

## ОЗДОРОВЧА ФІЗИЧНА КУЛЬТУРА

### IMPLEMENTATION OF THE ALGORITHM FOR CORRECTIVE AND PREVENTIVE MEASURES IN THE PROCESS OF ADAPTIVE PHYSICAL EDUCATION OF PUPILS WITH SPECIAL NEEDS

Svitlana Savliuk<sup>1</sup>, Vitalii Kashuba<sup>2</sup>, Viktoria Romanova<sup>3</sup>, Sergiy Afanasiev<sup>4</sup>, Nataliia Goncharova<sup>2</sup>, Igor Grygus<sup>5</sup>, Rafał Gotowski<sup>6</sup>, Ihor Vypasniak<sup>7</sup>, Andrii Panchuk<sup>1</sup>

<sup>1</sup>Rivne State University of Humanities

<sup>2</sup>National University of Ukraine on Physical Education and Sport

<sup>3</sup>Academician Stepan Demianchuk International University of Economics and Humanities

<sup>4</sup>Prydniprovsk State Academy of Physical Culture and Sport

<sup>5</sup>National University of Water and Environmental Engineering

<sup>6</sup>Nicolaus Copernicus University in Torun

<sup>7</sup>Vasyl Stefanyk Precarpathian National University

Corresponding Author: Rafał Gotowski, e-mail: [rgotowski@wp.pl](mailto:rgotowski@wp.pl)

Accepted for Publication: March 20, 2020

Published: March 25, 2020

DOI: 10.17309/tmfv.2020.1.01

---

#### Abstract

**Purpose.** The research has developed and substantiated the algorithm for implementation of corrective and preventive measures in the process of adaptive physical education of pupils with special needs (visually impaired children with postural disorders).

**Materials and methods.** Twenty-eight ten-year-old visually impaired children with postural impairments (scoliotic posture or round back) participated in the experiment. Theoretical analysis, synthesis and generalization of scientific literature, Internet resources, pedagogical experiment, visual posture screening (Bibyk, Kashuba, Nosova, 2012), photography, testing, methods of mathematical statistics.

**Results.** The developed algorithm of corrective and preventive measures corresponds to the aim, objectives, conditions, principles, forms, didactics, control measurements, and criteria of effectiveness. During the implementation of the algorithm for corrective and preventive measures in the process of adaptive physical education of visually impaired children with postural disorders in the experimental group, there was a statistically significant ( $p < 0.05$ ) improvement of the indicators of the posture bio-geometric profile and physical characteristics: strength endurance at significance level  $p < 0.05$  and vertical body strength at significance level  $p < 0.05$  and  $p < 0.01$ .

**Conclusions.** The results of the researches have confirmed the effectiveness of the developed algorithm for corrective and preventive measures, namely: improvement of the posture bio-geometric profile and increase in the level of physical qualities of visually impaired children with postural disorders. Quantitative changes at the level of  $p < 0.05$  and  $p < 0.01$  of the studied indicators, harmonious development of the individuals, and successful social adaptation in communication with healthy peers prove the effectiveness of the algorithm. At the end of the transformation experiment, based on the assessment of the posture bio-geometric profile, it was determined that ten-year-old visually impaired children with a scoliotic posture or round back improved their indicators from below-average to above-average level; strength endurance indicators from basic to intermediate and sufficient level of motor readiness; static equilibrium indicators from basic and low to medium and above-average level.

**Keywords:** correction, preventive measures, posture disorder, children, visual impairment, physical education.

---

## Introduction

As a reflection of the worldwide attention to people with disabilities, in the Global Disability Action Plan, it is imperative to promote effective disability prevention, restoration of work capacity and ensure equal and full participation of people with disabilities in social life. Visual impairment is among the disorders, which are especially dangerous in terms of creating the prerequisites for the occurrence of various negative consequences for the development of a personality (Pavlov, 1989; Mykhaylova, 2013; Rostomashvili, 2014). Based on the study of professional literature and own research, we have discovered a high level of frequency of posture functional disorders among visually impaired children of school age (Melentieva, 2004; Diachenko, 2010; Kashuba, & Yurchenko, 2013)

The problem of postural disorders of visually impaired children of younger school age has been in the focus of scientific interest since the end of the twentieth century. Thus, Pavlov (1989) conducted a study to determine postural disorders of low-sighted children of younger school age, and based on the observed deviations of the physiological bends of the spine, found the optimal exercise load for stretching and relaxing of different muscle groups. According to Sermeev (1983), the percentage of static-dynamic posture disorders among visually impaired children is 5–30% compared to their almost healthy peers. The research of Diachenko (2010), which proposed and tested the methodology for correction of postural disorders of younger pupils with impaired vision in the process of adaptive physical education, suggests higher indicators – 37%.

In the case of visually impaired children, functional disorders of the posture occur much more frequently compared to their almost healthy peers. The scientific research of Melentieva (2004) stated an increase in the percentage of postural disorders of low-sighted children at a younger school age. The study of Yurchenko (2013) suggested indicators of physical development, physical fitness, vertical stability of the body and walking kinematics for children of younger school age with impaired vision and differentiated various postural disorders. Additional forms of physical and recreational activity can improve the posture of visually impaired children in special boarding schools. These forms may facilitate the correction of movement disorders and successful social adaptation of children with visual impairment (Melentieva, 2004; Kashuba, & Yurchenko, 2013; Savliuk, 2017)

The analysis of scientific and methodological literature on the studied problem (Winnik, 2010; Demchuk, 2016; Nesterchuk, Grygus, Prusik, & Zukow, 2019) and practical experience of physical education in special educational institutions for visually impaired six-ten-year-old children gives grounds to argue that the issues of rational content of educational classes, development of means and methods of training in physical education lessons, in particular for correction and prevention of postural disorders of visually impaired children of younger school age, are not covered enough. These issues require scientific substantiation and development of an algorithm for corrective and preventive measures in the process of physical education of visually impaired children of younger school age with posture disorders.

The aim of the research is to scientifically substantiate the algorithm for implementation of corrective and preventive

measures in the process of adaptive physical education of visually impaired children of younger school age with postural disorders to ensure harmonious development and successful social adaptation in communication with healthy peers.

## Materials and methods

### *Sample and research methodology*

*Sample.* Given that in the course of the ascertainment experiment, the greatest number of posture functional disorders (scoliotic posture and round back), as well as disharmonious physical development were recorded among ten-year-old visually impaired children, the transformational pedagogical experiment involved twenty-eight ten-year-old visually impaired children (fourteen boys and fourteen girls) with scoliotic posture or round back.

*Research methodology.* The research was conducted in Klevan special boarding school of I-III degrees.

Express control of the posture bio-geometric profile of visually impaired children was performed using visual screening of the posture according to the methods of Howley and Don Franks, improved by Kashuba, Bibyk, and Nosova and adapted for visually impaired children. To evaluate the bio-geometric profile of the posture, we used the following indicators: for the sagittal plane – the position of the head and trunk with respect to the vertical axis, the presence of thoracic kyphosis and lumbar lordosis, abdomen shape, angle of the femur and lower leg; for the frontal plane – the location of the shoulders, lower corners of the blades and pelvic bones, triangles of the waist, the position of the feet (Nosova, 2008). We determined the posture bio-geometric profile taking into account 11 indicators: five in the front and six in the sagittal plane. The evaluation of each indicator was carried out using 1 to 3 grading scale by the method of comparing the individual record of posture with the graphical variants presented on the sample. A score of 1 was rated “unsatisfactory”, 2 points were “satisfactory”, 3 points were “good”. According to the number of scored points, the bio-geometric profile of the posture was defined as unsatisfactory – up to 11 points, below the average – 12–15 points; average – 16–20 points, higher than average – 21–29 points, good – 30–33 points (Savliuk, 2017). The method of photography was used to determine the type of posture of visually impaired children.

In the course of the study, we used pedagogical testing to determine the level of physical fitness of visually impaired children of younger school age. The tests were selected taking into account the motor capabilities of the surveyed contingent and the requirements of programs for visually impaired children of younger school age. Vertical stability of the body was determined using the method of Y. Bondarevskiy (Krutsevych, Bezverkhnya, & Vorobyov, 2011). Table 1 presents indicators of the physical qualities development of ten-year-old children with visual impairment (Sheremet, Nachinova, Arnautova, & Kolomyichenko, 2014).

According to the results of tests, based on the indicators of physical qualities development of ten-year-old children with visual impairment, we made a qualitative assessment of physical fitness at five levels, each of which corresponded to the following criteria: low – poor, below the average – unsatisfactory, average – satisfactory, higher than average – good, high – excellent (Krutsevych, et al., 2011).

**Table 1.** Assessment of physical qualities development of ten-year-old children with visual impairment

Indicators of the physical qualities development of ten-year-old children with visual impairment						
No.	Sex	Types of tests	Levels, standards			
			High	Sufficient	Medium	Basic
1.	M	Strength endurance, trunk lifting test (number)	32	28	23	18
	F		30	25	20	16
2.	M	One-leg stand (s)	35	20	8	2
	F		33	20	14	8

### Statistical Analysis

We used the mathematical statistics methods (descriptive statistics; Shapiro-Wilk test; Student's parametric test) to analyze sets of empirical data at different stages of the study; systematization of the material and initial mathematical processing were performed using MS Excel (Microsoft, USA), Statistica 8.0 (StatSoft, USA) software packages.

### Results

Based on the analysis of the scientific and methodological literature and the results of the ascertainment experiment (Winnik, 2010; Evseev, 2014; Kashuba, & Savliuk, 2017), the research has developed the algorithm for implementation of corrective and preventive measures in the process of physical education of low-sighted children of younger school age with postural disorders. The algorithm is aimed at harmonious development of personality, improvement of the posture bio-geometric profile and increase in the level of physical qualities of ten-year-old visually impaired children.

The tasks of the algorithm of corrective and preventive measures include harmonious development of personality; formation of correct posture, improvement of physical qualities of ten-year-old visually impaired children; development of knowledge and skills of a healthy lifestyle; development of the skills of independent exercising.

The main structural components of the algorithm are goal oriented aims and results; organization of the whole educational process (forms, methods, and means of teaching) in accordance with the educational goals; assessment of current results, correction of training aimed at achieving the set goals; determining the effectiveness of the algorithm (Sermeev, 1983; Evseev, 2014; Rostomashvili, 2014).

Corrective and preventive orientation of the algorithm was ensured by observing the following conditions: maximum possible conditions for each child to form a correct posture; integrated use of various forms of training in the process of physical education and preventive-corrective means of physical education (Kashuba, 2017; Savliuk, 2017).

The basis of the developed algorithm of corrective and preventive measures in the process of physical education of visually impaired children of younger school age with posture disorders were didactic and special principles (Kashuba, 2003, 2017; Savliuk, 2017).

The developed algorithm of corrective and preventive measures consisted of the following forms: extracurricular and regular classes (physical education lessons, medical physical education lessons, and individual classes that solved different goals with the help of different means of adaptive physical education) (Evseev, 2014; Kashuba, 2017; Savliuk, 2017).

The analysis of scientific and methodological literature and the results of the ascertainment experiment became the basis for the development of an algorithm of corrective and preventive measures, which includes two components – preventive and corrective, each of which was divided into three groups of physical education exercises, aimed at correction and prevention of musculoskeletal and vision functions. The preventive component (eight sets of different exercises) and the corrective component (nine sets of different exercises) were proposed for practical application during different parts of the classes. The recommended components of physical exercises were used at different stages of the implementation of the algorithm for corrective and preventive measures in the process of physical education of low-sighted children of younger school age with postural disorders.

The algorithm for corrective and preventive measures in the process of physical education of visually impaired children of younger school age with postural disorders includes two components:

I. The preventive component of the algorithm included three groups of physical education exercises: traditional physical education means (complexes of special physical exercises for the prevention of postural disorders; complexes of physical exercises for the prevention of resistance and spring properties of the foot); non-traditional means of physical education (special physical exercises according to Katsuzō Nishi system; special breathing exercises based on the yoga system using Katsuzō Nishi method; Tibetan health gymnastics); innovative means of physical education (a set of stretching physical exercises, physical exercises for the prevention of vision disorders for visually impaired children; exercises for the treatment and improvement of vision according to the method of Bates and Corbett).

II. The corrective component of the algorithm included a set of corrective physical exercises to form the correct posture; exercise complexes to strengthen the muscles that hold the arch of the foot; non-traditional means of physical education (special yoga physical exercises according to the method of Richard Hiltman; complexes of yoga physical exercises of Surya Namaskar; breathing exercises according to the method of Tolkachov); innovative physical training (Pilates exercises; physical exercises with yoga ball; exercises for correcting visual impairment; corrective exercises for eye muscles (according to the method of W. H. Bates and M. D. Corbett); complex ball exercises for the treatment of myopia.

The choice of techniques of the developed algorithm for corrective and preventive measures in the process of physical education of visually impaired children of younger school age implied an individual approach taking into account such features of visually impaired children as: the severity of

the basic disorder, presence or absence of concomitant and secondary disorders, age, physical development, preservation or damage of sensory systems, medical indications and contraindications, type of postural impairment.

During the implementation of the algorithm for corrective and preventive measures in the process of physical education of low-sighted children of younger school age, we used the following types of pedagogical control: preliminary, operative, current, and final.

The criteria for the effectiveness of the proposed algorithm were indicators of improvement of the posture bio-geometric profile, static balance, and endurance of ten-year-old visually impaired children.

### Analysis of the results

The main purpose of the transformation experiment was to establish the effectiveness of the implementation of the developed algorithm for corrective and preventive measures in the process of physical education of low-sighted children of younger school age with postural disorders. Considering the significant prevalence of postural impairments such as scoliotic posture and round back among ten-year-old visually impaired children, a comparative analysis of the posture bio-geometric profile of this contingent is presented before and after the implementation of the algorithm for corrective and preventive measures in the physical education of visually impaired children of younger school age.

As it was established during the performed calculations, the participants of the experiment showed statistically significant changes in all investigated parameters ( $p < 0.05$ ). The research has revealed positive changes in the posture bio-geometric profile of ten-year-old visually impaired children with scoliotic posture or round back.

The express control of the posture bio-geometric profile of ten-year-old visually impaired children included visual posture screening (Kashuba, Bibyk, Nosova) (Table 2). The main pedagogical experiment has demonstrated that the visually impaired ten-year-old boys and girls during the transformative experiment had a significant improvement in the investigated indicators of the posture bio-geometric profile, which, in our opinion, is associated with an increase in the volume of specific motor activity aimed at correction disorders of the musculoskeletal system.

The result of the implementation of the developed algorithm for corrective and preventive measures in the process of physical education of visually impaired children of younger school age with functional disorders of the musculoskeletal system was the improvement (according to visual screening) of the posture bio-geometric profile. At the beginning of the ascertainment experiment, visually

impaired boys with scoliotic posture received 13.2 points and a lower than average grade of the posture bio-geometric profile; at the end of the transformation experiment, they improved their score to 28.7 points and the grade was above average. At the beginning of the ascertainment experiment, visually impaired boys with a round back received 12.1 points and a lower than average grade of the posture bio-geometric profile; at the end of the transformation experiment, they improved their score to 27.5 points and the grade of the posture bio-geometric profile was above average.

Visually impaired girls with a scoliotic posture received 12.1 points at the beginning of the ascertainment experiment and a lower than average grade of the posture bio-geometric profile; at the end of the transformation experiment, they improved their score to 28.6 points and the grade was above average. Visually impaired girls with a round back received 13.2 points at the beginning of the ascertainment experiment and a lower than average grade of the posture bio-geometric profile; at the end of the transformation experiment, they improved their score to 29.7 points and the grade of the posture bio-geometric profile was above average.

The obtained better results prove the efficiency of the implementation of the developed algorithm for corrective and preventive measures in the process of physical education of low-sighted children of younger school age with posture disorders. At the end of the transformation experiment, two from six visually impaired boys with scoliotic posture and two from of eight boys with round back were transferred (according to the assessment of a vertebral neurologist) to a group of children with regular posture. For visually impaired girls with scoliotic posture, the result is as follows: two from four girls were transferred to a group of children with regular posture. After the implementation of the algorithm for corrective and preventive measures in the process of physical education of low-sighted children of younger school age with posture disorders, two girls with a round back were transferred to the group of children with regular posture.

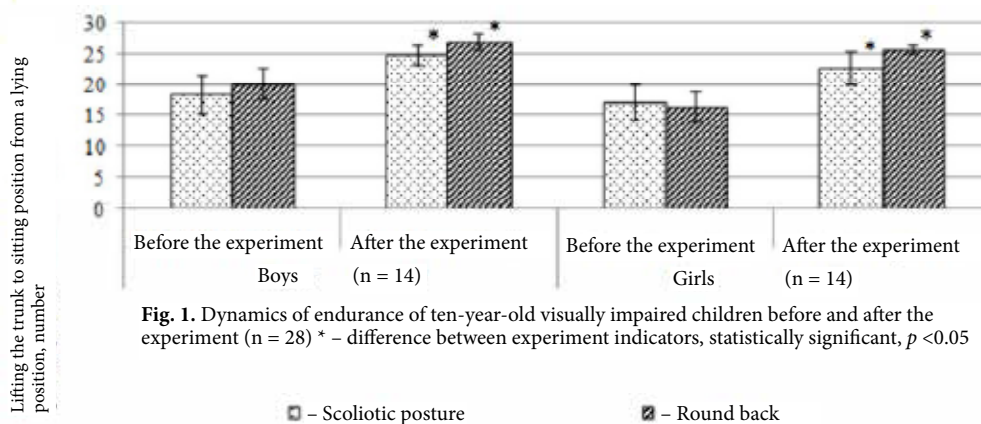
Changes in the musculoskeletal system of children became the evidence of the effectiveness of the implemented algorithm for corrective and preventive measures in the process of physical education of visually impaired children of younger school age with posture disorders. Namely, they were changes in strength endurance indicators of low-sighted children with scoliotic posture or round back when lifting the trunk to a sitting position from a lying position (Fig. 1).

As a result of the implementation of the algorithm for corrective and preventive measures in the process of physical education, the comparative analysis of endurance indicators of ten-year-old visually impaired children with scoliotic posture or round back before and after the experiment

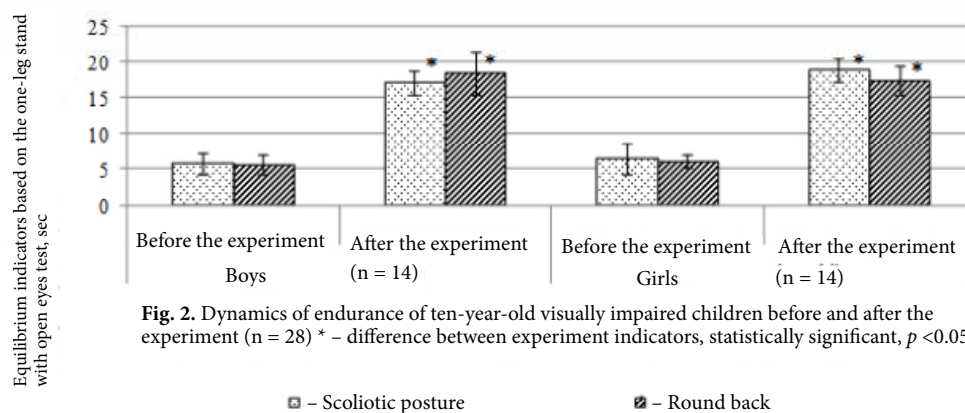
**Table 2.** Dynamics of visual screening indicators of the posture bio-geometric profile of ten-year-old visually impaired children (n = 28), points

Posture type	Boys (n = 14)		Girls (n = 14)	
	Before the experiment	After the experiment	Before the experiment	After the experiment
Scoliotic posture (n = 14)	13.2	28.7*	12.1	28.6*
Round back (n = 14)	12.1	27.5*	13.2	29.7*

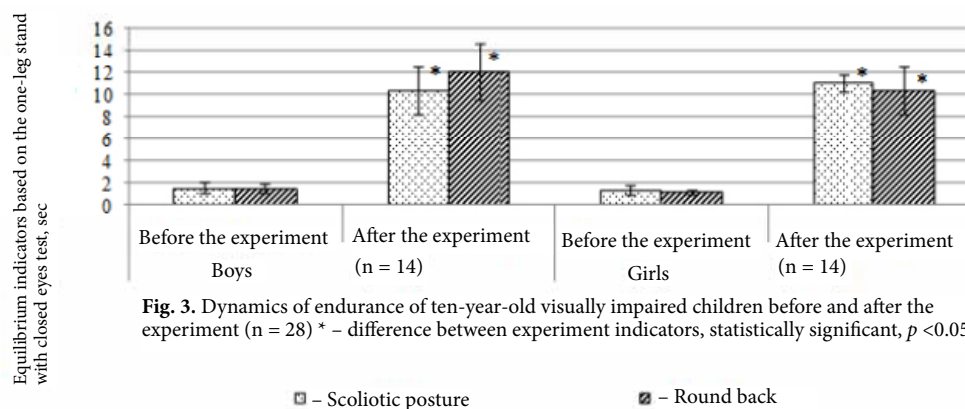
Note – \* the difference between grades at the 1st and 2nd stages is statistically significant,  $p < 0.05$



**Fig. 1.** Dynamics of endurance of ten-year-old visually impaired children before and after the experiment (n = 28) \* - difference between experiment indicators, statistically significant,  $p < 0.05$



**Fig. 2.** Dynamics of endurance of ten-year-old visually impaired children before and after the experiment (n = 28) \* - difference between experiment indicators, statistically significant,  $p < 0.05$



**Fig. 3.** Dynamics of endurance of ten-year-old visually impaired children before and after the experiment (n = 28) \* - difference between experiment indicators, statistically significant,  $p < 0.05$

showed positive dynamics at the significance level  $p < 0.05$ . During the transformation experiment, visually impaired ten-year-old boys with scoliotic posture or round back and visually impaired girls with scoliotic posture improved their endurance indicators from the basic to the medium level; visually impaired ten-year-old girls with round back – from basic to satisfactory level of motor readiness (Sheremet, Nachynova, Arnautova, & Kolomiichenko, 2014).

Figure 2 presents the results of the comparative analysis of static equilibrium indicators based on the one-leg stand with open eyes test for ten-year-old children with scoliotic posture or round back before and after the experiment.

The analysis of static equilibrium indicators based on the one-leg stand with open eyes test for ten-year-old visually impaired children with different types of after the implementation of the corrective and preventive measures

algorithm has shown a statistically significant difference ( $p < 0.01$ ). The implementation of the algorithm for corrective and preventive measures in the process of adaptive physical education of visually impaired ten-year-old boys with scoliotic posture and round back improved the indicators of static equilibrium (based on the one-leg stand with open eyes test), from basic to medium level; visually impaired girls with scoliotic posture and round back – from low to above average level (Sheremet, et al., 2014).

Figure 3 presents the results of the comparative analysis of static equilibrium indicators based on the one-leg stand with closed eyes test for ten-year-old children with scoliotic posture or round back before and after the experiment.

The analysis of static equilibrium indicators based on the one-leg stand with closed eyes test for ten-year-old visually impaired children with different types of after the

implementation of the corrective and preventive measures algorithm has shown a statistically significant difference  $p < 0.01$ . During the transformation experiment, ten-year-old visually impaired children with a scoliotic posture or round back increased their static equilibrium indicators based on the one-leg stand with closed eyes test to the level of results of visually impaired children with normal posture. It is important to note that, despite the positive dynamics of the presented indicators, these parameters remained at a low level relative to the average norm (Sheremet, et al., 2014).

## Discussion

Active experimental research aimed at solving the problem of correction and prevention of postural disorders of primary school age children with special needs has been conducted since the middle of the 20<sup>th</sup> century (Diachenko, 2010; Kashuba, & Yurchenko, 2013; Kashuba, 2017). Despite the great interest of the researchers and the results obtained so far, the problem of correction and prevention of postural disorders in the process of adaptive physical education of visually impaired children of younger school age has not been solved yet. This is evidenced by the fact that we have not found many scientific works in this field in the special literature.

The analysis of professional literature reveals the relevance of these problems for the theory and practice of physical education of visually impaired six-ten-year-old children. In particular, these problems include correction and prevention of functional disorders of the musculoskeletal system, which, as the results of this research prove, are found in 81.4% of visually impaired six-ten-year-old children (68.1% out of them are posture disorders). The data of other authors confirm this percentage (Diachenko, 2010; Kashuba, & Yurchenko, 2013; Kashuba, 2017). According to the results of our research, the number of visually impaired children with normal posture decreases by almost 50.0% with age, and the number of children with postural disorders increases: the number of children with scoliotic posture increased by 50.0% by the age of ten years, the number of children with round back increased by 40.0%, the number of children with rounded back at the age of nine-ten increased from 6.8% to 12.0%.

Despite recognizing the undeniable effectiveness of modern preventive medicine technologies for persons with disabilities, Evseev (2014); emphasized the much larger scope of adaptive physical education tools and methods, which can be the basis for socialization of a person with a disability, for adaptation to work, for retraining, and for general self-development, self-expression, and self-realization. Our studies are consistent with the opinions in (Melentieva, 2004; Diachenko, 2010; Nosova, 2008) and indicate that in the correction and prevention of fixed disorders of the musculoskeletal system, the focus should be on exercises to strengthen muscles of the back, abdomen, chest, lower leg and foot, as well as those, which will facilitate the unloading of the spine and muscles of the lower extremities. There are differences in opinions regarding the use of exercises with different modes of muscle work in physical education of younger schoolchildren. The results of our research coincide with the findings of a number of scientists (Pavlov, 1989; Diachenko, 2010; Kashuba, & Yurchenko, 2013) concerning the significant influence of physical education on the formation of the correct posture of visually impaired younger schoolchildren. The re-

sults of this research supplement and extend the works of Melentieva (2004), Yurchenko (2012), Kashuba (2017) on the correction and prevention of postural disorders of visually impaired children of younger school age.

Summarizing the results of this research, we can assume that worse physical fitness of visually impaired children is caused by low motor activity, which is a consequence of the increased visual load, congenital weakness of the muscles, and insufficient function of connective tissue, which in turn worsens the condition of the internal organs and systems, respiratory and cardiovascular in particular. Therefore, rational physical education is of particular importance for the physical development of visually impaired younger schoolchildren, because this age is the most sensitive for the correction of the motor sphere and the activation of visual functions (Melentieva, 2004; Rostomashvili, 2014; Kashuba, 2017).

Based on testing the development of motor qualities, we have found that ten-year-old low-sighted children have insufficient level of motor sphere development. The biggest problem was connected with the development of coordination (ability to maintain equilibrium) qualities. The reduced level of motor development is explained by pathological changes in the operation of the visual analyzer, which has the leading role in ensuring motor actions. As a result, spatial orientation becomes more difficult, the formation of motor skills and the development of new movements are delayed, and all this leads to a decrease in motor activity (hypokinesia).

The algorithm for corrective and preventive measures developed and implemented in the process of adaptive physical education helped to improve the posture bio-geometric profile and to increase the level of physical qualities of low-sighted younger schoolchildren with postural disorders. The effectiveness of the algorithm is proved by quantitative changes of the studied indicators ( $p < 0.05$  and  $p < 0.01$ ); the algorithm also contributed to the development of a harmonious personality and successful social adaptation in communication with healthy peers.

## Conclusions

The obtained research results confirm the effectiveness of the developed algorithm for corrective and preventive measures in the process of physical education of visually impaired younger schoolchildren with postural disorders. At the end of the transformation experiment, it was determined that, based on the assessment of the posture bio-geometric profile, ten-year-old visually impaired children with a scoliotic posture or round back improved their performance from a below average to above average level.

As a result of the implementation of the algorithm for corrective and preventive measures, the level of physical fitness of children improved significantly: endurance indicators of ten-year-old low-sighted boys and girls with scoliotic posture and boys with round back increased from the basic to medium level; girls with round back – from the basic to satisfactory level of motor readiness; boys with scoliotic posture and round back improved the indicators of static equilibrium (based on the one-leg stand with open eyes test), from basic to medium level; visually impaired girls with scoliotic posture and round back – from low to above average level; ten-year-old visually impaired children with a scoliotic posture or round back increased their static equilibrium

indicators (based on the one-leg stand with closed eyes test) to the level of results of visually impaired children with normal posture (Sheremet, et al., 2014).

The obtained results give reason to recommend the algorithm for corrective and preventive measures for the use in the process of physical education of visually impaired children of younger school age with postural disorders in special boarding schools.

The prospect of further research is to develop and implement a technique for the prevention and correction of posture disorders of visually impaired older schoolchildren in the special boarding schools.

### Acknowledgements

This scientific research has been carried out according to topic 3.7 “Improvement of biomechanical technologies in physical education, sports and rehabilitation taking into account the individual characteristics of human motility” (state registration number 0112U001860) of the “Consolidated plan of research work in the field of physical culture and sports for 2011-2015” of Ministry of Ukraine for Family, Youth and Sports. In 2016–2017, the research corresponded to topics 3.13 “Theoretical and methodological foundations of health-forming technologies in the process of physical education of different population groups” (state registration number 0116U001615) and 3.23 “Health-forming technologies of children and young people in the process of adaptive physical education” (state registration number 0116U001620) of the research plan of the National University of Physical Education and Sports of Ukraine.

### Conflicts of interest

The authors declare that there are no conflicts of interest.

### References

- Dyachenko, A. (2010). *Correction of postural impairment of children of primary school age with impaired vision by means of physical education*. Cand. Diss. K. (in Ukrainian).
- Evseev, S.P. (2014). *Adaptive physical education in the practice of working with people with disabilities and other people with limited mobility*. M.: Soviet sport. 298 p. (in Russian).
- Kashuba, V. (2017). Biological preconditions for the development of the formation concept of spatial organization of body of the children with vision deprivation. *Journal of Education, Health and Sport*, 7(7), 1095-1112. <http://doi.org/10.5281/zenodo.1039950> (in Polish).
- Kashuba, V. (2003). *Biomechanics of posture*. K.: Olympic literature. (in Ukrainian).
- Kashuba, V., & Yurchenko, O. (2013). Correction of postural impairment of young pupils with impaired vision in the process of physical education. *Theory and Methods of Physical Education and Sports*, 4, 67-74. (in Ukrainian).
- Kashuba, V.O., & Savlyuk, S.P. (2017). Structure and content of the technology of prevention and correction of disturbances of spatial organization of the body of children 6–10 years old with sensory systems deprivation. *Journal of Education, Health and Sport*, 7(8), 1387-1407. <http://doi.org/10.5281/zenodo.1050987> (in Polish).
- Krutsevych, T.Y., Bezverkhnya, G.M., & Vorobyov, M.I. (2011). *Control in the physical education of children, adolescents and young people*. K.: Olympic Literature. 224 p. (in Ukrainian).
- Melentyeva, N. (2004). *Posture formation in primary school children with visual impairment in the process of physical exercises in a special (correctional) school*. Cand. Diss. S-Pb. (in Russian).
- Mykhaylova, N., & Grygus, I. (2013). Improving physical performance in children with congenital clubfoot. *The journal of orthopaedics trauma surgery and related research*, 8(3), 53-58.
- Mikhailova, N., Grigus, I., Prusik, K., & Prusik, K. (2014). Enhancement of functional state of children with congenital clubfoot via physical rehabilitation. *Teoriya i Praktika Fizicheskoy Kultury*, (3), 30-32.
- Nesterchuk, N., Grygus, I., Prusik, K., & Zukow, W. (2019). The technique of physical rehabilitation in clubfoot. *Physiotherapy Quarterly*, 27(1), 25-34.
- Nosova, N. L. (2008). *Control of the spatial organization of the body of schoolchildren in the process of physical education: the dissertation of the candidate of sciences in physical education and sports: specialty 24.00.02 “Physical culture, physical education of different population groups”*. Kiev, 198 p. (in Ukrainian).
- Pavlov, A. (1989). *Features of the formation of posture in students with visual impairment. Physical education of children in special schools*. Gorki. (in Russian).
- Rostomashvili, L.N. (2014). *Pedagogical technologies in adaptive physical education of children of primary school age with complex developmental disabilities specialty: dissertation abstract for the degree of doctor of pedagogical sciences: specialization 13.00.04 “Theory and methodology of physical education, sports training. Wellness and adaptive physical education”*. St. Petersburg. 42 p. (in Russian).
- Savlyuk, S.P. (2017). *Body spatial organization in junior schoolchildren with sensory systems deprivation*. Rivne: O. Zen. 560 p. (in Ukrainian).
- Savlyuk, S. (2017). Analysis of programs for correction of the spatial organization of the body of younger students with visual impairment. *Scientific journal of National Pedagogical University named after M. P. Dragomanov. Series # 15. “Scientific and Pedagogical Problems of Physical Culture / Physical Culture and Sports”*, 3(84), 17, 421-424. (in Ukrainian).
- Sermeev, B. (1983). *Physical education of visually impaired children: a manual for teachers*. Moscow: Enlightenment. (in Russian).
- Sheremet, M.K., Nachinova, O.V., Arnautova, L.V., & Kolomiychenko, O.Y. (2014). *Curriculums for preparatory, 1-4 classes of special comprehensive educational institutions for the blind and visually impaired*. Physical training for blind children. Preparatory, grades 1-4. Odessa. 94 p. (in Ukrainian).
- Winnik, J.P. (2004). *Adapted physical education and sport*. NY: Human Kinetics. 608 p.
- Yurchenko, O. (2012). Correction of disturbances of statodynamic posture of young school children with impaired vision in the process of physical education. *Pedagogy, Psychology and Biomedical Problems of Physical Education and Sport*, (10), 80-83. (in Ukrainian).

## ВПРОВАДЖЕННЯ АЛГОРИТМУ КОРИГУВАЛЬНИХ ТА ПРОФІЛАКТИЧНИХ ЗАХОДІВ У ПРОЦЕСІ АДАПТИВНОГО ФІЗИЧНОГО ВИХОВАННЯ УЧНІВ З ОСОБЛИВИМИ ПОТРЕБАМИ

Світлана Савлюк<sup>1</sup>, Віталій Кашуба<sup>2</sup>, Вікторія Романова<sup>3</sup>, Сергій Афанасьєв<sup>4</sup>, Наталія Гончарова<sup>2</sup>, Ігор Григус<sup>5</sup>, Рафал Готовські<sup>6</sup>, Ігор Випасняк<sup>7</sup>, Андрій Панчук<sup>1</sup>

<sup>1</sup>Рівненський державний гуманітарний університет

<sup>2</sup>Національний університет фізичного виховання і спорту України

<sup>3</sup>Міжнародний економіко-гуманітарний університет імені академіка Степана Дем'янука

<sup>4</sup>Придніпровська державна академія фізичної культури і спорту

<sup>5</sup>Національний університет водного господарства та природокористування

<sup>6</sup>Університет Миколая Коперника в Торуні

<sup>7</sup>Прикарпатський національний університет імені Василя Стефаника

Реферат. Стаття: 8 с., 2 табл., 3 рис., 21 джерело.

**Метою дослідження** є наукове обґрунтування алгоритму впровадження коригувальних та профілактичних заходів у процесі адаптивного фізичного виховання дітей.

**Матеріали та методи.** В експерименті брали участь 28 десятирічних дітей із вадами зору і порушеннями постави. Були використані такі методи: теоретичний аналіз, педагогічний експеримент, візуальний скринінг постави, фотографія, тестування, методи математичної статистики.

**Результати.** Під час впровадження алгоритму коригувальних та профілактичних заходів у процесі адаптивного фізичного виховання дітей із вадами зору з постуральними порушеннями в експериментальній групі спостерігалось статистично значуще ( $p < 0,05$ ) поліпшення показників біогеометричної постави та фізичних характеристик.

**Висновки.** Результати досліджень підтвердили ефективність розробленого алгоритму коригувальних та профілактичних заходів, а саме: поліпшення біогеометричного профілю постави та підвищення рівня фізичних якостей дітей із вадами зору з постуральними порушеннями. Наприкінці експерименту з трансформацією на основі оцінки біогеометричного профілю постави було визначено, що десятирічні діти з вадами зору зі сколіотичною поставою або круглою спиною покращували свої показники від нижче середнього до вище середнього рівня; показники витривалості на міцність від базового до проміжного та достатнього рівня рухової готовності; статичні показники рівноваги від базового та низького до середнього та вище середнього рівня.

**Ключові слова:** корекція, профілактичні заходи, порушення постави, діти, порушення зору, фізичне виховання.

### Information about the authors:

**Savliuk Svitlana:** d\_sveta@ukr.net; <http://orcid.org/0000-0003-2004-2235>; Department of theory and practice of physical culture and sports, Rivne State University of Humanities, Stepan Bandera St, 12, Rivne, 33028, Ukraine.

**Kashuba Vitalii:** kashubavo@gmail.com; <https://orcid.org/0000-0001-6669-738X>; Department biomechanics and sport metrology, National University of Ukraine on Physical Education and Sport, Fizkultury St, 1, Kyiv, 03150, Ukraine.

**Romanova Victoria:** romanova250570@ukr.net; <https://orcid.org/0000-0003-0079-9855>; Academician Stepan Demianchuk International University of Economics and Humanities, Department of theory and methods of physical culture and adaptive physical culture, Academician Stepan Demianchuk St, 4, Rivne, 33000, Ukraine.

**Afanasiev Sergiy:** admin\_infiz@ukr.net; <https://orcid.org/0000-0001-7739-3461>; Prydniprovsk State Academy of Physical Culture and Sport, Naberezhna Peremohy St, 10, Dnipro, 49094, Ukraine.

**Goncharova Nataliia:** nataliinfiz@gmail.com; <https://orcid.org/0000-0002-3000-9044>; Department biomechanics and sport metrology, National University of Ukraine on Physical Education and Sport, Fizkultury St, 1, Kyiv, 03150, Ukraine

**Grygus Igor:** grigus03@gmail.com; <https://orcid.org/0000-0003-2856-8514>; Institute of Health, National University of Water and Environmental Engineering, Soborna St, 11, Rivne, 33028, Ukraine.

**Gotowski Rafal:** rgotowski@wp.pl; <https://orcid.org/0000-0003-1757-0723>; Faculty of Earth Sciences and Spatial Management, Nicolaus Copernicus University in Torun, Lwowska St, 1, Torun, 87-100, Poland.

**Vypasniak Ihor:** kicuk80@gmail.com; <https://orcid.org/0000-0002-4192-1880>; Department of Theory and Methods of Physical Culture and Sports, Vasyl Stefanyk Precarpathian National University, Shevchenko St, 57, Ivano-Frankivsk, 76018, Ukraine.

**Panchuk Andrii:** sportclub.rdgu@ukr.net; <http://orcid.org/0000-0002-1670-5772>; Department of theory and practice of physical culture and sports, Rivne State University of Humanities; Stepan Bandera St, 12, Rivne, 33028, Ukraine.

**Cite this article as:** Savliuk, S., Kashuba, V., Romanova, V., Afanasiev, S., Goncharova, N., Grygus, I., Gotowski, R., Vypasniak, I., & Panchuk, A. (2020). Implementation of the Algorithm for Corrective and Preventive Measures in the Process of Adaptive Physical Education of Pupils with Special Needs. *Teoriâ ta Metodika Fizičnogo Vihovannâ*, 20(1), 4-11. <https://doi.org/10.17309/tmfv.2020.1.01>

Received: 26.01.2020. Accepted: 20.03.2020. Published: 25.03.2020

This work is licensed under a Creative Commons Attribution 4.0 International License (<http://creativecommons.org/licenses/by/4.0>).