

# Effectiveness of the Therasuit Method in the Management of Chronic Non-evolving Encephalopathy: Case Report in Pediatrics

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**Citation:** Andrade TA, Antas BCM, Gislainy G. Effectiveness of the Therasuit Method in the Management of Chronic Non-evolving Encephalopathy: Case Report in Pediatrics. Brazilian Journal of Case Reports. 2025 Jan-Dec;05(1):bjcr12.

Received: 29 June 2024

Accepted: 21 July 2024

Published: 22 July 2024



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**Abstract:** Cerebral palsy (CP) is a non-progressive neurological condition that affects motor and postural ability, resulting from a static brain lesion. Early and intensive physical therapy intervention can promote significant improvements in the functionality and quality of life of affected individuals. To report the case of a girl with GMFCS level IV spastic quadriplegia, highlighting the clinical evolution and benefits of an intensive physiotherapy approach from the first months of life. A female patient diagnosed with cerebral palsy started physiotherapy at three months of age, with an intervention plan that included sessions two to five times a week. Gross motor function was assessed using the Gross Motor Function Measure (GMFM) scale, as well as qualitative analysis of videos and progress records. Through intensive physiotherapy follow-up, the patient showed significant improvements in her motor skills, including the ability to crawl, sit without support, and transfer positions independently. Quantitative and qualitative documentation of her progress demonstrated substantial advances in her functionality and independence. The patient's case report illustrates the positive impact of early and intensive physiotherapeutic intervention in children with cerebral palsy. This case underlines the importance of continued follow-up adapted to individual needs, emphasizing the capacity for neuroplasticity and the functional improvement that can be achieved, reinforcing the need for personalized and intensive treatment strategies to maximize developmental potential and quality of life in patients with CP.

**Keywords:** Cerebral palsy; Spastic quadriplegia; Physiotherapeutic intervention; Neuropsychomotor development; Neuroplasticity.

## 1. Introduction

Chronic non-progressive encephalopathy (CNE), also known as cerebral palsy (CP), encompasses a series of permanent disorders that affect the development of movement and posture, resulting from non-progressive abnormalities that impact the forming brain of the fetus or newborn [1-3]. CP can be triggered by a variety of brain injuries in childhood, such as hypoxic ischemia, periventricular leukomalacia, intracranial hemorrhage, hypoxic-ischemic encephalopathy, trauma, stroke and infections. This condition highlights the extensive burden it represents, both in personal, medical and socioeconomic terms globally, as well as highlighting the gaps in therapeutic options available for this pediatric population [2, 3].

In the treatment of cerebral palsy, physiotherapy plays a crucial role, encompassing various therapeutic interventions to improve physiological and functional outcomes. There is moderate evidence of the effectiveness of constraint-induced movement therapy for upper limb recovery, goal/function-oriented training and gait training to increase walking speed. However, the evidence is conflicting regarding the impact of exercises on strength training and cardiorespiratory conditioning. Approaches based on functional goals have been shown to be effective, suggesting the need for more research to determine the best ways to improve functional outcomes in children with cerebral palsy [4].

In this sense, the TheraSuit method is an intensive rehabilitation approach designed for children with cerebral palsy, inspired by a prototype developed for Russian astronauts for counter-resistance exercises in zero gravity. It uses a system of individually attached elastic bands that exert traction between the trunk and pelvis and between the pelvis and lower limbs. Associated with specific treatment protocols, the method includes rigorous strengthening and stretching exercises, as well as training specific motor activities while the child is wearing the suit. This method seeks to improve postural alignment, joint stability and movement efficiency [5-7].

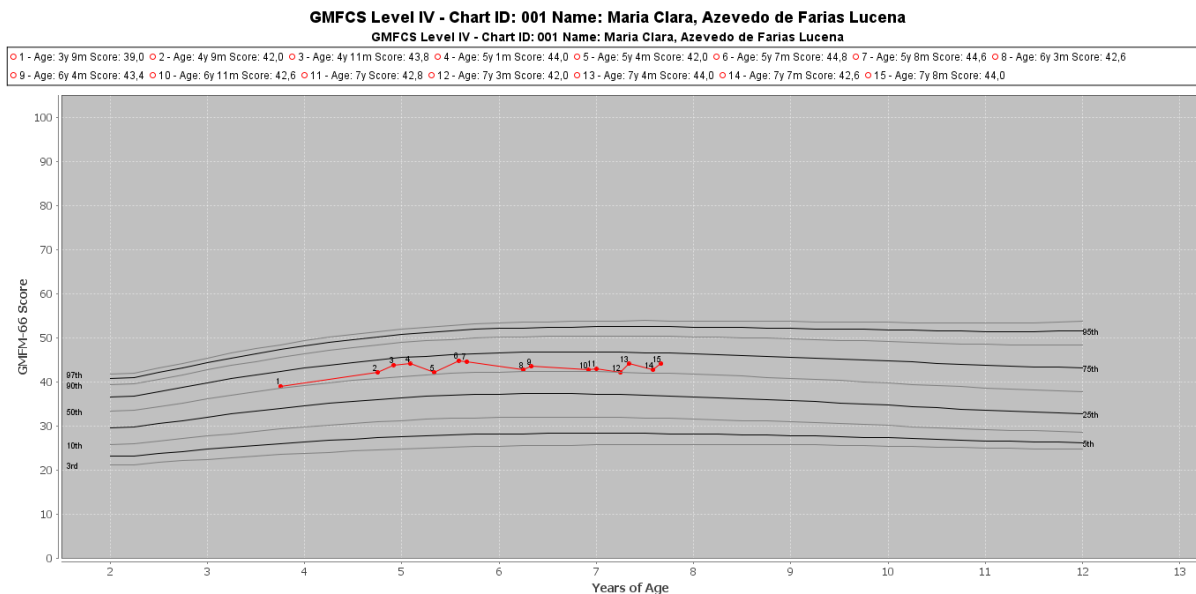
In this article, we present a detailed case report on the success of the TheraSuit Method in the rehabilitation of a child with cerebral palsy manifesting spastic quadriparalysis. Through this study, we aim to highlight the effectiveness of TheraSuit in improving mobility and quality of life in complex cases of cerebral palsy, offering practical evidence that can inspire other therapeutic approaches and encourage the adoption of similar methods in analogous clinical situations.

## 2. Case Report

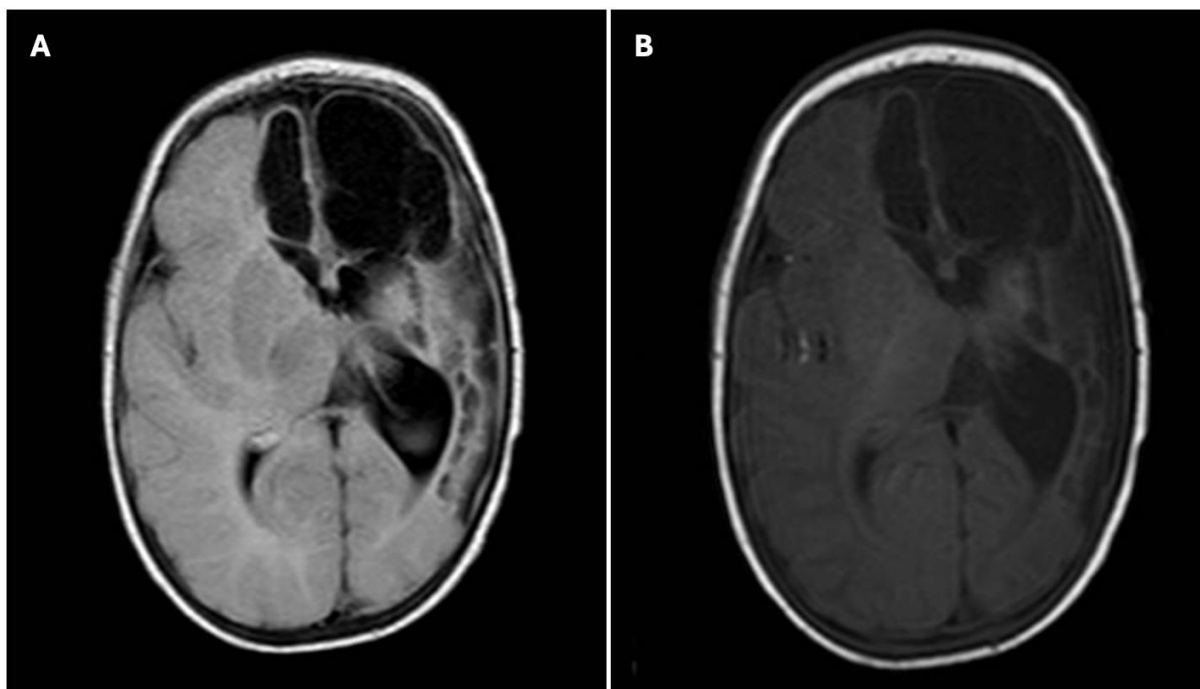
Patient female, 8 years and 4 months old, started physiotherapy in February 2016, with a clinical diagnosis of cerebral palsy, specifically GMFCS level IV spastic quadriparalysis (Figure 1). The condition was diagnosed as the result of a static lesion in the central nervous system during the structural and functional maturation phase, significantly affecting the patient's posture and movement (Functional mobility scale 1-1-1) (Manual ability classification system level 4). Born at 36 weeks' gestation by caesarean section, weighing 2.695 kg and 47 cm long, the child presented cyanosis and neonatal jaundice, requiring hospitalization for a week shortly after birth. During this period, intracranial differences and a cyst were identified through imaging tests, leading to the diagnosis of ischemia of the left cerebral hemisphere with more than 70% impairment, configuring chronic non-progressive encephalopathy, known as cerebral palsy (CP) (Figure 2). At the age of three months, she had a seizure, but no changes in her brain's electrical activity, as shown by the electroencephalogram.

Initially, the intervention consisted of physiotherapy sessions twice a week, lasting less than 90 minutes each due to the patient's diet (Figure 3). Subsequently, the frequency was increased to five times a week, as well as the duration, which became one hour and 30 minutes, with the aim of integrating persistent primitive reflexes, acquiring age-appropriate motor skills, strengthening the core, preventing contractures and deformities and improving balance and coordination. At the age of 2 years and 6 months, she began intensive 3-hour protocols interspersed with maintenance 5 times a week for an hour and 30 minutes. The initial assessment highlighted difficulties in integrating reflexes, postural asymmetry and limitations in limb mobility and functionality. With intensive treatment, significant progress was seen in the patient's motor capacity, as she was able to perform previously impossible movements, such as crawling, sitting without support and transferring from a lying to a sitting position independently. The quantitative assessment of gross motor function, carried out regularly, showed consistent improvements over time.

**Figure 1.** Graph of the patient's Gross Motor Function Classification System (GMFCS-5) data.



**Figure 2.** A. Axial FLAIR. B. Axial T2 showing extensive areas of cystic encephalomalacia affecting practically the entire irrigation territory of the left middle cerebral artery and both anterior cerebral arteries, determining a significant volumetric reduction in the white matter of the left cerebral hemisphere, associated with thinning of the corpus callosum and volumetric reduction of the left cerebral peduncle.



This case reinforces the need for continuous, intensive physiotherapy adapted to the individual needs of children with CP, with the potential to achieve substantial motor gains and improve patients' independence and functionality.

**Figure 3.** A. Patient in unipodal support position under spider support. B. Patient in active orthostatic position, with anterior support on walker using suit.



### 3. Discussion

Intensive neurofunctional strengthening therapy - TheraSuit Method is an intensive rehabilitation approach aimed at children and adults with neuromotor and sensory disorders [8, 9]. The theory and practice of the Therasuit method are based on scientific evidence from exercise physiology, epigenetics and neurology [10]. In intensive therapy with the Therasuit method, an assessment is initially carried out to identify the deficits and alterations that the patient has, and the exercises needed so that the patient can develop and improve new motor skills. Each intensive therapy module usually lasts 4 weeks, 5 days a week, with 3 to 4 hours of training per day. The combination of the pulley system, the activity cage (spider) and the therapeutic suit combined with a good treatment plan of individualized exercises promotes gains in muscle strength, endurance and resistance, joint stability, deep proprioceptive input, activation of postural muscles, improving the quality of motor function performance [12, 13].

In the specific case of a patient with spastic cerebral palsy, the use of the TheraSuit demonstrated a significant protective effect on the progression of the disease [9, 11]. In this case, early and intensive intervention provided substantial improvements in the patient's motor functionality and independence, highlighting the importance of continuing intensive physiotherapy tailored to individual needs, which is in line with findings in the literature [12]. The neuroplastic capacity of the developing brain was evidenced by the continuous improvements observed in the patient, who began to perform previously impossible movements, sit without support and transfer from a lying to sitting position independently and from sitting to kneeling with support. This case highlights the potential of TheraSuit to slow down the progression of clinical signs and comorbidities in cerebral palsy, reinforcing the need for personalized rehabilitation programs to maximize patients' development potential and quality of life.

In the case of the patient with spastic quadriparesis, the motor gains obtained with the intensive use of the TheraSuit Method were remarkable, similar to those found by Bailes and colleagues [9]. From the start of treatment, the patient showed significant progress in her motor skills, managing to perform movements that were previously impossible, such as crawling, sitting without support and transferring from a lying to a sitting position independently. These advances were evidenced both by regular quantitative assessments, using the Gross Motor Function Measurement Scale (GMFM), and by qualitative analysis of videos and progress records (Figure 02). The integration of persistent primitive reflexes, the strengthening of the core, and the improvement in postural symmetry and limb mobility contributed to the overall improvement in motor functionality. The maintenance of the patient's functional level, without worsening symptoms, demonstrates the protective potential of TheraSuit in the progression of cerebral palsy. This case emphasizes the importance of early and intensive intervention, adapted to the specific needs of each patient, and reinforces the ability of neuroplasticity to promote significant motor gains, improving the independence and quality of life of children with cerebral palsy.

Maintaining the clinical condition of the patient with spastic quadriparesis, without significant worsening, was a crucial aspect of the treatment in the case presented. In neurological conditions such as cerebral palsy, it is common to observe the progression of musculoskeletal deformities and the exacerbation of functional limitations over time. However, in this case, early and intensive intervention not only promoted substantial motor gains, but also stabilized the patient's clinical condition. The absence of worsening indicates that the method not only contributed to the acquisition of new motor skills, but also played a key role in preventing secondary complications, such as contractures and joint deformities. This result underscores the effectiveness of TheraSuit in offering a protective effect against the progressive deterioration often observed in children with cerebral palsy, highlighting the importance of intensive, personalized rehabilitation programs for maintaining functionality and quality of life in the long term.

#### 4. Conclusions

The follow-up of the patient, diagnosed with GMFCS level IV spastic quadriparesis, reveals the critical importance of early and intensive physiotherapeutic intervention in cerebral palsy. The significant improvements in her functionality and independence, documented quantitatively and qualitatively, demonstrate not only the effectiveness of this therapeutic approach, but also the potential for neuroplasticity in the developing brain. This case underscores the need for personalized and adaptive rehabilitation programs, grounded in a deep understanding of the individual capabilities and challenges faced by children with cerebral palsy. The patient's experience underlines the value of focused therapeutic strategies, which not only seek to improve patients' quality of life, but also explore the vast potential for motor recovery and development, reinforcing the vital role of physiotherapy in maximizing functionality and well-being in individuals with CP.

**Funding:** None.

**Research Ethics Committee Approval:** We declare that the patient approved the study by signing an informed consent form and the study followed the ethical guidelines established by the Declaration of Helsinki.

**Acknowledgments:** None.

**Conflicts of Interest:** None.

#### References

1. Christy JB, Chapman CG, Murphy P. The effect of intense physical therapy for children with cerebral palsy. *J Pediatr Rehabil Med.* 2012;5(3):159–170. doi: 10.3233/PRM-2012-0208.
2. Jensen A. Cerebral palsy - brain repair with stem cells. *J Perinat Med.* 2022;51(6):737–751. doi: 10.1515/jpm-2022-0505.

3. Albright AL. Spasticity and movement disorders in cerebral palsy. *Childs Nerv Syst.* 2023;39(10):2877–2886. doi: 10.1007/s00381-023-06045-5.
4. Furtado MAS, Ayupe KMA, Christovão IS, Sousa Júnior RR, Rosenbaum P, Camargos ACR, Leite HR. Fisioterapia em crianças com paralisia cerebral no Brasil: uma revisão de escopo. *Dev Med Child Neurol.* 2022;64(5)–e12. doi: 10.1111/dmcn.15094.
5. Almeida KM, Fonseca ST, Figueiredo PRP, Aquino AA, Mancini MC. Effects of interventions with therapeutic suits (clothing) on impairments and functional limitations of children with cerebral palsy: a systematic review. *Braz J Phys Ther.* 2017;21(5):307–320. doi: 10.1016/j.bjpt.2017.06.009.
6. Belizón-Bravo N, Romero-Galisteo RP, Cano-Bravo F, Gonzalez-Medina G, Pinero-Pinto E, Luque-Moreno C. Effects of Dynamic Suit Orthoses on the Spatio-Temporal Gait Parameters in Children with Cerebral Palsy: A Systematic Review. *Children (Basel).* 2021;8(11):1016. doi: 10.3390/children8111016.
7. Martins E, Cordovil R, Oliveira R, Pinho J, Diniz A, Vaz JR. The Immediate Effects of a Dynamic Orthosis on Gait Patterns in Children With Unilateral Spastic Cerebral Palsy: A Kinematic Analysis. *Front Pediatr.* 2019;7:42. doi: 10.3389/fped.2019.00042.
8. Baptista PPA, Furtado ACA, Fernandes TG, Freire Júnior RC, Lima CFM, Mendonça ASGB. Positive impact of the Therasuit method on gross motor function of children with autism spectrum disorder: Case series. *Front Neurol.* 2023;14:1254867. doi: 10.3389/fneur.2023.1254867.
9. Bailes AF, Greve K, Schmitt LC. Changes in two children with cerebral palsy after intensive suit therapy: a case report. *Pediatr Phys Ther.* 2010;22(1):76–85. doi: 10.1097/PEP.0b013e3181cbf224.
10. Martins E, Cordovil R, Oliveira R, et al. Efficacy of suit therapy on functioning in children and adolescents with cerebral palsy: a systematic review and meta-analysis. *Dev Med Child Neurol.* 2016;58(4):348–360.
11. Alagesan J, Shetty A. Effect of modified suit therapy in spastic diplegic cerebral palsy – a single blinded randomized controlled trial. *Online J Health Allied Sci.* 2010;9(4):14.
12. Mélo TR, Yamaguchi B, Chiarello CR, Szczypior Costin AC, Erthal V, Israel VL, et al. Intensive neuromotor therapy with suit improves motor gross function in cerebral palsy: a Brazilian study. *Motricidade.* 2017;13(4):54–61. doi: 10.6063/motricidade.13699.