

The physical development of children with cerebral palsy in use of Bobat's method in physical therapy course

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Abstract:

This article is devoted to the studying of the dynamics of physical indicators preschool children with cerebral palsy during the exhibiting the Bobat's method in the course of physical therapy for 6 months.

The analysis of the changes in the children with cerebral palsy physical evolution in the main and control groups have shown that after 6 months of the physical therapy, the body length ($p<0.05$), body weight ($p<0.01$), and chest circumference ($P<0.05$) have been increased by the Bobat's method. The indicators of the physical evolution of the children who have used standard approaches for physical rehabilitation have had a less positive dynamics.

Keywords: Bobat's method, physical development, cerebral palsy, physical therapy.

Topicality. Despite of the existence of traditional and diverse ranges of authors' approaches for physical therapy, the problem of choosing and applying the most effective methods of physical rehabilitation still exists.

The physical development as a complex of characteristic is one of the leading assessments of the morpho-functional child state in its development and in the process of growth [5, 8]. An important component of the child's development is the structure of the body, which is characterized by a number of anthropometric parameters that determine the features of sizes proportionality, indicating the physiology of the musculoskeletal, muscular, nervous and other systems of the body, as well as signaling the development of the child's pathology [3, 6 7, 9, 17]. Due to the ease of measurement and evaluation, most of them are part of the procedure for rehabilitation testing of patients with different pathologies. However, publications that would cover the dynamics of their changes in the process of the physical therapy of preschool children are not enough. Particularly relevant data of the studying are with various pathologies of the locomotorium and nervous system of children when it is expedient to establish the effectiveness of the influence of various methods of physical rehabilitation [2, 4, 13]. Usually they use highly informative instrumental methods of diagnosis, a number of motor tests, methods of psychophysical diagnosis, assessment of neurological status [1, 2]. However, in our opinion, it is inappropriate to neglect the methods of evaluating physical development in this case, since they have provided an opportunity to more fully assess the impact of the applied approaches to correction, physical rehabilitation, treatment, etc. [3, 4, 8, 10].

Bobath therapy is noted among the existing innovative and effective methods of physical therapy, the effect of which on the indicators of physical evolution of children with cerebral palsy in the course of physical therapy has not been studied currently. Although it is well known that children with cerebral palsy are significantly lagging behind their peers in PD [3, 6, 7, 9, 12]. Recall that the Bobat's method was created in the 30s of the twentieth century by practicing physiotherapist Bertha and a physician psychiatrist Carl Bobath. The concept of

the method was substantiated in the 40's, and in the 1950s, in addition to treating the situation and performing a complex of specialized physical exercises, the areas of speech therapy, gaming activity, self-care and child-care education with CNS damage were enriched [14, 15, 18, 19, 20].

The purpose of this study is to determine the effect of the physical therapy using the Bobat's method on the parameters of physical development in preschool children with cerebral palsy.

Materials and methods of research. The main indicators of physical development (PD) in preschool children include body weight (BW, kg), body length standing (BL, cm) and sitting (BLS, cm), head coverage (HC, cm), chest coverage (CC, cm) and its excursion (CE, cm). Other indicators of physical evolution have not been widely used in practice. All indicators of PD have been investigated using traditional methods [5, 8].

For the determination of PD of children of preschool age with various CNS lesions (Tabl. 1) for the influence of the physical therapy using the Bobat's method, 35 children aged 4.1 ± 1.1 years (at the beginning of the course) were examined. That was the main group (MG). All of 72 procedures were conducted. There was also a control group (CG), the results of the PD had been studied and analyzed in 34 children aged 3.8 ± 0.9 years who were undergoing rehabilitation using standard methods.

Table №1. The distribution of children with CNS lesions in the form of cerebral palsy

The Form of CP	MG	CG
Spastic diplegia	18 / 51.4%	16 / 47.1%
Double hemiplegia	6 / 17.1%	7 / 20.6%
Dextral or sinistral hemiparesis	7 / 20%	7 / 20.6%
Hyperkinetic form	4 / 11.4%	4 / 11.8%
Total :	35 / 100%	34 / 100%

The course of Bobath therapy included: the provision of treatment using specialized child's body position, the reduction of the influence of pathological reflexes (ASSHT, lip reflex (snot reflex), sucking, search, Moreau, cross extensor reflex, etc.) on the musculoskeletal system and implementation, the complex of the exercises for the formation of elementary motor skills and the development of basic physical qualities [20].

During the treatment, provision referred to "stacking" the limb or limbs, and sometimes to the entire body of the child in the defined position correction using specialized devices or their imitations. The main indication for the usage of this area are prevention or blocking the action of pathological reflexes that were result in abnormal positions of the joints and muscle groups and complicate the formation of basic motor skills; prevention of contracture and deformation formation; adaptation of the body to different positions relative to the gravity force.

Exhibition special exercises, which reduced or blocked the effect of pathological reflexes, has contributed to the formation of basic motor skills, etc. Carried out during physical activity, expert in physical rehabilitation and child were sent to inhibition (blockage) or eliminate abnormal motor patterns, stereotypes, promoted to more correct movements by stimulation, inhibition, facilitation, rotation, as well as the usage of positions that suppressed the action of pathological reflexes. When the inhibition was understood - blocking abnormal movements (tremors, associated and athetoid movements without dissociation), body positions (flexion or extension) and reflections that hinder the development of normal movement (corresponding to the biological age of the 0child). Facilitation is the facilitating the implementation of correct (normal) movements and the relationship between a child and a

specialist in physical rehabilitation and facilitates the implementation of physiological movements. Facilitation includes proprioceptive, cognitive, perceptual and emotional aspects and is an active sensorimotor learning process. Stimulation is carried out with the help of tactile and kinesthetic stimuli necessary for the child to feel better the correct movements and positions of his own body in space [11, 13].

Exercises, which were carried out, were taken into account the individual abilities of the child.

Standard approaches to the rehabilitation of preschool children with CNS lesions envisaged conducting lessons for physical therapy and pediatric massage [15].

In Tabl. 2 the results of the survey indicators PD children with lesions of the CNS studied groups before applying Bobath therapy in combination of physical therapy in the treatment of children's rehabilitation center named after Boris Litvak (Odessa, Ukraine) are shown. Taking into account the data presented at the beginning of the course of rehabilitation, there were significant differences between the indicators of the PD of the children of the mentioned groups.

Table №2. The average data of indicators of children physical evolution in the studied groups

Indicator	MG	CG
BL, cm	102.0 (97.0;110.0)	103.0 (95.0;107.0)
BLS, cm	44.0 (43.0; 50.0)	50.0 (45.0; 52.0) [#]
BW, kg	14.0 (12.0; 16.0)	15.0 (14.0; 16.0) [#]
HC, cm	47.0 (44.0; 48.0)	49.0 (48.0; 50.0) ^{###}
CC, cm	50.0 (50.0; 52.0)	52.0 (50.0; 52.0)
CE, cm	3.0 (2.0; 4.0)	3.5 (3.0; 4.0) [#]

[#] - $p < 0,05$; ^{###} - $p < 0,01$ between the data in the MG and the CG.

The children in the MG and the CG, despite of a slight difference in age, were not different in BL (cm), however, according to the BL (cm) and HC (cm), children of CG significantly prevailed in HC children ($p < 0.05$ and $p < 0.01$, respectively). Significantly higher in CG than in HC was also motility of the chest ($p < 0.05$). Considering the last important circumstance the assessment of the individual variations were based on the central tables of the age distribution of the PD indicators [8]. Therefore, at the level of the analysis of changes in the absolute values of the indicators of the PD, we used a centile assessment method with the construction of the individual and group profiles of the PD [5], which were used at the beginning and at the end of the course of the physical therapy.

Research results.

Changes in the parameters of the children PD with CNS lesions under the influence of a half-year course of rehabilitation were analyzed (Tabl. 3). Significant changes in the children of MG, in which Bobat's method was used as a means of physical therapy, were markedly increased by BL ($p < 0.05$), BLS ($p < 0.01$) and BW ($p < 0.01$). The positive effect of the applied method was also related to CG ($p < 0.05$), but the chest mobility was not increased. Positive dynamics of PD parameters was observed in CG children, among which significant changes ($p < 0.05$) were observed in BW (kg), HC (cm), CC (cm) and CE (cm). For a more careful analysis, it was important to evaluate the data obtained taking into account the central sex-age distributions (Fig. 1) with the construction of the profiles of PD (Fig. 2).

Table №3. The changes in the physical children evolution with CNS lesions due to the impact of a half-year course of rehabilitation

Indicator	MG		CG	
	at the beginning	at the end	at the beginning	at the end
BL, cm	102.0 (97.0;110.0)	106.0(102.0;114.0)**	103.0 (95.0;107.0)	105.0 (97.0;108.0)
BLS, cm	44.0 (43.0; 50.0)	48.0 (45.0; 52.0)**	50.0 (45.0; 52.0)	51.0 (47.0; 53.0)
BW, kg	14.0 (12.0; 16.0)	16.0 (14.0; 18.0)**	15.0 (14.0; 16.0)	15.0 (15.0; 17.0)#
HC, cm	47.0 (44.0; 48.0)	48.0 (45.0; 50.0)*	49.0 (48.0; 50.0)	50.0 (49.0; 51.0)#
CC, cm	50.0 (50.0; 52.0)	51.0 (50.0; 53.0)*	52.0 (50.0; 52.0)	52.0 (51.0; 53.0)#
CE, cm	3.0 (2.0; 4.0)	3.0 (2.0; 4.0)	3.5 (3.0; 4.0)	4.0 (3.0; 5.0)#

* - $p < 0.05$ between the data in the MG at the beginning and at the end;

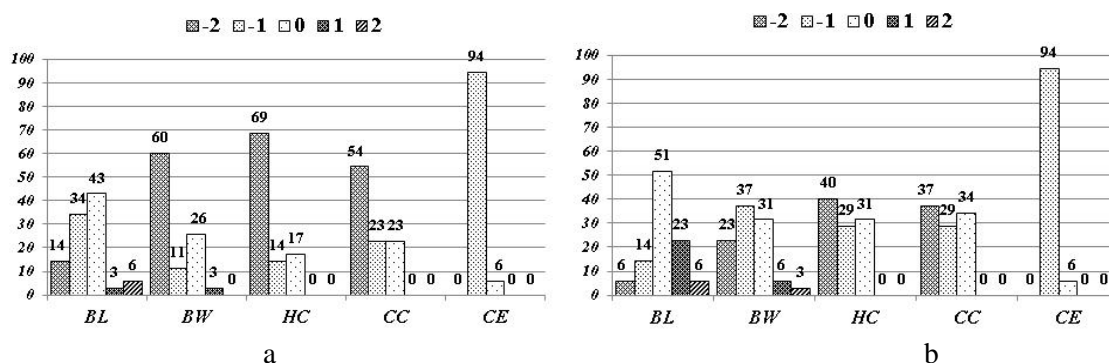
- $p < 0.05$ between the data in the CG at the beginning and at the end;

** - $p < 0.01$ between the data in the MG at the beginning and at the end.

The data of the centigrade analysis (Fig. 1), which is related to the changes of the BL (cm), BW (kg), HC (cm) and CC (cm), looks informatively informative. According to all of these indicators there is a positive dynamics. The most significant changes are related to the BL index, which have risen in 51% of children in the MG at the end of the course of rehabilitation corresponds to population values, and 29% - exceeds those that almost corresponds to the normative distribution. According to BW (kg), the initial values of the expressive deficit in 60% of children after the course are retained only in 23%. Such redistribution is mainly due to the increase of children with a small deficit, but the normative values of BW (kg) and its moderate increase are observed in 40% of children, in contrast to such values at the beginning of the course in 29% of children with cerebral palsy. The development of the chest is more active, and its low coverage rates decrease from 54% at the beginning of the course to 37%. Variants of population normative values increase from 23% to 34%. At the same time, in the CG there is absolutely no dynamics in terms of mobility of the chest. Positive dynamics was noted by the indicator of HC (cm), which, after the course of rehabilitation, in 31% of children, met normative values unlike 17% of cases at the beginning, and 40% of children were within the limits of low values, in contrast to 69% of cases at the beginning.

By analyzing the indicators of PD children CG it can be argued that some improvement of individual parameters in comparison with populations was observed in terms of BL (cm), HC (cm), CC (cm) and CE (cm). That is, it can be stated that the effect of the traditional method of rehabilitation, which was reflected in the absolute values of the PD, in comparison with the normative population values, was equalized with the exception of the BL index (cm).

Figure №1. The dynamics of indicators distribution of children MG of with lesions of the CNS at the beginning (a) and at the end (b), as well as CG at the beginning (c) and at the end (d) a half-year course of rehabilitation.



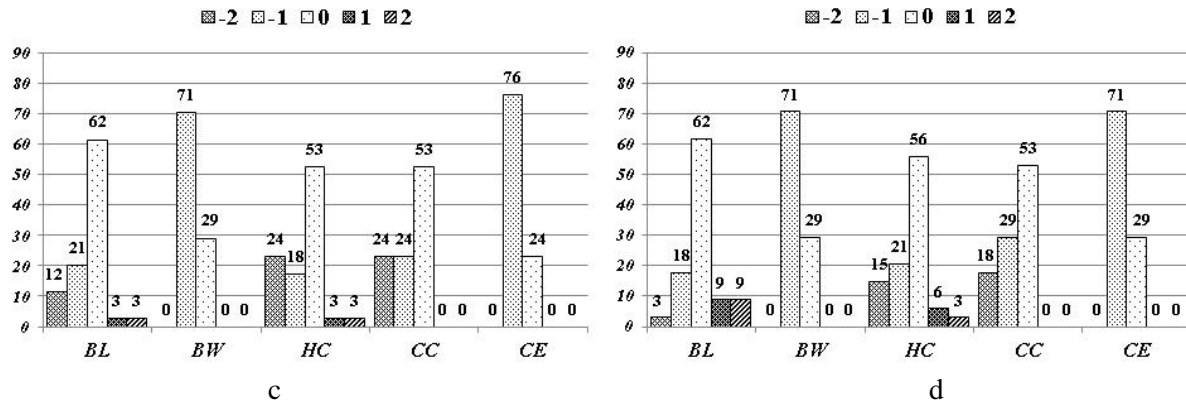
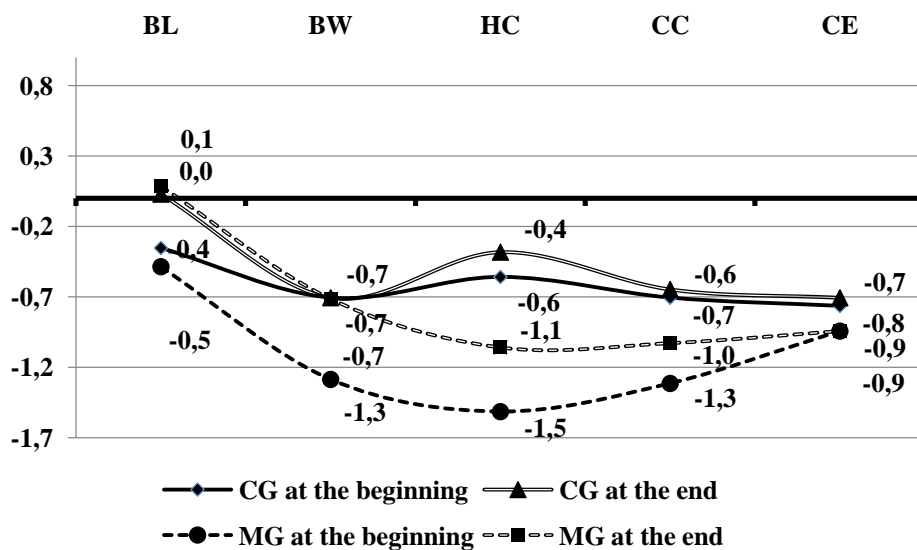


Figure №2. The changes in the PD profile of preschool children of with CNS lesions during half-year rehabilitation.



Quite clearly, the last assumption was confirmed by the data analysis of the changes in the profiles of PD children of the MG and the CG (Fig. 2). If in the MG the PD profile has risen within the population by 0,3-0,6 points for the indicators of BL (by 0,6), BW (by 0,6), HC (by 0,4) and CC (by 0,3). Then in the CG only 0,1 - 0,4 points for indicators of BL (by 0,4), BW (by 0,2), HC (by 0,1) and CC (by 0,1).

Discussion. Insufficient attention is paid to the question of the research of the PR of preschool children, and especially with the defeats of the central nervous system. In addition, the influence of various medical and rehabilitation measures, as there is a significant problem of an adequate assessment of changes [6, 7, 8]. First of all, they are connected to the individual peculiarities of the child's development, which varies considerably in preschool age. Equally important in the evaluation of PD children with CNS lesions is the variability of pathology, its manifestations, mechanisms for compensation of violations, etc. [17]. However, the creation of unified sentimental tables of different indicators of the PD allows for the location of a particular individual, taking into account age and gender (usually within the three-month corridors) within the population distributions, and then to evaluate them, which significantly reduces the error of estimation [5].

Based on the results of the study, it is possible to clarify the identity of the advantages and certain disadvantages of using the Bobat's method in the course of physical therapy for children with CNS disorders.

In the first place, it is necessary to explain the increase in absolute values of BL, which, in our opinion, is associated with a decrease in the tone of tense muscles of the trunk and lower extremities. In this case, the effect of using the Bobath's method in comparison with traditional approaches is more significant in long-term usage, which suggests its significant effect on the normalization of muscle tone in the affected sections of the neuromuscular apparatus [18, 21, 22]. In this case, we can assume a more optimal afferent proprioceptive impulse, which can contribute to the restoration of motor function [16, 22]. No less significant is the effect of the Bobath's method on the BW, which is not observed in traditional rehabilitation approaches.

Of course, at a hypothetical level of certain effects of metabolism, it can be assumed that the usage of active and passive techniques method Bobath, can be promoted activation visceromotor and motor-secretory mechanisms in internal organs and endocrine glands of children with diseases of the central nervous system, which can provide a tendency to restore BW to the population level [9]. However, this assumption requires more precise reasoning, since there are a sufficient number of other factors that can influence in the increasing of BW. As an example, the improvement of appetite, the stimulation of the central mechanisms, etc. Similarly, the improvement of such indicators of the PD as HC and CC can be explained. The dynamics of the PD indicator, which remains unaltered with absolute and estimated values, remains unchanged in the background with the Bobath's method. A separate issue, due to heterogeneity of groups, is the influence of Bobath's method on PD in different nosological forms of cerebrovascular disease, but this is a matter of further analysis.

Conclusion. As a whole, it can be argued that the usage of the Bobath therapy in the course of physical therapy for preschool children with different forms of cerebral palsy is more effective compared with traditional approaches, affects children's PD and contributes to optimization of weight-growth and coverage of body structure.

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