

Li Yixuan

PhD Student, Department of Special Education,
Azerbaijan State Pedagogical University
Baku, Azerbaijan

E-mail: 2689460251@qq.com

ORCID ID: <https://orcid.org/0009-0005-7350-5944>

Development of speech motility in children with Cerebral Palsy: Game-Based Intervention

Cerebral Palsy (CP) is a lifelong neuromaturational disorder characterized by movement and posture problems that occurs due to non-progressive damage to the developing fetus or infant brain. Although it is the most common physical disorder in the pediatric age group, the prevalence of CP has been reported to reach 17 million worldwide. Children with CP face many problems that affect daily living activities and functional performance. In CP, movement and posture disorders constitute the basic clinical picture, and accompanying sensory problems, cognitive function losses, perception and behavioral deficits negatively affect the child's development, functional skills, independence in daily life and participation in play. Collaboration of a multidisciplinary team in the treatment of CP, which is accompanied by physiological, physical, social and various functional disorders, is a great necessity for the success of the rehabilitation process. This treatment can last a lifetime; It includes medical interventions, educational practices, physiotherapy, occupational therapy and appropriate orthosis approaches. In our review, we did not find any study evaluating the effectiveness of goal-oriented GBI (Game-Based Intervention), which is based on top-down approaches and motor learning strategies, on functional performance in children with CP. The child with CP, who has to continue his/her life without these mechanisms, has difficulty in maintaining postural control and establishing his balance. As a result, the child with CP cannot acquire the necessary motor skills and becomes dependent on his/her family in his/her daily life. This study was planned to examine the effect of goal-directed GBI on activity performance participation and satisfaction level, as well as functional performance, for children with diparetic CP.

Keywords: cerebral palsy, rehabilitation, early diagnosis, function, therapy.

Introduction. Formulation of the problem. This study was conducted to examine the effects of goal-directed GBI on children's functional performance in children with diparetic CP, to measure the change in activity performance-satisfaction levels, and to determine the satisfaction of families with this intervention. Compared to the control group, the addition of targeted GBI to routine neurodevelopmental treatment was observed to increase the activity performance and satisfaction of children with CP. It was determined that the families' satisfaction level with this intervention was high. In addition to the movement and posture problems that constitute the basic clinical picture of individuals with CP; It is known that they experience a wide range of limitations in cognitive, behavioral and social areas. These limitations; It makes functional activities such as eating, personal hygiene and mobility a significant challenge. In addition, it is a known fact that children with CP are in a disadvantaged group in terms of participation in games. However, the game; It is one of the basic daily life activities that supports all areas of the child's social, emotional, physical and cognitive development and builds the basis of the child's knowledge and experiences of the world.

The main goal in the rehabilitation of CP is to support children's participation in daily life activities. In a systematic review by Case-Smith. It has been stated that approaches that include play activities that are meaningful for the child, coordinated progress with the family, and individual goals lead to significant changes in motor performance. It has also been stated that by including motor learning strategies in these programs, the goals will be progressed with stronger steps. Therapies commonly used in the rehabilitation of CP include disorder-focused bottom-up approaches based on normalization of motor movement. However, these traditional approaches focusing on the sub-components of performance have been shown to be insufficient in terms of supporting activity and participation. Current treatments within rehabilitation approaches focus on top-down strategies that support the individual's role performance. These strategies, rooted in motor learning principles, prioritize activity performance, unlike theories that focus on impairment in body structure and functions.

Analysis of the latest relevant research and publications. This study is based on sources written by various authors, such as "Cerebral palsy and fetal inflammatory response syndrome: a review" by A. Bashiri, E. Burstein, M. Mazor (Bashiri, 2006); "Antenatal risk factors for cerebral palsy" by B. Jacobsson and

G. Hagberg (Jacobsson, 2004); “Changes in Cardiorespiratory Responses and Kinematics With Hippotherapy in Youth With and Without Cerebral Palsy” by B.R. Rigby, A.R. Gloeckner, S. Sessums, B.A. Lanning, P.W. Grandjean (Rigby, 2017); “Surveillance of cerebral palsy in Europe: a collaboration of cerebral palsy surveys and registers” by C. Cans (Cans, 2000); “Enabling physical activity participation for children and youth with disabilities following a goal-directed, family-centred intervention” by C. Willis, A. Nyquist, R. Jahnsen, C. Elliott, A. Ullenhag (Willis, 2018); “Postural Control in Sitting Children with Cerebral Palsy” by E. Brogren, M. Hadder-Algra, H. Forssberg (Brogren, 1998); “Current psychological problems of personality formation” by A.S. Bayramov (Bayramov, 1981); “Rehabilitation plan and team approach in children with cerebral palsy” by M.K. Günel (Günel, 2018); “Clinical spectrum of cerebral palsy in north India-an analysis of 1000 cases” by P.D. Singhi, M. Ray, G. Suri (Singhi, 2002); “Movement and Posture Disorders”, Physiotherapy in Cerebral Palsy” by G.M. Kerem and A. Livanelioğlu (Kerem, 2009); “Development and reliability of a system to classify gross motor function in children with cerebral palsy” by R. Palisano, P. Rosenbaum, S. Walter, D. Russell, E. Wood, B. Galuppi (Palisano, 1997); “Cerebral Palsy in 1–12 Year Old Children in Southern Iran” by S. Inaloo, P. Katibeh, M. Ghasemof (Inaloo, 2016); “Detskij cerebral'nyj paralich” by L.M. Shhipicyna, I.I. Mamajchuk and others have been studied.

Aim and tasks. *The purpose of the study* is to analyze the features of the development of coherent speech of preschool children with cerebral palsy in the learning process and to develop training methods for its development. In accordance with the purpose of the study, the following tasks were set:

1. To study the literature on this problem and provide a psychological, pedagogical and theoretical justification of the problem.

2. To study the features of the development of coherent speech in children of senior preschool age with cerebral palsy.

3. To develop a system of classes for the development of coherent speech in children of senior preschool age.

4. To conduct classes on the development of coherent speech for children of senior preschool age.

The theoretical backgrounds. When we look at the place of targeted therapies as one of the current approaches in the literature, it is seen that there is strong evidence for the rehabilitation of CP. In the systematic review by Novak et al. in which they examined evidence-based interventions for CP, goal-oriented/functional treatments were among the approaches recommended to be continued. These approaches, which offer individual-specific strategies as required by the complex structure of CP and focus on activity rather than disorder, provide remarkable improvements in activity participation and performance. However, in the systematic review conducted by Carlberg and Löwing, it was stated that these treatments do not have a standardized procedure and a call was made for future studies to better understand the most effective components in the treatment. Although activity-oriented approaches constitute the main element of the occupational therapy perspective, it is known that the rate of use of these approaches in play-based treatments is very low. Among the reasons for this situation: obstacles such as time pressure on game-based programs, limited choice of game materials, inadequacy of the literature on the dynamics of the activity, and the tendency of clinical practice to component-oriented approaches were listed. Recent research has expressed the need to develop play-based interventions that include different play approaches and are meaningful for the child and to include them in the rehabilitation program. Despite this need highlighted by the literature, the number of comprehensive studies describing how occupational therapists practice gaming and the place of play in therapy practice is limited. The literature contains many studies in terms of identifying the participation limitations and activity problems of children with CP in daily life.

In the study conducted by Jacobsson and Hagberg (Jacobsson, 2004) to determine the activity and participation limitations of children with CP aged 5–8 years, 176 children were evaluated. It was reported that all children had problems in mobility, 71% in school education, and 57% in social functioning.

In their study of 181 children with CP, Chan (Cans, 2000) reported that significant difficulties were experienced in the areas of mobility and self-care, and that traveling caused intense stress on caregivers. In the study by Rigby [3] where they evaluated the activity limitations of children with CP, parents reported that they had 58.3% problems in self-care, 34.5% in game participation and 7.2% in socialization. In their study, Majnemer et al. described the leisure activity preferences of children with CP and their relationship with participation.

The areas most preferred by children were determined as recreational activities (games, artistic activities, watching movies, etc.), individual physical activities, and socialization (meeting with friends, calling). In Willis's (Willis, 2018) cross-sectional study examining problematic issues in participation areas, the self-reported activity priorities of the adolescent group were determined as 57% active leisure, 55% mobility, 48% education and 44% socialization.

Research methods. The following research methods were used during the research: analysis of psychological and pedagogical literature, observation, experiment, psychodiagnostic methods, qualitative and quantitative analysis of the research results. Literature analysis is an important method in researching the relevant problem. In addition, analysis of the content of the obtained materials, synthesis of different resources, analysis of statistical and theoretical data was carried out.

Mathematical-statistical methods. The data obtained through questionnaires and experimental methods were systematized and grouped, based on this, generalizations were made, and it was possible to determine quantitative dependencies between the studied psychological events and processes.

Results of the research. The term Cerebral Palsy (CP) does not describe the existence of a specific disease, but rather describes a group of diseases with different severities and similar developmental problems. According to a general definition made by an international panel, CP is defined as follows: “It is a group of permanent diseases in which postural and movement disorders caused by a number of non-progressive disorders occurring in the developing brain lead to activity limitations”. The motor disorders of CP are also accompanied by sensory disorders, cognitive disorders, perceptual problems, communication and behavioral problems, as well as epilepsy and secondary musculoskeletal system problems (Bashiri, 2006: 5–6).

CP is one of the most common motor disorders of childhood. According to social records, the prevalence of CP is generally seen as 1.5–2.5 per 1000 live births. In our country, this rate is 4.4 per 1000 live births (Rigby, 2017: 27). CP is a condition that lasts a lifetime and carries together physical as well as sensory, cognitive, psychological and social adaptation problems and creates functional disability. The resulting disability increases with age and aging begins relatively earlier. The care process and rehabilitation approaches should cover the age at which the diagnosis is first made, and even the periods of infancy and adulthood when CP may be at risk.

Almost all children with CP have a normal life expectancy, although 5–10% may die during childhood. The risk of early mortality is high in children with severe physical impairment accompanied by epilepsy and intellectual problems (Jacobsson, 2004: 431). It is therefore notable that less attention has been paid to long-term prognosis. Information obtained from long-term prognosis can be used not only in counseling parents, but also in therapy and concepts of therapy in infancy. In approximately 60% of the total CP population, ambulation is achieved independently (35.5% disability level, I; 24.5% disability level II); assisted ambulation is available in approximately 10% (10.7% disability level, III); Mobilization is provided with a wheelchair in approximately 30% (disability level, IV, in 12.2%). In the remaining 14.1%, disability level is V and ambulation cannot be achieved. CP is accompanied by a number of other disorders that are at least as important as the physical disability and affect the results: pain (in 3/4), intellectual disorders (in 1/2), inability to walk (in 1/3), hip dislocation (1/4), speech problems (1/4), epilepsy (1/4), behavioral disorders (1/4), bladder incontinence (1/4), sleep disorders (1/4) in 1/5, vision problems (in 1/10) and hearing loss (in 1/25). All these accompanying problems affect both the child's independence and the care and rehabilitation processes (Bayramov, 1981: 41).

Children with CP without intellectual disabilities can usually perform his/her daily activities, mobility and communication on his/her own. However, families of children report that 70% of children have some problems with daily life. It has been reported to occur in activities such as self-care (59%), gaming (37%), and school activities (52%) (Cans, 2000). Children with CP experience serious difficulties with social integration. This also applies to suitable leisure activities such as sports activities (Brogren, 1998).

Management of problems in children with CP varies from child to child. In some children, problems manifest themselves to varying degrees immediately after birth, while in others, the problem occurs in early childhood. Brain damage that occurs for various reasons begins to manifest itself with various symptoms as the child grows. Therefore, all health professionals working in the field of CP should evaluate the child comprehensively with evaluation methods appropriate to their field of expertise. The rehabilitation process in children with CP is like a very complex and multi-factor equation. Achieving the desired goal depends on many disciplines working together. Hence today, rehabilitation approaches are considered within the concept of team approach, and this is a necessity for the success of rehabilitation. The roles of the relevant disciplines in rehabilitation also vary, as the characteristics of the child and the family and the situations that create or may create obstacles create different situations for each child. The treatment plan or therapy plans within this scope are decided after a comprehensive evaluation after a definitive diagnosis (Günel, 2008). First of all, the family and the child are at the center, along with the family's expectations and the child's needs. Children's multifaceted therapy requires to be evaluated holistically. These evaluations should be made simultaneously in an environment where all physicians, therapists and specialists are together, observing the family and the child in a natural environment, and the professionals should convey their opinions to each other in the same environment. In this way, it may be possible to determine the most effective therapy and care programs for the child and family.

“Rehabilitation” approaches in children with CP is a phenomenon that requires a professional and multidisciplinary team approach to the problems caused by physical, sensory-perception, cognitive and social problems in the child, which may occur due to prenatal, birth or postnatal reasons.

Today, interventions in CP aim to identify functional and structural disorders in the body, minimize restrictions in activity, improve functional skills, and support the child's participation in age-appropriate environments. At an early age, the focus is on developing all developmental areas. Targeted therapies in rehabilitation practices are set of movements organized around a behavioral goal. The functional target is used to develop movement strategies, and the formation of the movement is enriched by the environment (Günel, 2018).

It is prioritized that therapies and care systems must be functional in accordance with the contents of the International Classification of Functions (ICF) in order to enable activity and participation. Targeted neuromotor therapy is a functional treatment application in children that complies with the “Activities and Participation” field of the ICF. Rehabilitation methods for children with CP are handled within the framework of ICF (Singhi, 2002). In addition to team members' detailed evaluation of children in their own fields, the first requirement for working

together is for the entire team to establish a common language. First of all, it is very important that the team uses a common language in the classification of CP. Classifications can be examined under various headings according to the affected body parts (topographic), clinical type in line with motor findings, causing pathology and severity of involvement. Since the pathology and etiology are unclear in many cases, the most commonly used system today is the classification system of SCPE (Surveillance Cerebral Palsy Europe), which is based on clinical features. The SCPE classification system is on its way to creating an international language. The system adopted by SCPE classifies CP as spastic, bilateral spastic (quadriplegic/diplegic), unilateral spastic (hemiplegia), dyskinetic, dystonic and choreoathetoid and ataxic (Palisano, 1997).

Another important concept is the five-level classification systems, which are important in determining the treatment, therapy and care strategies and methods of children with CP among the team. Gross motor classification system (GMFCS) is a system that evaluates the functional skills that the child with CP can perform on his own in sitting and walking, as well as the need for a walker and wheelchair. This system is a classification that can be used as a reference in determining the age-specific disability level of the child with CP and also the adaptive device needed for independent ambulation. The Manual Skills Classification System (MACS) determines how children with CP grasp objects in daily activities. It consists of a total of five levels that increase inversely with the skill level, and each level corresponds to children's ability to grasp objects spontaneously. The Communication Functions Classification System (CFCS) evaluates the communication functions of an individual with CP in daily life on a five-level scale. The International Classification of Health, Disability and Functioning (ICF-CY) perspective defined by the World Health Organization (WHO) focuses on activity and participation. Eating and Drinking Skills Classification System (EDACS) is a scale that evaluates eating and drinking skills in children with CP in a five-level classification system. This classification system is an analogue and complement of classification systems such as GMFCS, MACS and CFCS (Rigby, 2017: 30–32).

In the treatment of motor and sensory disorders of children with CP, physiotherapists focus on gross motor skills and functional mobility. Positioning, sitting, walking with or without the aid of supportive devices or orthoses, ensuring the functional status required for wheelchair use and transfers, and preventing secondary problems are the main areas that the physiotherapist works on. The physiotherapist plans and implements the physiotherapy program and the home program that the family will apply at home, prepares the child for the school environment and recommends the necessary equipment and orthoses. At the same time, it focuses on the visual-motor and sensory skills necessary for basic daily activities such as eating, dressing, toileting and bathing. Physiotherapy approaches also include strategies to help students gain school-related skills and compensate for deficiencies that make daily life difficult (Singhi, 2002).

Effective evaluation is necessary for physiotherapy practices. In the evaluation of a child, questions such as “Why is physiotherapy necessary?”, “What are the effective neurophysiological and biomechanical mechanisms?”, “How do the accompanying problems affect the situation?”, “What is the general structure of the child and the family that will affect the therapy?” Answers to questions such as these should be sought. Motor evaluation should include changes in muscle tone, contraction capacity of muscles, involuntary limb and trunk movements, stability of trunk and extremities, correction and balance responses, sitting balance, upper extremity and hand functions, sensory-perceptual problems, speech and language function, and nutritional status. In addition, orthoses, mobilization and other adaptation devices, the child's general health condition and the family's sociocultural and economic conditions should also be evaluated. Realistic goals should be defined and any changes in the treatment process should be evaluated with other members of the treatment team, family, and child. If we group the physiotherapy approaches applied in the field of CP, we can summarize them as approaches to adjust the neurophysiological foundations, approaches based on the principle of motor learning, approaches to treat specific symptoms (developmental, orthopedic and neurological) and pre- and post-physiotherapy applications.

When we look at the necessary conditions for applications, we see motivation for independent and functional activities, sampling of the desired movement or activity, as well as motivation for special demonstration and imitation, senses, selection of adequate and reasonable short and long-term goals to increase both motivation and adaptation in treatment and daily life, positive feedback even for small successes to support learning, and the importance of repetition to increase and consolidate the storage of learning contents should be taken into account (Kerem, 2009: 33).

Today, it is assumed that therapy effects and progress achieved are based on the same neurophysiological foundations as normal psychomotor development. Therapeutic interventions, even if they are limited and specific (such as a foot-ankle orthosis), have effects on the whole organism because they change the sensory chain. If these lead to improvement in target-oriented functions and skills, they are used repeatedly and thus stored in long-term memory. Here, the abilities and possibilities of self-organization and plasticity of the central nervous system are assumed. For therapy, there is a wide variety of therapy approaches that are based on different theoretical principles and use different techniques and methods. There is little documented scientific evidence regarding the effectiveness of these different approaches, leading to the existence of additional and opposing physiotherapy approaches (Singhi, 2002: 165–166).

The goals of physiotherapy and rehabilitation approaches are normal development, especially motor development, improving muscle tone, increasing the development of correction reactions, improving visual and

auditory reactions, preventing musculoskeletal system deformities, normalizing sensory and motor experiences, providing family education, and monitoring neuromotor changes with regular checks. Chronological age, age at starting physiotherapy, presence and severity of abnormal reflexes, insufficiency of postural reactions, muscle tone problems, co-occurring cognitive problems, hearing-vision-sensory-perception problems, general health status, family support and economic situation are also important in determining the appropriate physiotherapy approach is happening.

The physiotherapist who applies developmental therapy first observes, analyzes and interprets the child's current performance. Then, it aims to ensure that the child reaches the maximum level of independence in line with the potential assessment results and existing limitations. There are no strict rules regarding the intensity of practice. However, after orthopedic interventions and neurosurgeries, intensified therapy is critical in growth spurts that may affect the child's movement biomechanics or in the process of achieving a specific task. In this way, motivation can be provided for new skill acquisition.

Early detection of developmental problems in babies at risk of CP, especially in the first year of life, is very important for early intervention, supportive therapies and rehabilitation approaches during the first year of life. Early diagnosis and classification are important to support risky babies and provide appropriate services in the early period. Planning the appropriate intervention, monitoring the changes, evaluating the environment, supportive treatments and rehabilitation approaches constitute the main elements of habilitation. Since the survival chances of premature babies have increased with today's intensive care conditions and facilities, they constitute the largest group at developmental risk. These children have a risk of neurodevelopmental disorders such as motor problems, movement coordination disorder, cognitive impairment, attention deficit, learning disability, and a 5–15% risk of CP. Recognizing risky babies at an early stage and monitoring them with holistic and family-oriented physiotherapy and rehabilitation methods determined by neurodevelopmental evaluation will support neural plasticity and contribute to the solution of possible neurodevelopmental problems. Physiotherapists and health professionals who will work in this field need to improve their training and experience regarding the evaluation and therapy of premature babies. Targeted, family-oriented physiotherapy practices that support neurological development and are shaped by expert physiotherapists support neural plasticity. The main purpose of the “habilitation” approaches applied when necessary for premature babies is to provide normal functional movements and normal sensory input by using the rapid learning and adaptation ability of the brain plasticity, which is physically, cognitively, psychologically and socially possible within the child's physiological and anatomical deficiencies and environmental limitations. We can define it as reaching the most independent levels (Rigby, 2017: 27–32).

Conclusions. In our study examining the effectiveness of goal-oriented GBI in children with CP, the following results were obtained.

1. In our study it was revealed that goal-oriented GBI is an approach that can be used in the treatment process, with significant improvement in activity performance and satisfaction results.

2. It has been determined that goal-oriented GBI provides improvement in the areas of self-care, mobility and social function of functional performance in children with diparetic CP. It has also been shown to be an effective approach in reducing caregiver assistance.

3. One of the important contributions of this study is that it presents an intervention trial based on top-down strategies and motor learning principles in order to develop globally accepted and standardized game programs in the rehabilitation of CP. In addition, this study draws attention to the value of playing, which is both a goal and a basic tool in the rehabilitation of children with CP.

4. The effectiveness of GBI intervention in children with CP has been examined mainly on physical findings, but no studies have been found evaluating the results on activity role performance and satisfaction. In future studies, it will be valuable to examine the effectiveness of goal-directed GBI on cognitive status and psychosocial components in children with CP.

5. Although the change in functional performance was evaluated with GBI in our study, it was observed that some improvements in performance were not reflected in the evaluation and intermediate values were lost due to the binary Likert structure of GBI. We recommend that different inventories containing broader Likert measurements be preferred in future studies to evaluate the results of target-oriented GBI.

6. We also think that it is important to examine the effectiveness of goal-directed GBI in terms of activity performance-satisfaction and functional performance for both different types and levels of CP and other neurodevelopmental disorders in further studies.

7. The fact that the children in this study were distributed between the ages of 4–12 affected the situation in which the goals were determined by asking the family or the child. While targets are determined by the family for children in the younger age group, they are created by asking the common opinion of both the family and the child in the older age group. Considering that this situation may affect target activities and game preferences, it would be valuable to consider age groups in future studies.

8. In this study, which aims to evaluate only the families in the goal-oriented GBI group in terms of treatment satisfaction, although the satisfaction level was found to be high, questioning the satisfaction levels of the families in the control group may be included in future studies.

9. Future studies involving target-oriented GBI, carried out in interdisciplinary collaboration, will be valuable in terms of contribution to the literature.

10. In the future, there is a need to conduct follow-up studies examining the long-term effect of targeted GBI.

In this study, it was seen that goal-oriented GBI increased children's activity performance and satisfaction levels and had a healing effect on functional performance results, and all our hypotheses were confirmed at the end of the process. We think that the rehabilitation program will be positively affected by adopting the target-oriented GBI, which has a high level of family satisfaction, by the family and increasing its applicability at home.

In this study, a new approach was introduced that integrates top-down strategies and motor learning principles in a game-based intervention. Since this is the first controlled study examining the effectiveness of this approach on the functional performance of children with diparetic CP, it would be valuable to conduct further studies that include goal-directed GBI.

All the theoretical and research approaches mentioned in our article suggested that the personality is formed in the voluntary sphere of behavior and evaluated the relevant exceptions as pathology. We can give this interpretation that most of the theoretical and research approaches given to the personality so far prove the existence of the personality in the willful sphere of behavior.

Розвиток мовленнєвої моторики в дітей із ДЦП

Лі Ісюань

докторант відділу спеціальної освіти
Азербайджанського державного педагогічного університету,
Баку, Азербайджан

Дитячий церебральний параліч (ДЦП) – це довічний невроматураційний розлад, який характеризується проблемами руху й постави, що виникає внаслідок непрогресуючого ураження мозку плода чи немовляти, що розвивається. Незважаючи на те що це найпоширеніший фізичний розлад у педіатричній віковій групі, повідомляють, що поширеність ЦП досягає 17 мільйонів у всьому світі. Діти з ДЦП стикаються з багатьма проблемами, які впливають на повсякденну діяльність і функціональну продуктивність. У разі ДЦП розлади рухів і постави становлять основну клінічну картину, а супутні сенсорні проблеми, втрати когнітивних функцій, дефіцит сприйняття й поведінки негативно впливають на розвиток дитини, функціональні навички, незалежність у повсякденному житті, участь у грі. Співпраця мультидисциплінарної команди в лікуванні ДЦП, що супроводжується фізіологічними, фізичними, соціальними та різними функціональними розладами, є надзвичайно необхідною для успіху реабілітаційного процесу. Таке лікування може тривати все життя: включає медичні втручання, навчальні практики, фізіотерапію, трудотерапію та відповідні підходи до ортезів. Ми не знайшли жодного дослідження, яке б оцінювало ефективність цілеспрямованого ігрового втручання, що базується на підходах зверху-вниз і стратегіях рухового навчання, щодо функціональної продуктивності дітей із ДЦП. Дитина з ДЦП, яка змушена продовжувати своє життя без цих механізмів, відчуває труднощі у збереженні постурального контролю в установлення рівноваги. Як наслідок, дитина з ДЦП не може набути необхідних рухових навичок і стає залежною від сім'ї в повсякденному житті. У дослідженні заплановано вивчити вплив цілеспрямованого ОТМ на участь у діяльності й рівень задоволеності, а також функціональну продуктивність дітей із дипаретичним ЦП.

Ключові слова: дитячий церебральний параліч, реабілітація, рання діагностика, функція, терапія.

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