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EFFICACY OF HYDROKINESIOTHERAPY IN INFANT CHILDREN WITH MUSCLE HYPOTENSION SYNDROME

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Annotation. This article presents the results of using hydrokinesiotherapy for infant children with muscle hypotension syndrome. The 6-month study was carried out in the “Eveksia” Medical Rehabilitation Center (Moscow). With parents’ informed permission, it included children aged 1-2 years with muscle hypotension, who, according to the preliminary medical report, did not have any contraindications to hydrokinesiotherapy. The results have revealed the efficacy of hydrokinesiotherapy, which is demonstrated through the improvement of global motor and manual functions indicators: the babies under 2 years began to form walking skills, develop speed and volume of manual functions.

Keywords: hydrokinesiotherapy, muscular hypotension syndrome, young children, global muscle functions, manual functions.

Introduction. Muscle hypotension is a decrease in skeletal muscle tone (residual stress and muscle resistance to passive muscle pull) with the contractile function deterioration. This state is a symptom of a whole number of inherent and acquired pathologies that are attributed to neuromuscular disorders [1].

Total statistics of muscle hypotension syndrome in Russia is insufficiently represented. The world statistics, however, show that the incidence of the most common inherent neuromuscular disease – the Charcot-Marie-Tooth disease – is 1-3 cases per 10 thousand population [2]. According to some studies [3-4], one case of this pathology occurs per 9 thousand population in Japan, in Iceland – per 8.3 thousand, in Italy – per 5.7 thousand, in Spain – per 3.3 thousand. In addition, incidence of the inherent myasthenic syndrome is one case per 200 thousand of 1-year children, incidence of myofibrillar myopathy – one case per 50 thousand of newborns [5].

In the etiopathology of the hypotension occurrence and development, there are factors of damage to the nervous system occurring at any of its levels (brain and spinal cord, peripheral nerves, local neuromuscular connections) caused by dysfunctions of muscle or connective

tissues and dependent on pathologies of metabolism or synthesis of individual enzymes [6]. The muscle tone decrease in children can be caused by anomalies of the neuromuscular junction, primary muscle diseases, endocrine pathologies et al. Infant muscle hypotension – congenital hypotension (P94.2 in ICD-10) – is mainly seen in prematurely-born babies (who were born under 37th week of pregnancy) with signs of general underdevelopment of organs and systems diagnosed at birth. Moreover, decrease in muscle tone in mature infants may indicate damage of functional or organic nature to the central nervous system (CNS), muscle or genetic disorders.

According to the literary data [7-8], muscle hypotension syndrome is registered in 12-17% of newborns during the residual period after any diseases. The progressive muscle dystrophy is a group of diseases, the main symptoms of which are weakness, skeletal muscle atrophy, disorders of the support movement function, muscle contractures. Muscle dystrophy progression entails a lag in the child’s psychomotor development, which determines the search for methods to start rehabilitation measures adequate to the age, anatomical and physiological characteristics of young children as soon as possible.

Hydrokinesiotherapy is an appropriate rehabilitation measure for children with muscle hypotension syndrome. Exercises in water contribute to an optimal toning and strengthening of weakened muscles and the capsular ligament apparatus, improvement of blood supply and metabolic-nutritional processes, support formation of physiological volume of movement in joints. By decreasing static loads, the body water facilitates the verticalization of children with reduced muscle tone, promotes stimulation, formation and improvement of the supporting function, walking skills, performing manual movements [1, 2, 5]. In connection with the above, the use of hydrokinesiotherapy is relevant in the rehabilitation of children with muscular hypotension syndrome.

The purpose of the study – evaluation of the efficacy of hydrokinesiotherapy in infant children with muscle hypotension.

Methods and organization. Global motor functions of children with muscle hypotension was assessed with the GMFCS scale (Gross Motor Function Classification System), 5 points total [9]. Evaluation of the manual disorders was made with the MACS scale (Manual Ability Classification System for children with Cerebral Palsy), 5 points total [10].

The study was conducted in the “Eveksia” Medical Rehabilitation Center (Moscow), duration – 6 months. With parents’ informed consent, the study involved children (n=8) aged 1-2 years with muscle hypotension, who, according to the preliminary medical report, did not have any contraindications to hydrokinesiotherapy.

The results obtained were processed with the mathematical statistics methods with calculation of average values and their standard deviation, the significance of differences was rated with the Wilcoxon T-test ($p \leq 0.05$).

Results and discussion. The 7-week hydrokinesiotherapy course was divided into 3 periods: introductory, main and final. During each one, we solved general and special tasks of health-improving and developmental nature. The tasks included the following: adaptation of a child’s body to physical loads and being in an

aquatic environment; normalization of the CNS function, normalization of the blood circulation system function; strengthening and increasing muscle tone; improving and stabilizing the background emotions of a child; general strengthening of the body; increasing immunity; coordination development; training and improvement of walking skills and manual functions.

Sessions were held in the presence of parents, in a shallow pool with a water temperature of 32-34 °C that contributes to an increase in muscle tone. The session time varied from 20 minutes at the beginning to 30 minutes at the course’s end. The session structure included exercises for the development of all muscle groups performed in horizontal and vertical position of the trunk and head with supporting equipment. These exercises are aimed at the increase of muscle tone, activation of volitional movements of global and regional muscle groups of the higher and lower extremities, formation and improvement of the head and trunk verticalization skills, manual and walking skills. We have used passive, passive-active and active exercises. The directed activation of a child’s volitional movements was made with the help of parents, using toys, equipment, word and visual-object accompaniment during each exercise. It supported its comprehensive development, the formation of a positive emotional response to the session, which in turn contributed to an additional increase in the overall tone of children with muscular hypotension syndrome.

The efficacy of hydrotherapy sessions was rated according to dynamics of the GMFCS (result – 1 to 5 points) and MACS (result – 1 to 5 points) indicators (table).

Values of global motor function according to the GMFCS scale improved by 50% and amounted to 1.25 ± 0.04 points ($T_{crit} \leq 0.05$), which corresponds to an approximation to the GMFCS I level, characterized by gait without restrictions. In children under 2 years of age, the formation of independent walking has also begun.

Table

Dynamics of global and manual functions of infant children with muscle hypotension syndrome during the hydrokinesiotherapy course

Indicator	M±m		Dynamics		Reliability (Tcrit)
	Before the course	After the course	Absolute values (point)	Relative values (%)	
GMFCS, points	2.5±0.05	1.25±0.04	1.25	50	≤0.05
MACS, points	2.0±0.05	1.0±0.03	1.0	50	≤0.05

According to the manual function disorders evaluation in 1-2 years old children with muscle hypotension syndrome, we have noted improvement by 50% of the indicator, average values of which amounted to 1.0±0.03 points (Tcrit≤0.05). Changes were noted in a qualitative improvement of manual function in terms

of increased speed and improved handgrip of objects with different diameter.

Conclusion. Significant differences of global and manual function indicators rated with the GMFCS and MACS scales prove the efficacy of using hydrokinesiotherapy in rehabilitation of children with muscle hypotension syndrome.

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