ijlpr 2023; doi 10.22376/ijlpr.2023.13.1.L104-108

International Journal of Life science and Pharma Research

ISSN 2250-0480

Research Article

Psychology for curing mental health

Development of Vestibular Stability of Children in Physical Education Lessons

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Abstract: The problem of the influence of physical activity of schoolchildren on their mental processes is promising and little studied. The aim is to determine the influence of physical activity in physical education lessons on the vestibular stability indicators of schoolchildren. The main objectives of the study are to study the problems of children's health, to determine the factors that improve it, to identify the role of physical culture for the health and development of schoolchildren. The study was conducted in a secondary school in Russia, it was attended by ninth graders aged 15-16 years in the number of 141 schoolchildren. The main research method was the "Turns on the gym bench", which determines the level of vestibular stability development of schoolchildren. The test was used before and after the physical education lesson 1 time per month for 5 months. Children who did not engage in physical education in the lesson were not able to significantly improve their performance in the test, which indicates a possible adaptation to the test after its first performance before the lesson. Children who were engaged in physical exercises were able to significantly increase the test results. The results obtained determine the effectiveness of the influence of a physical education lesson at school on the indicators of children's vestibular stability. This study will serve as an additional motivation for children to engage in physical culture, since the impact of physical exercises has a positive effect not only on the development of physical qualities, but also on the vestibular stability of schoolchildren.

Keywords: Health, Mental Processes, Physical Culture, Physical Exercises, Students.

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Received On 19 October, 2022

Revised On 11 November, 2022

Accepted On 18 November, 2022

Published On 2 January, 2023

Funding This research did not receive any specific grant from any funding agencies in the public, commercial or not for profit sectors.

Citation Georgiy Polevoy , Development of Vestibular Stability of Children in Physical Education Lessons.(2023).Int. J. Life Sci. Pharma Res.13(1), L104-108 http://dx.doi.org/10.22376/ijlpr.2023.13.1.L104-108

1. INTRODUCTION

The topic of children's health and development is always relevant.[1-4] From early childhood and throughout life, people try to make their health stable, stable to the effects of adverse factors. Of course, this is achieved in many ways. For example, there is such a thing as a healthy lifestyle. It includes such components as:

1. Physical activity;
2. Proper nutrition;
3. Healthy sleep;
4. Giving up bad habits;
5. Some other factors.

Such a classification is offered by a fairly large number of studies. At the same time, the percentage of components practically does not change. However, none of the researchers ranked physical activity last in importance, noting its value for human development and health.[5-9] Unfortunately, today, children who enroll in colleges and universities after school increasingly have a preparatory or special health group. Children with the main health group, which allows them to engage in physical culture and sports without restrictions, began to meet less frequently.[10-11] At the same time, these are not only congenital problems and pathologies, most of them are acquired health problems, such as obesity, hypertension, that is, for the most part, a consequence of a sedentary lifestyle.[12-13] At the same time, a sedentary lifestyle since childhood leads to an increase in chronic diseases, a decrease in functional and physical fitness.[14-16] Thus, it is important to form children's desire and needs for physical culture and sports from childhood.[17] One of the most important tasks of physical culture is the development of motor skills[18-20] and increasing the level of physical fitness.[21-22] Physical education lessons at school are indispensable tools for the implementation of such a component of a healthy lifestyle as physical activity. A lesson at school is mandatory to attend and is conducted under the influence and supervision of a teacher.[23] A fairly large number of studies have been presented on the benefits of physical education lessons at school for the development of physical qualities (strength, speed, motor abilities, endurance, flexibility, and others). The authors note the effectiveness of a particular methodology, school curriculum for the development of physical qualities of schoolchildren of different genders and ages.[24-27] Some studies mention that physical activity has a positive effect not only on the development of physical qualities, but also on the development of cognitive and some mental processes.[28-31] It is known that physical exercises have proved to be an effective means for developing the creative abilities of schoolchildren.[32-33] The aim of study is to determine the influence of physical activity in physical education lessons on the vestibular stability indicators of schoolchildren. Vestibular stability is a person's capabilities that determine his readiness for optimal control and adjustment of motor action.[34]

1.1 The Main Objectives of the Study

1. To study the problems of children's health;
2. To determine the factors that improve it;
3. To identify the role of physical culture for the health and development of schoolchildren.
4. To investigate how the physical activity of children in physical education classes at school affects the indicators of their vestibular stability

1.2 Research Hypothesis

It is assumed that the motor activity of schoolchildren at a physical education lesson has a positive effect on the indicators of schoolchildren's vestibular stability.

2. MATERIAL AND METHODS

Participants

Inclusion criteria

Age - 15-16 years, gender - boys and girls.

2.1 Exclusion criteria

Children with health disorders, schoolchildren who do not have a basic health group and are exempt from physical education lessons at school. The study involved ninth grade students of secondary school number 60 (Kirov, Russia), aged 15-16 years. A total of 141 students took part in the pedagogical experiment. The 9th grade students are graduates of the school and treated the study with maximum responsibility, all exercises and tests were performed consciously. The pedagogical study involved children regardless of gender and age, weight and height and level of physical fitness. Children with basic and preparatory health groups were admitted to physical education classes by the doctor. All procedures met the ethical standards of the 1964 Declaration of Helsinki. Informed consent was obtained from all parents of the children included in the study. This study was approved by Research Ethics Committee, Vyatka State University. From the record of the meeting of the ethics committee on January 17, 2022 №1.

2.2 Procedure

The study was conducted for five months (January – May 2022). According to the schedule, physical education classes in the ninth grade were held 2 times a week for 45 minutes according to the physical education curriculum at the school for children of grades 1-11.[20] The current study did not take into account the favorable period and the natural increase in vestibular stability indicators in children. Differentiation of children into control and experimental groups was not provided. In this study, the main fact was the active physical participation or non-participation of the student in the process of physical education. Therefore, only the impact of physical activity of schoolchildren on their vestibular stability indicators was considered.All physical exercises were performed under the supervision of a physical education teacher. Before the lesson, the children performed the "Turns on the gym bench".[35] Procedure: Students must perform turns on the narrow part of the bench. When calculating, half a turn around its axis is taken into account. If the student fell, then he comes back and continues the exercise. The number of turns is summed up before and after the fall. Test exercise lasts 15 seconds. Before the start of the physical education lesson, testing was conducted in order to assess the current level of vestibular stability. After the end of the physical education lesson, the children performed this test again. After the end of the physical education lesson, testing showed the effect of children's active activity on vestibular stability indicators. It should be noted that the time interval (before and after the lesson) was not chosen by chance, since during the day or

week students carry out other activities that could affect the test results. For the accuracy of the result, the procedure was performed once in the middle of each month from January to May. All students took the test, including those who were not allowed to attend classes for one reason or another. But, as a rule, such children are simply present at the lesson, without active participation in it. Children who were not present at school on the day of the test were not included in the results.

3. STATISTICAL ANALYSIS

All the indicators of schoolchildren according to the test results were entered in an Excel spreadsheet. The average value of the indicators before and after the study and their percentage increase were determined, the reliability of the increase in indicators was determined by the Student's T-criterion ($p>0.05$).

4. RESULTS

Before the beginning of the physical education lesson and after its completion, all children passed the control test: "Turns on the gym bench". The test results are presented in Table 1.

Table 1. "Turns on the gym bench" results

Month	Physical education lesson	Number of children in lessons	Test before the lesson	Test after the lesson	%	p
January	engaged	**361**	**7.1**	**8.2**	**15.2%**	**<0.05**
	not engaged	34	8.1	8.3	2.3%	>0.05
February	engaged	**348**	**7.4**	**8.6**	**16.4%**	**<0.05**
	not engaged	41	7.6	7.8	2.8%	>0.05
March	engaged	**372**	**7.5**	**8.8**	**17.1%**	**<0.05**
	not engaged	33	7.4	7.5	1.9%	>0.05
April	engaged	**368**	**7.8**	**9.1**	**16.1%**	**<0.05**
	not engaged	29	7.9	8.2	3.1%	>0.05
May	engaged	**350**	**7.9**	**9.1**	**14.9%**	**<0.05**
	not engaged	42	7.5	7.7	2.8%	>0.05

Table 1 shows that children who did not engaged physical education, but completed the test, were able to only slightly improve their performance. This trend is observed every month. On average, the indicators improved from 1.9% to 3.1% (p>0.05).

The situation is different for children who were engaged in a physical education lesson. In each of the five months, the test indicators improved significantly, on average from 14.9% to 17.1% ($p<0.05$). Such results of the pedagogical experiment indicate the effectiveness of the influence of physical exercises and physical education lessons on the vestibular stability of schoolchildren

5. DISCUSSION

The aim of this study was to determine the effect of physical activity of schoolchildren on their vestibular stability indicators. At the beginning of the study, the problem of the health of students who study at school was studied. It was revealed that children have a fairly large number of diseases, while the main problem is a sedentary lifestyle, which leads to obesity and a number of other diseases. It is also determined that the lesson is one of the main tools of the teacher in the physical activity of schoolchildren. A review of the literature on the problem shows the relevance of the issue of the health and development of children.[1,3,36] Physical education has a great importance on the sedentary lifestyle of children.[8,9,37,38] Despite the fact that a fairly large number of studies prove the effectiveness of physical education lessons for the health of children and the development of their physical qualities,[24,26,27] there are studies that speak about the impact of physical exercise on development of cognitive processes,[28,30,31] and creative abilities of children.[32-34] However, it is also important that physical exercises have an impact on some mental processes, which is confirmed by some studies conducted. [39,40] In this study, for the first time, the influence of a physical education lesson at school on the memory indicators of schoolchildren is investigated. During the study period, children's memory indicators improved in each month, regardless of the goals and objectives of a particular lesson, whether it was athletics, endurance running, forward somersault or the use of outdoor games, or sports games as a means of physical culture in the classroom. A physical education lesson is the main and mandatory form of physical education at school. At the lesson, students receive the necessary minimum of knowledge, skills, and skills provided for in the school curriculum, increase their level of physical development. Each lesson solves educational, educational and health-improving tasks, forms students' interest in physical exercises, encourages them to be active. The main task is to ensure that children, starting from very early childhood, grow up healthy, strong, harmoniously developed, so that they study well. Physical culture plays a major role in improving a person, strengthening his health. Physical education in all its diversity influences the mental performance of younger schoolchildren. Based on the tasks of educating the creatively thinking younger generation, the problem of the relationship between mental and physical activity is especially relevant at the present time. For normal mental performance of the body, an optimal ratio of the processes of excitation and inhibition in the cerebral cortex is necessary. A limited flow of information enters the brain from a poorly functioning muscular system, and this leads to a decrease in the excitatory process and inhibition in the cerebral cortex. There are conditions for increasing fatigue, reducing efficiency. The main conclusion of this study is that children who were engaged in physical education were able to significantly improve their vestibular stability indicators. Of course, this indicates the effectiveness of the influence of a variety of physical exercises on vestibular stability indicators. Children who did not do physical exercises in the physical education lesson were not able to significantly improve their performance in the "Turns on the gym bench" test. This can probably be explained by the fact that performing the test before the start of the lesson served as some kind of training

or adaptation to it, since all the children performed it again after the physical education lesson. This trend was observed throughout the study. In this study, for the first time, the influence of a physical education lesson at school on vestibular stability indicators is investigated. During the study period, vestibular stability indicators improved in each month, regardless of the goals and objectives of a particular lesson, whether it was athletics, endurance running, forward somersault or the use of outdoor games, or sports games as a means of physical culture in the lesson. The results obtained will serve as additional motivation for physical education classes, since in the process of motor activity not only physical qualities develop, but also the vestibular stability of children. This study is relevant and promising for further study of the health and physical activity of children at school, as well as its impact on other processes.

6. CONCLUSION

This study examines the problem of children's health, their sedentary lifestyle. The role of the physical education lesson for the health and development of schoolchildren is determined. As a result of the study, the effectiveness of the influence of physical activity of schoolchildren in the physical education lesson on the vestibular stability indicators of schoolchildren has been proved. The results of the study are of great importance, as they will serve as further motivation for children to perform physical exercises in physical education lessons. This is of great importance because children of high school age are preparing to enter grades 10-11 or college, so it is important to look for additional opportunities for the development of cognitive and mental processes. In the future, research should focus on the impact of physical activity and physical activity in physical education lessons not only on the physical qualities of schoolchildren, but also on different mental processes of children of different ages.

7. CONFLICT OF INTEREST

Conflict of interest declared none.

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