

The Study Of The Influence Of The Volume Of Motor Activity On The Indicators Of Physical And Mental Development And On The Functional State Of The Body Of Children And Adolescents

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Abstract

Movement plays an indispensable role in every person's life. Through movement, the child learns about the world, forms perception, sensations, emotional and volitional sphere. Since it is at a young age that the development of the most important functions of the body's systems takes place, motor activity plays a fundamental role in this period. The purpose of this study was to identify the multifunctional importance of movement in all areas of children's development, to demonstrate the effect of physical activity on the morphofunctional parameters of the child's body. The study involved 122 schoolchildren aged 7 to 9 years (average age -7.6 ± 0.3 years) In the structure of the surveyed girls – 63 (51.6%), boys - 59 __ (respectively, 48.3%). Based on the results of our study, the following conclusions can be formulated: morphofunctional indicators such as height, weight and Quetelet index are more determined by genetic material than by the level of motor volume, physical education is a favorable context for the formation of healthy physical culture and sports habits, and a high volume of motor activity may be the key to explaining the level of physical activity physical fitness of children.

Keywords: children, motor activity, sports, physical performance.

1. Introduction

The decrease in physical activity in modern life, the insufficient development of mass forms of physical culture among the population, the lack of time for physical culture and sports, the widespread use of cars, computers, television and video, all this is the reason for a sedentary lifestyle. Lack of physical activity is increasingly becoming a serious public health problem in many industrialized countries. Due to technological progress and the low need for physical activity, people in modern society, both young people and adults, have become accustomed to a more sedentary lifestyle. The topic of reducing physical activity is becoming increasingly relevant every year. This also applies to children of primary school age. The environment for modern children has changed. Exciting active games have been replaced by no less exciting ones - computer games. There have been significant changes in the structure of their free time in the preferences and interests of preschoolers and younger schoolchildren [1,2,3].

Thus, an increasing number of children are in conditions of physical inactivity. The biological need for children's movement in the modern educational space of Russia is satisfied only by 60%. Similar trends are observed in other countries[4,5].

Regular physical activity strengthens health and improves the physical condition of the cardiorespiratory and musculoskeletal systems, cognitive performance, helps reduce stress levels among adolescents. [6,7].

International studies show that the morbidity structure of schoolchildren during school increases the degree of spread of disorders of the musculoskeletal system. It is believed that moderate physical activity in adolescence allows you to maintain and strengthen the health of the musculoskeletal system and muscle fitness. Innovative approaches to increasing physical activity in the school environment based on scientific research are currently being developed and tested. However, the research data, which are the basis for the introduction of school physical activity programs, are mainly limited to children of younger adolescence. At the same time, such studies do not take into account the possible negative impact of physical activity on the condition of the musculoskeletal system of adolescents -the occurrence of pain, discomfort, and injuries. [8,9,10,11,12].

Today, there are studies on the problems associated with excessive physical activity (professional sports) in adolescence or improper organization of sports, showing that this can lead to injuries, overwork, and psycho-emotional discomfort. At the same time, there is insufficient data that show the effect of physical activity on the functional state of the nervous system using objective methods. [13,14].

Thus, it is necessary to conduct studies that show the influence of factors related to physical activity on the occurrence of symptoms of disorders of the musculoskeletal system of adolescents, indicators of physical fitness, functional indicators of the nervous system and the consequences of interventions, taking into account the influence of concomitant factors. [15,16].

Studies confirm that insufficient motor activity negatively affects many functions of a growing organism and can serve as a pathogenetic factor in the occurrence and progression of a number of diseases. Movement plays an indispensable role in every person's life. Through movement, the child learns about the world, forms perception, sensations, emotional and volitional sphere. Since it is at a young age that the development of the most important functions of the body's systems takes place, motor activity plays a fundamental role in this period. [17,18].

2. Objectives

The purpose of this study was to identify the multifunctional importance of movement in all areas of children's development, to demonstrate the effect of physical activity on the morphofunctional parameters of the child's body.

3. Methods

The study involved 122 schoolchildren aged 7 to 9 years (average age -7.6 ± 0.3 years) In the structure of the surveyed girls – 63 (51.6%), boys -59 __ (48.3%, respectively).

The research data obtained by us were processed using the computer program "BioStat" (version 4.03) using descriptive statistics, one-factor analysis of variance and the Student's criterion for multiple comparisons with the Bonferroni correction. The analysis included the determination of arithmetic averages and correlation coefficients.

To assess the motor activity of children, the generally accepted method of pedometry was used, developed in the studies of L.G. Suzarev, N.G. Lebedev, M.A. Runova. He made it possible to derive quantitative values of the main locomotions in children. In order to increase the reliability of the results, data on the volume of motor activity was collected during the week. After comparing the results with the range of levels of the main indicators of motor activity, all the subjects were divided into two groups: children with low physical activity (the average number of steps was 6984.31); children with high physical activity (the average number of steps is 13893.27).

Table 1.

Groups	Number of children (n)	Motor activity (number of locomotions)
Children with low motor activity	60	6984,31±182,4
Children with high motor activity	62	13893,27±452,3

The assessment of morphofunctional indicators of younger schoolchildren was carried out taking into account the following indicators: height, body weight, Quetelet index, vital index, strength index.

The determination of physical fitness was carried out using the physical fitness test "Presidential Fitness Test". The Presidential Fitness Test was developed in the 1950s by the Youth Fitness Program of the Presidential Council on Youth Fitness, which was created by President Dwight D. Eisenhower[6], The original test consists of 6 parts:pull-ups (for boys), modified pull-ups or hand-hangings (for girls), Squats, Shuttle run, Long jump from a place, 30-meter run, push-ups lying down.

In the study of children's physical performance, the Roufier test was used, as well as the Harvard step test. The pulse rate change during the recovery period was determined, and based on these results, the interpretation of the data obtained was performed.

Judgments about mental development, namely the assessment of indicators such as speed, accuracy and productivity of attention, as well as mental performance, were made based on the use of the Bourdon test in the modification of the "Landolt Ring".

4. Results

The comparison of the obtained indicators between groups with high and low physical activity allowed us to register the influence of the volume of motor activity on the indicators of physical and mental development of schoolchildren.

In the study of morphofunctional features, significant differences were observed in indicators of vital signs, vital index, and strength index ($P < 0.05$). However, there were no differences in height, weight and Quetelet index ($P > 0.05$).

Table 2.

Groups	n	Indicators of physical fitness of younger students					
		Height(cm)	Weight (kg)	Quetelet Index (standard units)	YELLOW	Life index	Power Index
Children with low motor activity	60	137,8±3,3	30,6±1,09	16,3±4,4	1386±42	47,4±1,38	17,5±1,17
Children with high motor activity	62	138,4±3,9	29,25±0,93	15,8±4,3	1478±48	50,7±1,51	19,91±1,32

The difference in the volume of motor movements led to a discrepancy in the indicators of physical fitness ($P < 0.05$), which is demonstrated in Table 2.

Table 3.

Groups	n	Indicators of physical performance.				
		pull-ups from hanging lying on a low crossbar number	Shuttle run of seconds	Long jump from a place-cm	30-meter race-sec	push-ups in the prone position. quantity
Children with low motor activity	60	7,7±1,6	10,8±0,95	98±11,3	8,8±0,74	9,3±1,88
Children with high motor activity	62	9,4±1,4	10,1±0,78	103±9,5	8,2±0,72	9,3±1,37

The difference in the indicators of both groups is also observed according to the Ruffier test and the Harvard step test, which confirms the positive effect of high physical activity on the physical performance of the child.

Groups	n	Indicators of physical performance.	
		The Ruffier Test	The Harvard Step Test
Children with low motor activity	60	8,74±0,79	52,5±1,87
Children with high motor activity	62	6,12±0,54	57,1±1,39

The Bourdon test did not reveal significant differences.

Groups	n	Assessment of mental performance indicators
		Landolt rings (conl. Ed)
Children with low motor activity	60	0,56 ±0,03
Children with high motor activity	62	0,54±0,04

5. Discussion

Based on this, it can be assumed that

1. Morphofunctional indicators such as height, weight and Quetelet index are more determined by genetic material than by the level of motor volume. The difference in the indicators of vital signs, vital index, and strength index indicates that children with high physical activity have higher results in the development and functioning of the cardiovascular and respiratory systems.

2. Physical education is a favorable context for the formation of healthy physical culture and sports habits, and a high volume of motor activity can be the key to explaining the level of physical fitness of physical performance of children.

3. The absence of significant differences in the Bourdon test is more likely due to the fact that children with low physical activity are more engaged in educational activities and successfully completed the task.

Physical activity plays an important role in the lives of children and adolescents, as it positively affects many aspects of physical and mental health, fundamentally contributing to positive social, emotional and cognitive development. A sufficient amount of motor activity will favorably affect the growth of physical fitness, working capacity, and morphofunctional indicators of the child.

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