# ТЕРАПІЯ ТА РЕАБІЛІТАЦІЯ

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## IMPACT OF OCCUPATIONAL THERAPY INTERVENTIONS ON ACTIVITIES OF DAILY LIVING IN MIDDLE CHILDHOOD

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*The goal of the research is to assess the effectiveness of occupational therapy in improving self-care skills and quality of life in children of middle childhood with the hemiparetic form of cerebral palsy.*

*The study included 40 children aged 9–12 years, comprising 18 boys and 22 girls. The participants were assigned to two groups. The control group (CG) followed a nine-week standard rehabilitation program, receiving services from an occupational therapist, physical therapist, speech therapist, and psychologist. The experimental group (EG) underwent constraint-induced movement therapy (CIMT) as part of their occupational therapy sessions.*

*The effectiveness of the developed intervention algorithm was evaluated by analyzing changes in pROM, the self-care domain of the WeeFIM scale, and PedsQL scores reported by both parents and children. Occupational therapists performed assessments prior to the intervention and after three weeks of therapy.*

*Results. The mean age of the children was 10.7 ± 0.98 years, with no statistically significant age differences between the groups. Additionally, the initial assessment results revealed no significant differences between the groups.*

*The mean ± SD self-care domain scores of the WeeFIM scale were 48.6 ± 0.52 in CG and 44.4 ± 1.25 in EG. The mean ± SD total PedsQL scores reported by parents were 73.5 ± 0.76 in CG and 71.2 ± 1.25 in EG, while the PedsQL scores reported by children were 75.9 ± 1.26 in CG and 72.4 ± 1.35 in EG. A comparison between the groups revealed statistically significant differences.*

*Following the follow-up assessment, statistically significant differences were confirmed between the groups ($p < 0.05$). The mean ± SD WeeFIM scale scores were 51.7 ± 0.85 in CG and 50.6 ± 1.24 in EG. The PedsQL scores reported by parents were 79.7 ± 1.94 in CG and 83.6 ± 1.57 in EG, while the PedsQL scores reported by children were 79.8 ± 2.37 in CG and 83.0 ± 1.98 in EG.*

*Conclusions. A comparison of the follow-up assessment results between the experimental group (EG) and the control group (CG) demonstrated a statistically significant improvement in both groups. Statistical analysis of the initial and follow-up assessments indicated that children in the EG, who received CIMT for 3 weeks, exhibited greater improvements in upper extremity (UE) functionality, daily living skills, and quality of life compared to the CG, which received occupational therapy interventions without constraint of the unaffected UE, focusing primarily on enhancing self-care skills.*

*These findings confirm the effectiveness of CIMT in promoting greater independence and functional recovery in children with hemiparetic cerebral palsy.*

***Key words:*** *rehabilitation, occupational therapy, school environment, occupational therapy services, quality of life, recovery, independence, self-care, occupational participation, activities of daily living.*

**Маргарита Виноградова, Олександра Калінкіна. Вплив ерготерапевтичних утручань на активність повсякденного життя дітей періоду другого дитинства**

*Метою дослідження є оцінка ефективності впливу ерготерапії на рівень самообслуговування та якість життя дітей періоду другого дитинства з геміпаретичною формою церебрального паралічу.*

*Матеріали та методи. У дослідженні взяли участь 40 дітей віком 9–12 років, із яких 18 хлопчиків та 22 дівчинки. Учасники були розподілені на дві групи. Контрольна група (КГ) проходила 9-тижневу стандартну програму реабілітації, отримуючи послуги ерготерапевта, фізичного терапевта, логопеда та психолога. Основна група (ОГ) отримувала індуковану обмеженням рухову терапію (CIMT) у рамках занять з ерготерапевтом.*

*Ефективність розробленого алгоритму втручання оцінювали на основі динаміки pROM, домену самообслуговування шкали WeeFIM та показників PedsQL, отриманих від батьків та дітей. Оцінювання проводили до початку втручання та через три тижні після терапії.*

*Результати. Середній вік дітей становив 10,7±0,98 роки, без статистично значущих відмінностей між групами. Початкові результати оцінювання також не показали значущих відмінностей між групами.*

*Середні показники самообслуговування за шкалою WeeFIM (M ± SD) становили 48,6 ± 0,52 у КГ та 44,4 ± 1,25 у ОГ. Загальні показники PedsQL, отримані від батьків, становили 73,5 ± 0,76 у КГ та 71,2 ± 1,25 у ОГ, а від дітей – 75,9 ± 1,26 у КГ та 72,4 ± 1,35 у ОГ. Порівняння груп виявило статистично значущі відмінності.*

*Після повторного оцінювання статистично значущі відмінності між групами були підтверджені (p < 0,05). Середні ± SD значення шкали WeeFIM становили 51,7 ± 0,85 у КГ та 50,6 ± 1,24 у ОГ. Показники PedsQL, отримані від батьків, були 79,7 ± 1,94 у КГ та 83,6 ± 1,57 у ОГ, а від дітей – 79,8 ± 2,37 у КГ та 83,0 ± 1,98 у ОГ.*

*Висновки. Порівняння результатів повторного оцінювання між ОГ та КГ показало статистично значуще покращення в обох групах. Статистичний аналіз початкових та повторних оцінювань показав, що діти з ОГ, які отримували CIMT протягом трьох тижнів, продемонстрували більше покращення функціональності верхньої кінцівки, навичок повсякденного життя та якості життя, ніж діти з КГ.*

*Ці результати підтверджують ефективність CIMT у підвищенні незалежності та функціонального відновлення у дітей із геміпаретичною формою ЦП.*

***Ключові слова:*** *реабілітація, ерготерапія, шкільне середовище, ерготерапевтичні послуги, якість життя, відновлення, незалежність, самообслуговування, заняттєва активність, активність повсякденного життя.*

**Introduction.** Cerebral palsy (CP) is a group of permanent neurological disorders that affect movement development and limit activity. These non-progressive conditions, which emerge during fetal or infant brain development, can lead to motor impairments and functional limitations, with their severity and type varying depending on etiology [1, 2].

The etiology of CP is multifactorial and may be associated with prenatal, perinatal, or postnatal causes. CP is often accompanied by comorbid conditions, including epilepsy, musculoskeletal disorders, intellectual disabilities, feeding difficulties, visual and auditory impairments, and communication challenges [1,3].

Once CP is diagnosed, a comprehensive care plan is essential to enhance quality of life. Given the broad functional impact of CP, its management requires a multidisciplinary approach, integrating various medical, therapeutic, and supportive interventions [3, 4].

Cerebral palsy remains the leading cause of childhood disability, with an incidence of 1.5–2.5 cases per 1,000 live births. The prevalence is significantly higher in preterm infants than in those born at term, with the risk of CP increasing as gestational age decreases. Infants born before 28 weeks of gestation are at the highest risk. Additionally, CP prevalence is greater among low-birth-weight infants (<1500 g), who are considered the highest-risk group, with 5 % to 15 % of infants born under 1500 g developing CP. Prenatal factors account for approximately 80 % of CP cases, while postnatal events contribute to around 10 % [1,4].

Congenital hemiplegia is present in 50 % of children with CP, making it the most common physical disability in childhood [7].

The rehabilitation of children with CP is complex and multifaceted, requiring a combination of medical and surgical interventions, physical therapy, occupational therapy, speech and language therapy, leisure activities, preparation for education or productive activities, psychosocial support, and the selection and training in the use of orthoses and assistive technologies [8].

In Ukraine, as well as globally, the prevalence of CP is increasing. Worldwide, the incidence of CP is estimated at 2–2.5 cases per 1,000 live births. In Ukraine, this rate ranges from 2.3 to 4.5 cases per 1,000 children, with approximately 30,000 individuals affected by the condition. Among them, nearly 19,000 are children under the age of 16. Additionally, around 30 % of individuals with CP present with severe forms of the disorder, requiring a personalized approach to socialization [5,6].

Occupational therapy (OT) focuses on developing essential skills required for participation in daily activities, serving as a key factor in improving functionality, engagement, participation, and overall quality of life for both the child and their caregivers. As a relatively new profession in Ukraine, OT is recognized as a core component of rehabilitation and an important area of research [8–9].

Occupational therapy is a clinical discipline and profession dedicated to the development, recovery, and maintenance of essential skills, enabling individuals to engage in meaningful daily activities. In pediatrics, OT focuses on helping children achieve functional independence in daily life, which includes self-care, play, learning, and social interaction [10,11,12].

Interventions in physical therapy and occupational therapy incorporate a broad spectrum of techniques and approaches, including classical neurodevelopmental therapy techniques, Cognitive Orientation to daily Occupational Performance (CO-OP), and CIMT.

For children with hemiparetic CP, CIMT is consistently recognized as a highly effective intervention for improving hand and UE function [13]. However, CIMT treatment protocols vary significantly in terms of dosage and constraint methods, creating uncertainty regarding the impact of these variations [6, 14].

CIMT involves high-dose therapy, typically ≥3-hour sessions, 5 days a week, for ≥2 weeks, along with constraint of the non-hemiparetic UE, and the application of operant conditioning and motor learning techniques to facilitate skill acquisition and functional improvements [15, 6]. However, high-dose CIMT can be costly and stressful. Theories of experience-driven neuroplasticity support the dose-response principle, suggesting that higher doses result in greater brain and behavioral changes [16, 17, 6].

**Alignment with Research Programs and Plans.** This study was conducted as part of the National University of Physical Education and Sport of Ukraine research plan for 2021–2025, under the topic: "Enhancing Functional Independence and Occupational Participation of Individuals from Various Nosological Groups Through Occupational Therapy Interventions", State Registration No. 0121U107532.

**The goal.** To assess the effectiveness of occupational therapy in improving self-care skills and quality of life in children of middle childhood with the hemiparetic form of CP.

**Materials and Methods.** The study included 40 children aged 9–12 years, comprising 18 boys and 22 girls. Participants were divided into two groups. The CG underwent a 9-week standard rehabilitation program, receiving services from an occupational therapist, physical therapist, speech therapist, and psychologist. The EG received CIMT as part of their occupational therapy sessions.

Both groups followed a normal distribution, with no significant differences in gender distribution. The mean age of participants was 10.7 ± 0.98 years, with no statistical differences between groups. Baseline assessments also showed no significant differences between the groups.

The inclusion criteria for CIMT participants followed the minimum movement requirements [18]:

- 20° wrist extension
- 10° thumb abduction
- 10° finger extension
- 45° active shoulder flexion and abduction
- 90° active elbow flexion

Additionally, participants were required to have spasticity levels of 0, 1, or 1+ on the Modified Ashworth Scale [18]. All children in both the EG and CG met these criteria.

Exclusion criteria included: uncontrolled seizures, botulinum toxin injection within the past 6 months, severe cognitive impairments, cardiopulmonary conditions, history of surgery or trauma within the past year.

The effectiveness of the developed algorithm was assessed based on the dynamics of pROM, the self-care domain of the WeeFIM scale, and PedsQL scores for parents and children. Occupational therapists conducted assessments before the intervention and after three weeks of therapy.

Patient inclusion was carried out with physician approval and informed parental consent.

On days 1–3, children underwent a comprehensive assessment by all specialists. Interviews were conducted with parents and the child, goals were set, and a method for constraining the unaffected UE was selected. An individualized intervention program was developed, and fixation devices for the unaffected UE were fabricated.

The occupational therapy sessions for the EG were conditionally divided into three parts:

- Exercises aimed at increasing range of motion, strength, and coordination of the affected limb, as well as improving fine motor skills.
- Performance of activities of daily living (ADL) and instrumental activities of daily living (IADL) with immobilization of the unaffected UE.
- Performance of ADLs and IADLs without fixation of the unaffected UE (using bimanual coordination).

Bimanual training was conducted for 40 minutes, three times per week, starting from the second week. Other occupational therapy sessions were held daily for 1 hour and 20 minutes. Tasks were adapted according to the applied intervention method.

During therapy, we implemented the Shaping method, which is the primary method used in CIMT worldwide [19]. Shaping is a learning approach in which a target skill is achieved by breaking it down into smaller, progressively challenging steps, tailored to the child's motor abilities. Key Principles of the Shaping Method:

- The difficulty level of each task should be higher than what the child can easily accomplish but not so difficult that they are unable to complete it at all.
- Shaping is based on three parameters: time, number of repetitions, and distance or positioning of the activity. These parameters are adjusted dynamically to improve performance.
- The complexity of the task increases by modifying only one parameter at a time – either time, number of repetitions, or distance/positioning.
- The difficulty level is increased only when the child can complete the task fully but with some effort. Tasks should not be made too easy, as this can reduce motivation and limit progress [19].

During the intervention process, children worked toward achieving individual short-term and long-term goals, formulated using the COAST format (Client, Occupation, Assist level, Specific condition, and Timeline) within a patient-centered rehabilitation model.

When designing the intervention algorithm, the multidisciplinary team followed the principles of the ICF-CY (International Classification of Functioning, Disability, and Health – Children & Youth version), considering the components of Body Functions & Structures, Activity, and Participation.

**Results and Discussion.** The assessment of children with hemiparesis began with analyzing medical records and conducting interviews with both the children and their parents, utilizing the components of the Person-Environment-Occupation (PEO) occupational therapy model.

The next step involved testing the active range of motion (pROM) of the paretic arm to determine whether the children met the minimum motor criteria for inclusion in CIMT. The test results are presented in Table 1.

Table 1

**Obtained pROM Data**

| Movement | Obtained pROM Data (°) | |
|---|---|---|
| | EG | CG |
| Thumb abduction | 39,7 ± 2,68 | 32,6 ± 1,39 |
| Wrist extension | 28,3 ± 1,58 | 22,8 ± 0,51 |
| Finger (II-V) extension | 13 ± 0,66 | 13,8 ± 0,81 |
| Shoulder flexion | 66,2 ± 7,46 | 60,4 ± 7,36 |
| Shoulder abduction | 80,6 ± 6,08 | 54,7 ± 4,21 |
| Elbow flexion | 93 ± 3,29 | 96,1 ± 2,78 |

All indicators met the minimum motor criteria for inclusion in CIMT (Figure 1).

In addition to pROM of the UE, spasticity criteria were assessed using the Modified Ashworth Scale, requiring a score of 0, 1, or 1+. All children in both the EG and CG met these requirements.

The recovery of UE function was evaluated based on testing results and their comparison with baseline data in EG and CG. Assessments were conducted at the first session and after three weeks (initial and follow-up evaluations). In some cases, interim testing was performed to adjust goals and intervention strategies. The final assessment took place three weeks after the initial evaluation.

The results of the follow-up pROM assessment for EG and CG, along with a comparison to the baseline assessment, are presented in Table 2.

When comparing the mean values of the follow-up pROM assessment with the baseline data (see Table 1), we observed a statistically significant improvement in both groups (Figures 2–3).

Analyzing the graphs, we can conclude the greater effectiveness of EG. The increase in the mean thumb abduction angle in EG was 8.2°, compared to 2.4° in CG. Wrist extension showed an increase of 5° in EG and 1.8° in CG. The mean finger (II–V) extension angle increased by 3.2° in EG and 0.3° in CG. Shoulder flexion increased by 20.6° in EG and 2.1° in CG. The mean shoulder abduction angle increased by 12.8° in EG and 3.7° in CG. The increase in elbow flexion in EG was 12.5°, compared to 2.8° in CG.

Effectiveness in both groups was higher in gross motor assessments than in fine motor skills. The greatest increase in ROM in EG was observed in shoulder flexion.

The WeeFIM assessment also demonstrated positive dynamics in both groups, with higher effectiveness in EG.

A comparison of initial and follow-up assessments for the self-care domain of the WeeFIM scale in CG and EG is presented in Table 3.

The dynamics of EG and CG relative to the baseline data are shown in Figure 4.

The mean increase in the WeeFIM scale score was 6.2 points in EG and 3.1 points in CG, with final

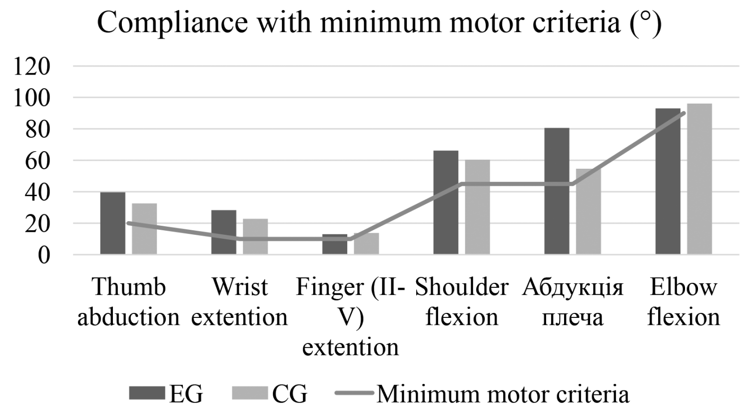


**Fig. 1. Compliance with Minimum Motor Criteria pROM**

Table 2

**Comparison of Initial and Follow-up pROM Assessment Results**

| Movement | Initial Assessment | | Follow-up Assessment | | Min. criteria |
|---|---|---|---|---|---|
| | CG | EG | CG | EG | |
| Thumb abduction | 32,6 ± 1,39 | 39,7 ± 2,68 | 35 ± 1,3* | 47,9 ± 2,64*# | 20 |
| Wrist extension | 22,8 ± 0,51 | 28,3 ± 1,58 | 24,6 ± 0,45* | 33,3 ± 1,63*# | 10 |
| Finger (II–V) extension | 13,8 ± 0,81 | 13 ± 0,66 | 14,1 ± 0,93 | 16,2 ± 0,71*# | 10 |
| Shoulder flexion | 60,4 ± 7,36 | 66,2 ± 7,46 | 62,5 ± 8,54* | 82,8 ± 12,31*# | 45 |
| Shoulder abduction | 54,7 ± 4,21 | 80,6 ± 6,08 | 58,4 ± 4,49* | 93,4 ± 7,61*# | 45 |
| Elbow flexion | 96,1 ± 2,78 | 93 ± 3,29 | 98,9 ± 3,05* | 105,2 ± 4,82*# | 90 |

Note: * – $P < 0.05$ compared to baseline values.
# – $P < 0.05$ compared to the control group.

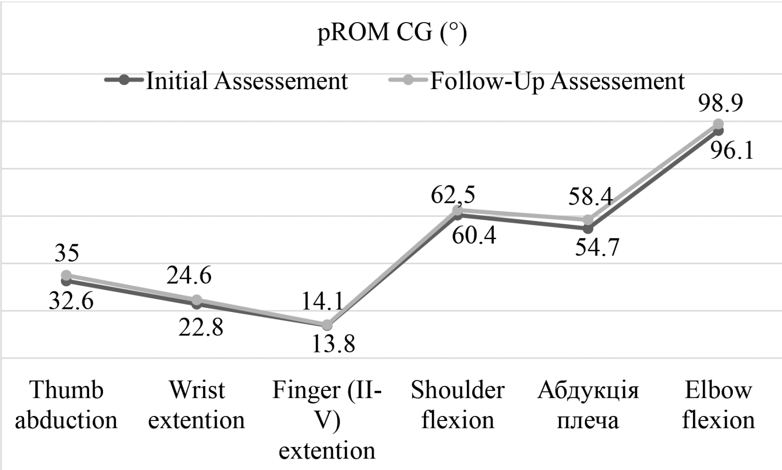


**Fig. 2. Comparison of Initial and Follow-up pROM Assessment Results in the CG**

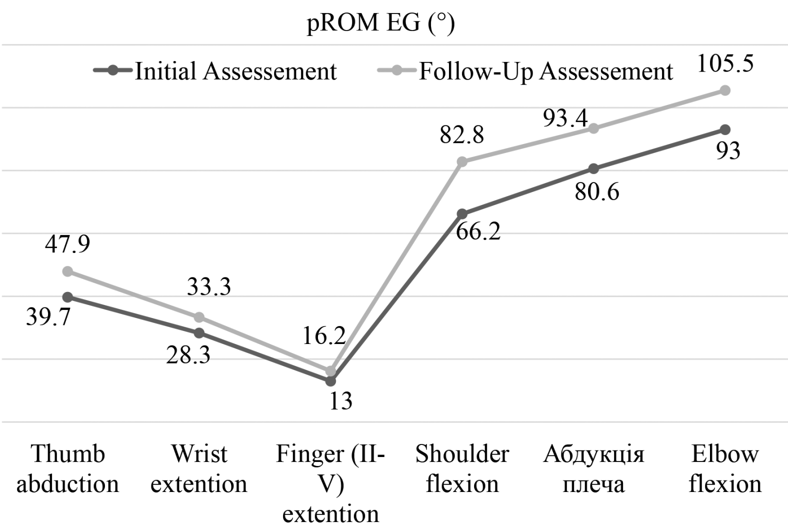


**Fig. 3. Comparison of Initial and Follow-up pROM Assessment Results in the EG**

scores of 50.6 ± 1.24 in EG and 51.7 ± 0.85 in CG, compared to the normal value of 56 points.

The improvement in self-care skills was particularly evident in the following areas:

– Hair brushing
– Bathing/showering
– Dressing the lower body
– Dressing the upper body
– Toileting

The mean PedsQL scores reported by both children and parents increased in both groups, but EG demonstrated greater effectiveness compared to CG.

The follow-up assessment results for both groups are presented in Table 4.

The dynamics of the comparison between initial and follow-up results in both groups are clearly illustrated in Figure 5.

Table 3

**Comparison of Initial and Follow-up WeeFIM Assessment Results**

| WeeFIM | Initial Assessment | | Follow-up Assessment | | Max. score |
|---|---|---|---|---|---|
| | CG | EG | CG | EG | |
| Self-Care Domain | 48,6 ± 0,52 | 44,4 ± 1,25 | 51,7 ± 0,85* | 50,6 ± 1,24*# | 56 |

Note * – $P < 0.05$ compared to baseline values.
# – $P < 0.05$ compared to the control group.

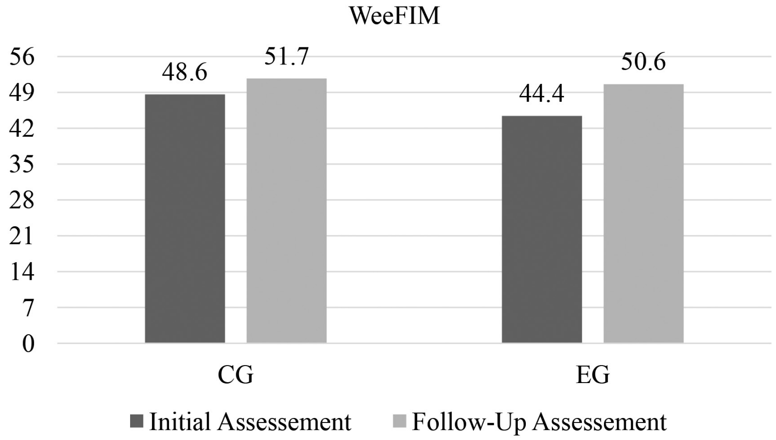


**Fig. 4. Comparison of Initial and Follow-up WeeFIM Assessment Results**

Table 4

**Obtained Results of the Follow-up PedsQL Survey**

| PedsQL | Initial Assessment | | Follow-up Assessment | | Max. score |
|---|---|---|---|---|---|
| | CG | EG | CG | EG | |
| Parents | 73,5 ± 0,76 | 71,2 ± 1,25 | 79,7 ± 1,94* | 83,6 ± 1,57* | 100 |
| Children | 75,9 ± 1,26 | 72,4 ± 1,35 | 79,8 ± 2,37* | 83 ± 1,98 | 100 |

Note * – $P < 0.05$ compared to baseline values.
# – $P < 0.05$ compared to the control group.

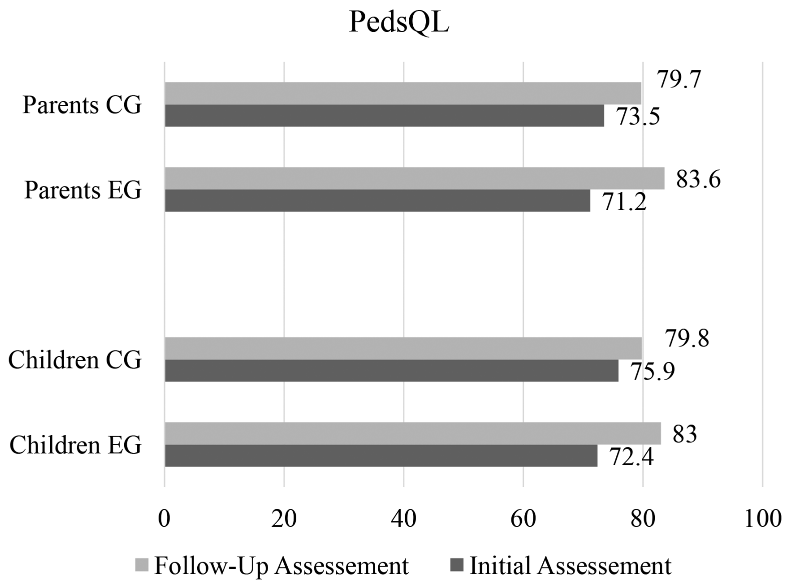


**Fig. 5. Comparison of Initial and Follow-up PedsQL Results**

The mean PedsQL scores reported by parents increased by 12.4 points in EG and 6.2 points in CG. The mean follow-up score in EG was 83.6 ± 1.57, compared to the normal value of 100 points.

Among children, the mean score increase was 10.6 points in EG and 3.9 points in CG. The mean follow-up score in EG was 83 ± 1.98, with a normal value of 100 points.

**Conclusions.** The analysis and synthesis of international scientific and methodological literature on occupational therapy interventions for children with hemiparesis in middle childhood highlight the high effectiveness of CIMT in functional recovery and the restoration of ADL and IADL performance. However, domestic literature reveals a lack of specific therapy for children with hemiparesis in Ukraine. The integration of innovative theoretical and practical knowledge is essential for the advancement of the rehabilitation process in Ukraine.

A comparison of follow-up assessment results between EG and CG demonstrated a statistically significant improvement in both groups. Statistical analysis of initial and follow-up assessments showed that children in EG, who received CIMT for 3 weeks, exhibited greater improvements in UE functionality, daily living skills, and quality of life compared to CG, which underwent occupational therapy without constraint of the unaffected UE, focusing primarily on self-care skills enhancement.

The study results confirm the effectiveness of the developed CIMT algorithm for children with hemiparesis in middle childhood.

**Prospects for Further Research.** Future research should focus on comparing the effectiveness of different CIMT modifications and developing an optimal approach based on UE function characteristics, cognitive and behavioral impairments, and the child's age. Additionally, further studies should assess the impact of repeated CIMT courses and determine the optimal time interval between intervention cycles to maximize therapeutic outcomes.

**BIBLIOGRAPHY**

1. Hallman-Cooper J., Rocha Cabrero F. Cerebral Palsy. Treasure Island (FL): StatPearls Publishing, 2024. 25 p. URL: https://www.ncbi.nlm.nih.gov/books/NBK538147/

2. Кущенко О. О., Вітомський В. В., Лазарєва О. Б., Вітомська М. В. Засоби ерготерапії у підвищенні рівня функціонування та незалежності дітей із церебральним паралічем. *Молодіжний науковий вісник Східноєвропейського національного університету імені Лесі Українки*. 2017. № 26. С. 94–102. URL: https://sportvisnyk.vnu.edu.ua/index.php/sportvisnyk/article/view/187

3. Morgan C., Fahey M., Roy B., Novak I. Diagnosing cerebral palsy in full-term infants. *Journal of Paediatrics and Child Health*. 2018. Vol. 54. № 10. P. 1159–1164. DOI: 10.1111/jpc.14177

4. Oskoui M., Coutinho F., Dykeman J., Jetté N., Pringsheim T. An update on the prevalence of cerebral palsy: a systematic review and meta-analysis. *Developmental Medicine & Child Neurology*. 2013. Vol. 55. № 6. P. 509–519. DOI: 10.1111/dmcn.12080

5. Мамотенко А. В. Особливості психічного розвитку дітей із церебральним паралічем. *Science, theory and ways to improve methods*: Abstracts of XVII International Scientific and Practical Conference, London, 1–3 May 2023 London, 2023. С. 46–50. URL: https://eu-conf.com/events/science-theory-and-ways-to-improve-methods/

6. Ramey S. L., DeLuca S. C., Stevenson R. D., Conaway M., Darragh A. R., Lo W. Constraint-Induced Movement Therapy for Cerebral Palsy: A Randomized Trial. *Pediatrics*. 2021. Vol. 148. № 5. DOI: 10.1542/peds.2020-033878

7. Boyd R. N., Greaves S., Ziviani J., Novak I., Badawi N., Pannek K., et al. Randomized Comparison Trial of Rehabilitation Very Early for Infants with Congenital Hemiplegia. *The Journal of Pediatrics*. 2024. Vol. 277. Article № 114381–1. DOI: 10.1016/j.jpeds.2024.114381

8. Чухловіна В. В. Корекція рухових порушень у дітей молодшого шкільного віку зі спастичними формами церебрального паралічу в процесі фізичного виховання : автореф. дис. … канд. наук з фіз. виховання і спорту : 24.00.02. Дніпро, 2018. 19 с.

9. Імас Є. В., Кашуба В. О., Буховець Б. О. Із досвіду фізичної реабілітації дітей із дитячим церебральним паралічем із застосуванням засобів Бобат-терапії. *Слобожанський науково-спортивний вісник*. 2018. Вип. 4(65). С. 13–18. URL: http://dspace.pdpu.edu.ua/handle/123456789/4472

10. Soderback I. International Handbook of Occupational Therapy Interventions. Cham : Springer International Publishing, 2016. 1226 p.

11. Кущенко О. О., Вітомський В. В., Лазарєва О. Б., Вітомська М. В. Засоби ерготерапії в підвищенні рівня функціонування та незалежності дітей із церебральним паралічем. *Молодіжний науковий вісник Східноєвропейського національного університету імені Лесі Українки*. 2017. № 26. С. 94–102. URL: https://sportvisnyk.vnu.edu.ua/index.php/sportvisnyk/article/view/187

12. Мангушева О. О. Короткий термінологічний словник ерготерапії. *Українське товариство ерготерапевтів*. 2021. URL: https://bit.ly/3yB4McT

13. Novak I., Morgan C., Fahey M., Finch-Edmondson M., Galea C., Hines A., et al. State of the Evidence Traffic Lights 2019: Systematic Review of Interventions for Preventing and Treating Children with Cerebral Palsy. *Current Neurology and Neuroscience Reports*. 2020. Vol. 20. № 2. DOI: 10.1007/s11910-020-1022-z

14. Eliasson A. C., Krumlinde-Sundholm L., Gordon A.M., Feys H., Klingels K., Aarts P. B. M., et al. Guidelines for future research in constraint-induced movement therapy for children with unilateral cerebral palsy: an expert consensus. *Developmental Medicine & Child Neurology*. 2013. Vol. 56 № 2. P. 125–137.

15. Kwakkel G., Veerbeek J. M., van Wegen E. E. H., Wolf S. L. Constraint-induced movement therapy after stroke. *The Lancet Neurology*. 2015. Vol. 14. № 2. P. 224–234. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4361809/

16. Reid L. B., Rose S. E., Boyd R. N. Rehabilitation and neuroplasticity in children with unilateral cerebral palsy. *Nature Reviews Neurology*. 2015. Vol. 11. № 7. P. 390–400. URL: https://www.nature.com/articles/nrneurol.2015.97

17. Dimyan M. A., Cohen L. G. Neuroplasticity in the context of motor rehabilitation after stroke. *Nature Reviews Neurology*. 2011. Vol. 7. № 2. P. 76–85.

18. Wolf S. L., Winstein C. J., Miller J. P., Taub E., Uswatte G., Morris D., et al. Effect of constraint-induced movement therapy on upper extremity function 3 to 9 months after stroke: the EXCITE randomized clinical trial. *JAMA*. 2006. Vol. 296. № 17. P. 2095–2104. URL: https://www.ncbi.nlm.nih.gov/pubmed/17077374

19. Pacheco M. M., García-Salazar L. F., Gomes L. H. S. C., Marques F. S., Pereira N. D. Shaping Exploration: How Does the Constraint-Induced Movement Therapy Helps Patients Finding a New Movement Solution. *Journal of Functional Morphology and Kinesiology*. 2023. Vol. 8. № 1. Article 4. DOI: 10.3390/jfmk8010004

## REFERENCES

1. Hallman-Cooper J., Rocha Cabrero F. Cerebral Palsy. Treasure Island (FL): StatPearls Publishing, 2024. 25 p. URL: https://www.ncbi.nlm.nih.gov/books/NBK538147/

2. Kushchenko O. O., Vitomskyi V. V., Lazareva O. B., Vitomska M. V. Zasoby erhoterapii v pidvyshchenni rivnia funktsionuvannia ta nezalezhnosti ditei iz tserebralnym paralichem. *Molodizhnyi naukovyi visnyk Skhidnoievropeiskoho natsionalnoho universytetu imeni Lesi Ukrainky*. 2017. № 26. P. 94–102. URL: https://sportvisnyk.vnu.edu.ua/index.php/sportvisnyk/article/view/187

3. Morgan C., Fahey M., Roy B., Novak I. Diagnosing cerebral palsy in full-term infants. *Journal of Paediatrics and Child Health*. 2018. Vol. 54. № 10. P. 1159–1164. DOI: 10.1111/jpc.14177

4. Oskoui M., Coutinho F., Dykeman J., Jetté N., Pringsheim T. An update on the prevalence of cerebral palsy: a systematic review and meta-analysis. Developmental Medicine & Child Neurology. 2013. Vol. 55. № 6. P. 509–519. DOI: 10.1111/dmcn.12080

5. Mamotenko A. V. Osoblyvosti psykichnoho rozvytku ditei z tserebralnym paralichem. *Science, theory and ways to improve methods*: Abstracts of XVII International Scientific and Practical Conference, London, 1–3 May 2023 London, 2023. P. 46–50. URL: https://eu-conf.com/events/science-theory-and-ways-to-improve-methods/

6. Ramey S. L., DeLuca S. C., Stevenson R. D., Conaway M., Darragh A. R., Lo W. Constraint-Induced Movement Therapy for Cerebral Palsy: A Randomized Trial. *Pediatrics*. 2021. Vol. 148. № 5. DOI: 10.1542/peds.2020-033878

7. Boyd R. N., Greaves S., Ziviani J., Novak I., Badawi N., Pannek K., et al. Randomized Comparison Trial of Rehabilitation Very Early for Infants with Congenital Hemiplegia. The Journal of Pediatrics. 2024. Vol. 277. Article № 114381–1. DOI: 10.1016/j.jpeds.2024.114381

8. Chukhlovina V. V. Korektsiia rukhovykh porushen u ditei molodshoho shkilnoho viku zi spastychnymy formamy tserebralnoho paralichu v protsesi fizychnoho vykhovannia: avtorefer. dys. kand. nauk z fiz. vykhovannia i sportu : 24.00.02 “Fiz. kultura, fiz. vykhovannia riznykh hrup naselennia” ; Prydnipr. derzh. ak-ia fiz. kult. i sp. Dnipro, 2018. 19 p.

9. Imas Ye. V., Kashuba V. O., Bukhovets B. O. Z dosvidu fizychnoi reabilitatsii ditei z dytyachym tserebralnym paralichem iz zastosuvanniam zasobiv Bobat-terapii. *Slobozhanskyi naukovo-sportyvnyi visnyk*. 2018. Vol № 4(65). P. 13–18. URL: http://dspace.pdpu.edu.ua/handle/123456789/4472

10. Soderback I. International Handbook of Occupational Therapy Interventions. Cham : Springer International Publishing, 2016. 1226 p.

11. Kushchenko O. O., Vitomskyi V. V., Lazareva O. B., Vitomska M. V. Zasoby erhoterapii v pidvyshchenni rivnia funktsionuvannia ta nezalezhnosti ditei iz tserebralnym paralichem. *Molodizhnyi naukovyi visnyk Skhidnoievropeiskoho natsionalnoho universytetu imeni Lesi Ukrainky*. 2017. № 26. P. 94–102. URL: https://sportvisnyk.vnu.edu.ua/index.php/sportvisnyk/article/view/187

12. Mangusheva O. O. Korotkyi terminolohichnyi slovnyk erhoterapii. Ukrainske tovarystvo erhoterapevtiv, 2021. URL: https://bit.ly/3yB4McT

13. Novak I., Morgan C., Fahey M., Finch-Edmondson M., Galea C., Hines A., et al. State of the Evidence Traffic Lights 2019: Systematic Review of Interventions for Preventing and Treating Children with Cerebral Palsy. *Current Neurology and Neuroscience Reports*. 2020. Vol. 20. № 2. DOI: 10.1007/s11910-020-1022-z

14. Eliasson A. C., Krumlinde-Sundholm L., Gordon A. M., Feys H., Klingels K., Aarts P. B. M., et al. Guidelines for future research in constraint-induced movement therapy for children with unilateral cerebral palsy: an expert consensus. *Developmental Medicine & Child Neurology*. 2013. Vol. 56 № 2. P. 125–137.

15. Kwakkel G., Veerbeek J. M., van Wegen E. E. H., Wolf S. L. Constraint-induced movement therapy after stroke. *The Lancet Neurology*. 2015. Vol. 14. № 2. P. 224–234. URL: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4361809/

16. Reid L. B., Rose S. E., Boyd R. N. Rehabilitation and neuroplasticity in children with unilateral cerebral palsy. *Nature Reviews Neurology*. 2015. Vol. 11. № 7. P. 390–400. URL: https://www.nature.com/articles/nrneurol.2015.97

17. Dimyan M. A., Cohen L. G. Neuroplasticity in the context of motor rehabilitation after stroke. *Nature Reviews Neurology*. 2011. Vol. 7. № 2. P. 76–85.

18. Wolf S. L., Winstein C. J., Miller J. P., Taub E., Uswatte G., Morris D., et al. Effect of constraint-induced movement therapy on upper extremity function 3 to 9 months after stroke: the EXCITE randomized clinical trial. *JAMA*. 2006. Vol. 296. № 17. P. 2095–2104. URL: https://www.ncbi.nlm.nih.gov/pubmed/17077374

19. Pacheco M. M., García-Salazar L. F., Gomes L. H. S. C., Marques F. S., Pereira N. D. Shaping Exploration: How Does the Constraint-Induced Movement Therapy Helps Patients Finding a New Movement Solution. *Journal of Functional Morphology and Kinesiology*. 2023. Vol. 8. № 1. Article 4. DOI: 10.3390/jfmk8010004