THE DYNAMICS OF INDICATORS OF AGILITY DEVELOPMENT AT 4-6 YEAR OLD CHILDREN UNDER THE INFLUENCE OF SPECIAL EXERCISES AIMED AT IMPROVING THE FUNCTIONAL STATE OF SENSORY SYSTEMS

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Abstract. Indicators of agility development at 5-6 year old children and their changes after the introduction of exercises into the educational process aimed at improving the functions of sensory systems are given in the article.

Keywords: physical qualities, physical education, pre-school children, analyzers.

Introduction. Recently, the considerable attention has been paid to the child's physical development as a basis for the formation of a diverse harmonious personality in science and practice of study. The spiritual growth and development of mental functions are closely related to motor experience that pre-school children receive in the first years of their lives. So, sufficient motor activity and observance of the day regime contributes to the ration and improvement of the central nervous, cardiovascular, respiratory and motor systems, while the long-term hypo-dynamics regime becomes a satellite of numerous chronic diseases and as a consequence of general functional weakness [1, 3, 6].

Physical education provides a wide range of opportunities for improving the motor and intellectual activity of pre-school children and the development of physical qualities in this sense is a priority [1].

The study of domestic and foreign literature defines agility as a combination of two main components, firstly, the ability to master new motor actions quickly (the ability to learn quickly) and secondly, the ability to rebuild motor activities quickly

and more coordinated in conditions of sudden change of situation. The second ability is sometimes considered to be the ability for agile adaptation that manifests itself in relatively standard and unexpected situations that change rapidly [2, 4, 8].

The results of pedagogical work show that the solution of motor tasks and the agility development in the middle and senior pre-school age depend both on the maturity degree of the central nervous system, and on the preparedness of the motor system, the general level of physical preparation. The acquisition of new movements takes place on the basis of already existing coordination links. The more motor skills a child has, the easier she/he will be to perceive a new motor experience. In this sense, the acquisition of certain types of coordination in pre-school age and the foundation of methods of its improvement are brought to the fore.

A. S. Rovny, 2001; L. Ye. Shesterova, I. A. Kuzmenko, I. P. Maslyak, 2017; O. K. Moiseenko, 2019 but etc. studied the impact of sensory stress on physical preparation of different populations. The authors point to a relatively high degree of interaction between the development of physical qualities and individual sensory systems in their works. However, the works which are dedicated to the impact of special exercises aimed at the development of sensory systems on indicators of agility development at pre-school children is not enough in the accessible literature.

Connection of the work with scientific programs, plans, themes. The research was conducted in accordance with the Thematic Plan of the research work of Kharkiv state academy of physical culture under the scientific theme “Improvement of the physical education process of different segments of the population” for 2020-2026 (the state registration № 0120U101110).

The purpose of the research is to determine changes in indicators of agility development at 4-6 year old children under the influence of special exercises aimed at improving the functions of sensory systems.

Research tasks:

1. To study indicators of agility development at 4-6 year old children.

2. To determine changes in the investigated indicators under the influence of special exercises aimed at improving the functions of sensory systems.

Material and methods of the research. The research was carried out on the basis of the preschool institution № 393 in Kharkov for a period of 1 calendar year. They were attended by 106 pre-school children of 4-6 years of age, who were divided into two main groups – I group (54 children) – children aged 4-5; II group (52 children) – children aged 5-6. All the children who took part in the experiment were almost healthy and under the supervision of a children's doctor a pediatrician.

The primary testing of agility development was carried out at the first stage. As a result of this testing, the identity of experimental and main groups was established, which proved the validity of the objective conduct of the experiment.

At the second stage the repeated testing was carried out for the purpose of taking measures to change the parameters studied after the introduction into the physical education process of pre-school children of the developed by system of special exercises aimed at activating the function of sensory systems.

The following methods were used to solve the tasks: theoretical analysis and generalization of scientific methodological literature, pedagogical testing, pedagogical experiment, methods of mathematical statistics.

The motor tasks proposed by E. S. Vilchkovskyi, O.I. Kurok [1], L. P. Serhiienko [7] were used to determine the level of agility development at children of pre-school age.

Results of the research and their discussions. The results of testing at 4 - 6 year old pre-school children of main groups are obtained before and after the pedagogical experiment, presented in Table 1.

The analysis of average indicators of agility development after the results: determination of accuracy of object hit to target, obstacle course, static balance deduction, ball tossing and catching established their improvement after the pedagogical experiment and these changes were significant and statistically reliable both at boys and at girls of both age groups ($p<0,05$) (Table 1).

Table 1

Indicators of the level of agility development at 4-6 year old pre-school children before and after the experiment

groups	I		II	
	Indicators $\overline{X} \pm m$			
	Boys	Girls	Boys	Girls
	Agility indicators			
n	31	23	30	22
Determination of accuracy of object hit to target (points)				
before the experiment	5,23±0,28	4,61±0,31	8,57±0,26	8,59±0,29
after the experiment	5,85±0,11	5,54±0,21	9,64±0,45	9,45±0,12
t	2,06	2,48	2,06	2,74
p	<0,05	<0,05	<0,05	<0,01
Obstacle course (s)				
before the experiment	19,50±0,44	19,64±0,32	18,68±0,39	18,96±0,15
after the experiment	18,24±0,12	18,49±0,22	16,67±0,12	17,45±0,10
t	2,76	2,96	4,93	4,03
p	<0,05	<0,05	<0,001	<0,001
Static balance deduction (s)				
before the experiment	9,06±0,46	8,83±0,34	10,68±0,39	12,77±0,62
after the experiment	10,35±0,39	9,74±0,21	11,91±0,55	14,32±0,29
t	2,03	2,28	2,04	2,26
p	<0,05	<0,05	<0,05	<0,05
Ball tossing and catching (number of times)				
before the experiment	20,87±0,64	19,13±0,35	24,90±1,05	22,14±0,92
after the experiment	23,36±0,40	21,44±1,16	28,26±1,00	25,28±0,99
t	3,3	2,03	2,32	2,32
p	<0,05	<0,05	<0,05	<0,05

So, the best result in testing the accuracy of object hit to target, on average, at senior pre-school children, boys – 14 points, girls – 12 points; at pre-school children of middle age these data were at boys – 12 points, girls – 11points. There was a slight prevalence of indicators of boys over such girls in both age groups. Similar differences were recorded after the pedagogical experiment.

While the worst mark was set before the experiment, both middle and senior pre-school children. These indicators were – 6 points at 5-6 year old pre-school children both at boys and at girls; the results of test were 5 points at boys and 4 points at girls in middle-aged pre-school children. It should be noted that the results of girls were slightly worse than indicators of boys.

When comparing the results of tennis ball throws with the standards presented by E. S. Vilchkovskyi, O. I. Kurok [1], it was found that indicators of 4-5 year old pre-school children meet the low level; this indicator was set at the average level in senior groups. Changes in the level of preparedness in the analysis of indicators in both age groups weren't established after the pedagogical experiment.

It should be noted that the system of exercises, which was a part of the pedagogical experiment and aimed at improving the functional state of the analyzers, included exercises on the development of orientation functions in space, in particular exercises on the improvement of visual and vestibular systems, which indirectly affected the obtained results of agility.

Obstacle course (s) took place by the normative criteria proposed by L. P. Serhiienko [7].

The best indicator of this test exercise was set by the boy of the senior age group and it was 13,6 s, in the middle age group this indicator was recorded at 14,9 s and also by the boy. Both best attempts were made after the pedagogical experiment.

The worst performance indicators of this exercise were established by girls, so in the middle age segment these data amounted to 22,1 s, in the senior – 19,6 s.

Comparing the indicators of children of middle and senior pre-school age obtained before and after the experiment with the standards presented by L.P. Serhiienko [7], it was found that they meet the score 1 point both before and after the experiment.

The exercise performance on static balance deduction established the prevalence of senior pre-school children's data, over such average, and indicators of boys in middle groups were better than indicators of girls. Senior pre-school children had a reverse trend.

When comparing the results of static balance deduction with the estimated criteria, it was found that indicators of 4-5 year old pre-school children meet the average level, in the senior groups this indicator was set at the level above the average. After the pedagogical experiment, the results of both age groups improved by the same level.

It should be noted that the function of maintaining a stable pose is directly under the influence of nerve pulses, which come from vestibular and visual sensory systems, because specially directed exercises, which were performed by pre-school children significantly improved the indicators of final testing.

The analysis of average indicators of exercise performance ball tossing and catching established the prevalence of results of girls over data of boys, and it was observed both in middle and in senior pre-school age. This tendency was observed both in previous testing and re-testing.

The comparison of the obtained indicators with the norms [1] found that the obtained indicators meet the average level.

Conclusions:

1. As a result of the research, on average, it was established the "average" level of agility development at pre-school children.

2. We offered the system of special exercises aimed at improving the functional state of sensory systems positively affected the indicators of agility at pre-school children of middle and senior pre-school age. All the studied indicators improved, but the assessment by the normative criteria didn’t show this in any way.

The further research prospects in this direction are the relationship between sensory functions and physical preparation indicators of pre-school children.

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