The use of adaptive physical culture in the comprehensive rehabilitation of children with cerebral palsy

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Abstract

Objective of the study is to identify the effectiveness of a comprehensive rehabilitation program for primary school children with cerebral palsy using adaptive physical education (APE) tools.

Methods and structure of the study. As part of an experiment conducted at Kursk boarding school No. 3, sixteen children (equally boys and girls) aged 7-9 years with a diagnosis of cerebral palsy (spastic diplegia, GMFCS level 1) were engaged in a special adaptive physical education program. This program consisted of three blocks: general development exercises, fitball exercises and water exercises, and was aimed at correcting motor disorders, developing coordination and forming correct posture.

Results and conclusions. The experiment, which included goniometry and pedagogical testing, demonstrated the positive effect of the developed program of comprehensive rehabilitation with AFC on the motor functions of the lower extremities. The subjects showed an increase in the angle of flexion in the hip joints and dorsal flexion in the ankle joint. In addition, the indicators of balance and performance of dynamic exercises (squats and walking) improved. The study confirms the effectiveness and expediency of using this AFC program in the comprehensive rehabilitation of primary school students with cerebral palsy, which is reflected in an increase in the time of balance, the number of steps and squats, as well as the amplitude of movements in the joints.

Keywords: *disability, primary school students, adaptive physical education, cerebral palsy, comprehensive rehabilitation program, goniometry, pedagogical testing, fitball exercises, swimming.*

Introduction. According to the World Health Organization, the number of children with various forms of disabilities continues to grow, and one of the leading positions among diseases causing childhood disability is occupied by cerebral palsy (CP). CP unites a group of non-progressive neurological syndromes that arise as a result of damage or underdevelopment of the brain in the early stages of ontogenesis, which leads to persistent movement disorders such as paralysis and paresis, less often hyperkinesis, ataxia, as well as various speech and mental disorders and, as a consequence, to limitation of the child's life [2].

Despite the key role of medical rehabilitation in matters of restoring impaired body functions, the modern practice of rehabilitation of people with CP emphasizes the importance of an integrated approach that includes medical, psychological, social and pedagogical components. At the same time, a significant role is given to adaptive physical education (APE) – an area aimed at the use of specially selected physical exercises taking into account the health characteristics of the child [1].

That is why the Government of the Russian Federation approved the "Concept for the Development of a System of Comprehensive Rehabilitation and Habilitation of Disabled Persons, Including Disabled Children, in the Russian Federation for the Period up to 2025" [6].

The problem of rehabilitation of disabled persons with cerebral palsy is reflected in numerous medical

and pedagogical studies, which present the means of adaptive physical education [3, 4].

At the same time, the issue of using adaptive physical education in the comprehensive rehabilitation of patients with cerebral palsy remains insufficiently studied.

Objective of the study is to identify the effectiveness of a comprehensive rehabilitation program for primary school children with cerebral palsy using adaptive physical education (APE) tools.

Methods and structure of the study. The research was carried out at the Kursk Regional State Educational Institution Boarding School No. 3. The study involved 16 children (8 girls and 8 boys) aged 7-9 years with a diagnosis of cerebral palsy, spastic diplegia. The parents of the participants, in accordance with the Helsinki Declaration of the World Medical Association, which regulates the conduct of scientific research, signed an informed consent form for the examination [5].

The children belonged to level 1 according to the gross motor function classification system (GMFCS). Children walk at home, at school, outdoors and in public places. They are able to go up and down curbs without the physical assistance of another person, and can climb stairs without using handrails. They are able to run and jump, but their speed, balance and coordination of movements are limited. They can participate in sports games of their own choice and depending on environmental factors.

The subjects were divided into two groups (8 people each). The experimental group (EG) followed the developed program. The control group (CG) used traditional methods of exercise therapy.

The comprehensive rehabilitation program for patients with cerebral palsy includes three sessions per week using three groups of tools:

1. General development exercises (twice a week, in the gym): correction of support ability and feet (flexion and extension of toes, rolling from heel to toe, walking on a narrow support, etc.); development of balance (standing on one leg, walking along a line, an inclined plane, etc.).

2. Exercises with a fitball (as part of indoor classes): familiarization and basic elements (simple rolls, hand rests, sitting on a fitball). Formation of correct posture (keeping the back straight, control of the position of the feet). Special exercises (lying rests with support on the ball, "boat", "half-bridge", etc.).

3. Water exercises (once a week, in a pool): mastering water (walking and running along the bottom, breathing exercises). Game tasks ("crossing", "tag", "fishermen and fish", etc.), which stimulate the work of the muscles of the whole body and develop coordination.

Results and conclusions. To evaluate the effectiveness of the program, instrumental research methods and pedagogical testing were used.

To study the motor functions of the lower limbs, the goniometry method was used – an assessment of the motor function of the joints of the limbs by measuring the direction and amplitude of movement in them using a goniometer. The angular parameters of flexion / extension in the hip and ankle joints of the right and left legs were studied.

Pedagogical testing was carried out according to the following control tests:

- maintaining balance (support ability), standing on one leg (s);

- walking in place for speed in 1 minute (number of steps);

- squatting on two legs in 1 minute (number of squats).

Before the initial stage of rehabilitation, each child was examined for indicators of the functional state of the musculoskeletal system, concomitant diseases, and features of psychophysical development. According to the results of the study of goniometry indicators in the experimental group, a reliable ($p<0.05$) improvement in the angular flexion indicators in the hip joints was noted (from ~67–68° to ~92–93°). At the same time, dorsiflexion in the ankle joint improved by an average of 8–10%, which indicates greater mobility of the feet. In the control group, the changes were less pronounced (an increase of 3-7%).

Pedagogical tests demonstrated the following results:

- maintaining balance: the time of standing on one leg in the EG increased almost twice (from 4.0–4.5 sec to 8.9–9.7 sec), while in the CG – only up to 5.6–6.1 sec.;

- walking in place (1 min): in the EG the number of steps increased from 50.2±0.6 to 66.8±0.6, in the CG – from 48.7±0.6 to 54.9±0.6;

- squats (1 min): in the EG – from 16.1±0.4 to 22.9±0.4, in the CG – from 16.3±0.4 to 19.6±0.4.

Conclusions. The developed rehabilitation program based on physical culture (general development exercises, exercises with a fitball, water exercises) contributes to a significant improvement in the functional state of the musculoskeletal system of children

with cerebral palsy. This is expressed in an increase in the angle of flexion in the hip joints, improved dorsiflexion in the ankle joint, as well as an increase in the ability to maintain balance and perform dynamic loads (squats, walking). The results of the study confirm that the systematic use of the indicated AFC means can increase the effectiveness of complex rehabilitation of children aged 7-9 years with cerebral palsy, improving their motor abilities and creating the preconditions for further social and educational integration.

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