

Development of balance in children with visual deprivation during adaptive physical education classes

UDC 376.2

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Received by the editorial office on 10.07.2023

Abstract

Objective of the study was to compare indicators of balance development in children with visual deprivation engaged in different types of adaptive physical education - goalball or ice skating in extracurricular activities.

Methods and structure of the study. During the comparison, two experimental groups were formed, each with nine children with visual deprivation of a different nature. Each group had one participant with total blindness. The age of the participants is 8-12 years. As part of extracurricular activities, group No. 1 attended goalball classes, group No. 2 attended skating classes. The dynamics of the development of static balance were determined using the Romberg heel-toe test with open eyes, the Romberg test with closed eyes, and the E.Ya. Bondarevsky test. The dynamics of development of dynamic balance was determined using the test according to V.I. Lyakh.

Results and conclusions. At the end of the scientific work, an analysis of the results of performing the Romberg test with eyes closed showed almost the same increase in indicators in both groups - 39.6% in children involved in goalball and 39.1% in children involved in skating, in terms of the Romberg heel-toe test. There is a significant difference: among children involved in ice skating, the increase was 116.6%, while among children involved in goalball - 52.9%. Results in the test by E.Ya. Bondarevsky indicate a greater increase in indicators in the group of children involved in goalball than in the group of children involved in skating: 160% and 133%, respectively.

According to the results of the test to determine dynamic balance (V.I. Lyakh), in group No. 1 there is an increase of 37.5%, in group No. 2 - 36.8%, however, there is a statistically significant decrease in the average value only in group No. 1.

The results of the study can be applied in the development of rehabilitation programs to develop coordination (balance) for children with visual deprivation.

Keywords: *visual deprivation, balance, goalball, skating, adaptive physical education.*

Introduction. Among the main types of persistent disorders that cause childhood disability, one of the leading places is occupied by sensory dysfunction, and among them – visual impairment. [5]. Complete or partial visual deprivation in children significantly affects their life activities [6]. The consequence of impaired functioning of the visual analyzer is a limited understanding of the world around us (impaired spatial images, sensory cognition of the world), which is expressed in the lag of blind and visually impaired children behind healthy peers in mental and physical development [7]. Developmental disorders lead to mo-

tor coordination disorders [6]. Due to an inadequate perception of the environment, a child with visual deprivation has difficulties associated with the accurate, economical and coordinated performance of motor actions, which characterizes underdeveloped coordination abilities.

Among the coordination abilities, which are responsible for the ability to regulate and manage one's actions in accordance with the assigned tasks, balance is of particular importance for blind and visually impaired children. Improving balance can greatly influence walking stability and reduce the risk of injury from falls [8].



Components that play a vital role in balance control include the visual, vestibular, and somatosensory systems. Thanks to them, a person experiences static sensations that help maintain a stable body position in space [4]. Thus, disturbances in the functioning of the visual analyzer negatively affect the development of balance.

There is an opinion that children with visual analyzer disorders have poorly developed balance in comparison with healthy peers [9]. In some scientific works, goalball is considered as a means of developing balance in children with visual impairments [2, 3], the influence of skating is not sufficiently represented in the scientific literature. The development of balance in children with visual deprivation can be carried out both within the framework of classroom and extracurricular activities in adaptive physical education. Extracurricular activities do not have strict regulations regarding time characteristics, the number of children involved, or the location of the classes. This form of organizing classes is aimed at meeting children's needs for physical activity, emotional motor activity, communication and self-realization [6].

Objective of the study was to compare indicators of balance development in children with visual deprivation engaged in different types of adaptive physical education - goalball or ice skating in extracurricular activities.

Methods and structure of the study. Scientific work was carried out at the Center for Adaptive Physical Culture of Petrozavodsk State University and the sports club "Energy" of correctional boarding school No. 23 in Petrozavodsk for five months. Two experimental groups were formed, each with nine children with visual deprivation of a different nature - myopia, retinopathy, retinitis pigmentosa, astigmatism, strabismus, nystagmus, amblyopia, each group had one participant with total blindness. The age of the participants is 8-12 years.

As part of extracurricular activities, group No. 1 attended goalball classes, group No. 2 attended skating classes. All classes were held twice a week.

The main part of goalball classes included exercises to practice elements of the technique of throwing the ball in different directions, catching, and changing body positions on the playing court. At the skating rink, students performed exercises such as sliding on two legs, on one leg, rotation, moving around objects, etc. A characteristic feature of all classes was the performance of complex coor-

dination exercises aimed at maintaining balance in various positions.

The dynamics of development of static and dynamic balance were determined using the Romberg heel-toe test with open eyes, the Romberg test with closed eyes (narrow stance, hands in front of you), the E.Ya. Bondarevsky test (stand on one leg, the other leg is bent and its heel touches the knee joint of the supporting leg, hands on the belt, head straight) and the V.I. Lyakh test (from the starting position "standing on a gymnastic bench, hands on the belt", performing three full rotations in one direction as quickly as possible without losing balance). Comparison of indicators was carried out using the nonparametric Wilcoxon Mann-Whitney test. Differences were considered statistically significant at $p < 0.05$.

Results of the study and discussion. The results of the test to determine dynamic balance (V.I. Lyakh) indicate a statistically significant decrease in the average time for performing rotations without loss of balance from 8 to 5 s in group No. 1 and a statistically insignificant decrease in the average time from 19 to 12 s in group No. 2.

In group No. 1, the average time to perform the Romberg heel-toe test increased from 17 s to 26 s. It should be noted that among the results obtained at the beginning of the study, one significantly exceeds the others, which makes it impossible to talk about statistically significant differences between the results of the two samples. It was found that the highest result belonged to a child with a weak visual impairment (mild strabismus) compared to other participants in the experiment. In this regard, this result of performing the Romberg heel-toe test was excluded from the sample, which led to a decrease in the mean and median and, as a consequence, to the emergence of statistically significant differences between the samples.

When performing the Romberg test with eyes closed, a statistically significant increase in the average time of holding the pose was observed from 53 s to 74 s, which indicates the development of the ability to maintain balance in a static pose. Analysis of the data obtained showed that the result of one child obtained at the beginning of the study was significantly lower (22 s) compared to the results of other children and the average time for performing the Romberg test with eyes closed (53 seconds). The reason for this may be severe visual impairment, which significantly limits the perception of the surrounding space, which, in turn, affects the development of balance. After five months of train-



ing, the result increased to 38 seconds and was already comparable with the results of other children.

The average value of the time of holding a pose when performing the test by E.Ya. Bondarevsky changed from 5 to 13 s.

In group No. 2, there was an increase in the average time of holding the body position without loss of balance in a given position from 6 to 13 s when performing the Romberg heel-toe test and from 23 to 32 s when performing the Romberg test with eyes closed. According to the test results of E.Ya. Bondarevsky observed a statistically significant increase in the average time of maintaining a body position without loss of balance from 3 to 7 seconds. By the end of the study, one of the results of the test by E.Ya. Bondarevsky was more than twice as high as the others. This result belonged to a child with mild impairments of the visual analyzer, in contrast to other children who took part in the study.

Conclusions. It was revealed that indicators of balance development in children with visual deprivation engaged in various types of adaptive physical education - goalball or ice skating - have positive dynamics, however, in group No. 2 a more pronounced effect in the development of static balance is observed.

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