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Age dynamics of the level of development of static equilibrium in middle-class students with visual impairments

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Purpose: *to study the age-related dynamics of indicators of the ability to maintain static equilibrium in middle-class students with visual impairments.*

Material & Methods: *static equilibrium indices were determined by the method of E. Ya. Bondarevsky. The study was attended by middle school students with impaired view of the communal institution "Kharkiv Special Boarding School I–III Steps 12" Kharkiv Regional Council.*

Results: *peculiarities of the dynamics of static equilibrium in children of secondary school age with visual impairment, depending on age and sex.*

Conclusions: *it was revealed that the indices of static equilibrium on one leg, both with the eyes open and with the eyes closed, vary with age in different directions with age. The girls observed mostly the best indicators of static balance with their eyes open, the boys – with closed.*

Keywords: *lack of vision, age dynamics, static equilibrium, content of a sustainable situation, middle-class pupils.*

Introduction

The nature of human motor activity is largely determined by the ability to maintain and maintain equilibrium. This ensures the normal functioning of all physiological systems of the body, the optimal amplitude of movements, the rational distribution of muscular effort, which leads to energy efficiency and increased efficiency of motor actions.

Static equilibrium manifests itself with prolonged preservation of certain postures by a person [1; 10]. The basis of spatial orientation and maintaining the equilibrium is static sensitivity [4].

Static sensations reflect the position of the body in space. When you change the posture in the receptors located in the vestibular apparatus of the inner ear, muscles, joints, tendons, skin of the feet, and eyes, there is an excitation – nerve impulses that flow along the leading nerve fibers into the brain, where they cause a sense of static. Static sensations contribute to balancing the position of the body in space, taking a pose when performing work operations with auditory and visual spatial differences. Static sensation is individual, gives in to training and changes with age. The development of visual and auditory sensitivity contributes to its formation [4].

Coordination of the vertical position of the body, provided by the ability to maintain equilibrium, is an indicator of a person's functional state, his health [25].

The ability to maintain static equilibrium is provided by the joint functioning of the motor, auditory, visual, vestibular and tactile analyzers [1; 5; 11; 18; 21].

Visual impairment leads to a decrease in a person's ability to maintain a balance [1; 11; 18], which negatively affects its vital activity, since the performance of even relatively simple movements requires a sufficiently high level of development of the equilibrium organs [9].

The static sensation in persons with visual impairments is corrected by the participation of auditory and proprioceptive analyzers, muscular sensitivity of the hands, feet and the reception of the feet [4].

The problems of studying the age dynamics of the indices of the ability to maintain static equilibrium in different contingents were handled by L. E. Shesterova [22], T. Bala [2], I. A. Kuzmenko [6–8].

B. V. Sermeev [16], L. V. Kharchenko [20], I. Yu. Gorskaya [3], L.O. Ryadova [12–15] and others studied the problem of developing coordination abilities in children of secondary school age with visual impairments. However, the age-specific features of the development of the ability to maintain static equilibrium in middle-class students have not been the subject of a special study, which requires further scientific research.

Relationship of research with scientific programs, plans, themes. The study was carried out in accordance with the thematic plan of the research work of the Kharkiv State Academy of Physical Culture for 2013–2015. On the topic "Theoretical and Applied Basis for Building Monitoring of Physical Development, Physical Preparedness and Physical Condition of Different Populations" and for 2016–2020. On the topic "Improving the process of physical education in educational institutions of various profiles" (State Registration No. 0115U006754).

Purpose of the study: was to investigate the age features of the development of the ability to maintain static equilibrium in middle-class students with visual impairments.

Material and Methods of the research

The study was conducted on the basis of the communal institution "Kharkiv Special Boarding School No. 12" Kharkov Regional Council for children with visual impairments. 117 middle-class students took part in it.

To achieve the research goal, the following methods were used: theoretical analysis and generalization of scientific and methodological literature, testing of the ability to maintain static equilibrium.

Results of the research and their discussion

Considering the indicators of the ability to holding n static equilibrium among students of middle classes with visual impairments, which were evaluated according to the results of the content of a stable position on one leg with open and closed eyes, it was found that they are the best of the 9th grade girls and 8 classes of both exercises.

We note that the results of the content of a stable position with closed eyes among schoolchildren of the 7th and 10th grades were almost the same level.

Analysis of the ability to maintain static balance with open eyes in children in the age aspect indicates that with age, they vary in different directions. The most significant improvement in the results is the holding of a stable position on one leg in students from the 7th to the 9th grade, and their significant deterioration from the 9th to the 10th grade (Figure 1). Differences in indicators statistically significant ($p<0,05$).

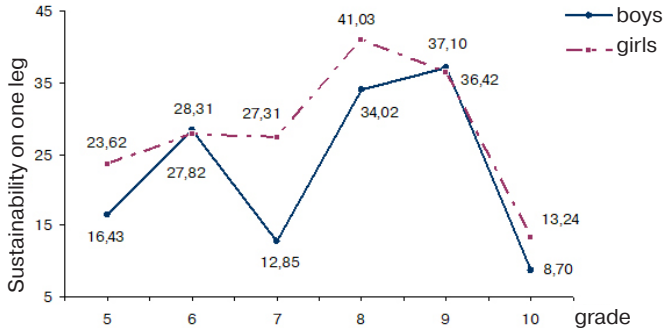

Fig. 1. Age dynamics of indicators of development of the ability to maintain static balance with open eyes in children of secondary school age with visual impairments

Comparing the results of holding a stable position on one leg with the eyes open in girls in the age aspect, we conclude that with age, they change wavy. The lowest indices of the ability to maintain static equilibrium are fixed in the pupils of the 10th grade. Differences in the results, in general, are significant ($p<0,05$). The exception is the indicators of schoolgirls of the 6th and 7th grades, where the authenticity of the differences is not observed ($p>0,05$).

The study of the indices of the ability to maintain static balance with closed eyes in children, depending on the age, showed a multidirectional change in them. The best results of the maintenance of a stable position on one leg were recorded in students of the 9th grade (Figure 2). Differences in indicators are mainly reliable ($p<0,05$), except for the results of pupils of the 5th and 6th, 7th grades, 6th and 7th grades, 8th and 9th grades, where the authenticity of the differences is absent ($p>0,05$).

Age dynamics of the results of the content of the situation stand on one leg with closed eyes in girls has a wavy character: from the 6th to the 8th grade there is an increase in the indices of the ability to maintain static equilibrium, and from the 8th to the 10th grade – their decrease Figure 2). The differences in the results are, in the main, reliable ($p<0,05$), with the exception of those of the 8th and 9th grade pupils, where the authenticity of differences is not observed ($p>0,05$).

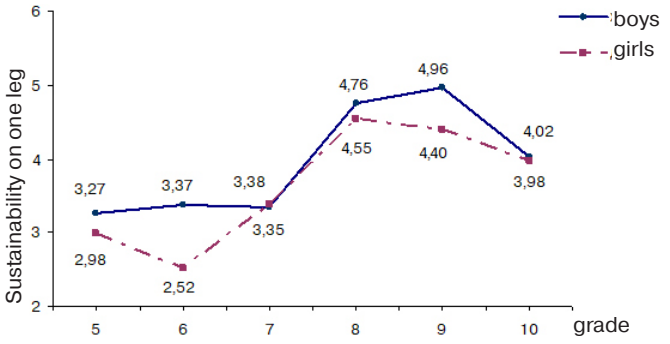

Fig. 2. Age dynamics of the indices of development of the ability to maintain static balance with closed eyes in children of secondary school age with visual impairments

In our opinion, a significant and sharp decrease in their level can be explained, on the one hand, by violations of the functions of the vestibular analyzer, which negatively affects the motor skills of children with visual impairment; with another – secondary deviations, such as a violation of posture in the frontal and sagittal planes.

A significant increase in the indices of the ability to maintain static equilibrium in schoolchildren of the 8th class can be associated with the preservation of a stable position due to the reflex muscle tension of synergists and adequate relaxation of the muscles of the antagonists, which contributes to a rapid reflex movement towards a stable support area.

Comparison of the indicators of the ability to maintain static equilibrium in the sexual aspect allowed to say that with the eyes open, they are mostly reliably ($p<0,05$) higher in girls, except for the results of schoolchildren of the 6th and 9th grade, where the authenticity there are no differences ($p>0,05$).

Analyzing the results of the content of a stable position on one leg with closed eyes in children of secondary school age with visual impairments on the basis of gender, it should be noted that in children they are basically better than girls, except for the indicators of 7th grade pupils. Differences are significant ($p<0,05$) in the results of schoolchildren of grades 5, 6, 9.

Figures 1 and 2 show that the indicators of the ability to maintain static balance in both children and girls with visual problems are more pronounced when performing an exercise with open eyes. This confirms the thoughts of VP Ermakov, A. A. Yakunin [4]; I. B. Soldatova, V. G. Gofman [17], T. Yu. Krutsevich [18], who believe that a person is able to maintain a more stable position with open eyes than with closed ones.

We believe that the differences in the indicators of the abil-

ity to maintain static equilibrium in schoolchildren are due to the fact that the reflexive inclusion of adaptive mechanisms, in particular, the vestibular analyzer, with the content of a stable position with the eyes open, comes faster in girls, with closed ones in children.

Conclusions

1. A sensitive period of development of the ability to maintain static equilibrium with both open and closed eyes in children of secondary school age with visual impairment is the age of 14–15 years for men and 13–14 years for girls. It should be noted that in healthy children the most favorable period of development of coordination abilities, in particular, the ability that was investigated, M. A. Fomin, Yu. N. Vavilov [19] consider the age of 7–10 years. So, in children with visual impairment, the sensitive period of development of static equilibrium comes later than those who see well.

2. Indicators of the ability to maintain static equilibrium with open and closed eyes, both in children and in girls of secondary school age with visual impairments, change with age, wavy.

3. In the course of the study it was revealed that the results of the maintenance of a stable position with the eyes open are mostly the best for girls, with closed ones for children.

Prospects for further research in this area are the study of the age-related dynamics of indicators of development of other types of coordination abilities among middle-school students with visual impairments.

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