EG passed control tests, the difference in the results between the indicators was not reliable. After the experiment, children from 3A and 3B classes again passed both standards, the indicators changed significantly in EG ($P<0.05$) (**Table.3**).

Table-3: Indicators of coordination abilities and memory in schoolchildren 9-10 year-old.

Test	Control group, n=20				Experimental group, n=20			
	Before	After	%	P-value	Before	After	%	P-value
Shuttle run 3x10 m (s)	10.2±0.6	9.9±0.5	2.9	P>0.05	9.9±0.5	8.5±0.4	14.1	P<0.05
Jacobs Method (points)	5.7±0.6	5.9±0.4	3.5	P>0.05	5.4±0.3	6.5±0.4	20.4	P<0.05

Table.3 shows that after the pedagogical study, the indicators in both tests for schoolchildren from grades 3A and 3B improved, although not equally. For example, in CG, children in the Shuttle run 3x10 m test improved their performance by only 2.9% (P>0.05), while in EG school children, their coordination abilities improved by 14.1% (P<0.05). In the memory test, primary school children in grade 3A had higher scores, from 5.7±0.6 to 5.9±0.4 (P>0.05), and schoolchildren in grade 3B on the Jacobs method test had higher scores from 5.4±0.3 to 6.5±0.4 (P<0.05). Thus, it can be assumed that the standard physical education and sports program for school-age children is effective for the development of coordination abilities and memory in children 9-10 years-old. At the same time, the results in EG indicate a significant effect when implementing exercise Classics in the educational process of schoolchildren. In class 3B children, performance in both tests improved significantly.

4- DISCUSSION

We aimed to determine the impact of exercise Classics on the development of memory in children 9-10 years-old. The results obtained after the pedagogical experiment indicate that the goal has been achieved. The main results of the study are the effectiveness of using exercise Classics in physical education classes at school. Exercise Classics can not only improve the coordination abilities of children, but also effectively affects the level of development of their memory. Great importance is given to children's health from an early age. Compulsory physical education classes are already being introduced at school, which are aimed at the comprehensive development of schoolchildren and their preparation for an active life in society. Physical education classes at school bring the necessary physical development of schoolchildren through physical exercises (3, 4, 20). The standard physical education program at school is filled with a variety of methods for developing physical abilities, sets of exercises, requirements and methods of training.[5] Some authors believe that the physical education program is no longer relevant, and the data in it is outdated.

The authors suggest completely changing the program, replacing it with more modern methods (for replacing programs). This approach is too strict, in our opinion, it is necessary to only slightly supplement the existing system of physical education of schoolchildren. One of these additions is the introduction of the exercise Classics in the school physical education process. We have previously proven the effectiveness of using the exercise Classics for school children (8). For the first time, the influence of exercise Classics on the state of memory of schoolchildren was revealed. From the beginning to the end of the study, children who were engaged in physical education and performed exercise Classics improved their memory indicators. Thus, the hypothesis that physical exercise has a positive effect on cognitive and mental processes is fully confirmed (14, 15, 21, 22). In addition, studies that emphasize the effectiveness of implementing a differentiated approach in

the school process have also been confirmed in this study (9, 10, 23). If we evaluate the indicators in the control group, we can state the fact that the favorable period for the development of most physical abilities, including coordination abilities, is primary school age. This is confirmed by research by other authors (13, 24). The positive impact of competitive and game methods in the period of pedagogical research should be noted. These methods increase the emotional background of the class and actively enable each schoolchild to develop individually (25).

4-1. Study Limitations

One limitation of this study is the limited number of participants. This is due to the number of healthy children who can engage in physical education at school without restrictions.

5- CONCLUSION

Based on the results of the study, the following conclusion can be made. If exercise Classics are performed in every physical education lesson at school, the indicators will improve not only coordination abilities, but also the memory indicators of children. This research is new, relevant and promising for further studies of physical and mental relationships of schoolchildren of different ages.

6- CONFLICT OF INTEREST: None.

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