

Research Article

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Physiotherapeutic Management of Pain in Children with Cerebral Palsy: A Narrative Analysis

Paula Andrea Ahumada Rodriguez^{1*}, Aydee Luisa Robayo Torres¹ and Andrea Carolina Amaya Cordoba²

¹Physical Therapy Student at the National University of Colombia, Colombia

²Ft. Esp. Mg., Head Teacher, National University of Colombia, Colombia

³Ft. Esp. Mg de Colombia, Colombia

SUMMARY

Pain in boys and girls with Cerebral Palsy (CP) is a problem that can significantly affect their quality of life, altering movement and development. Therefore, this research seeks to describe, based on a narrative review, the approach of Physiotherapy in the pain of pediatric cerebral palsy.

Methodology: A retrospective documentary search was carried out in databases, PubMed, OVID, PeDro and Scielo, using connectors (AND) (OR); with the MESH terms Cerebral Palsy, Pediatrics, Pain Management, Rehabilitation, Chronic Pain and Physical therapy. The inclusion criteria are: Pediatric population, English, French, Portuguese or Spanish language, including physiotherapy intervention, underlying pathology, cerebral palsy. The selection process is carried out by reading titles, reading summaries and finally reading the full text. Information was extracted using the PICO format (participants, intervention, comparison and results).

Results: The search obtained a total of (n=373) articles, from which (n=364) were eliminated, including a total (n=9). The two main categories aimed at physiotherapy intervention in this type of patient are pain evaluation and interaction for pain management. Studies show positive results for pain management in pediatric patients with cerebral palsy, from physiotherapy interventions in modalities such as therapeutic massage, relaxation training, biofeedback and interventions within motor function.

Conclusions: The approach to pain care in children with cerebral palsy seeks to be preventive, curative and rehabilitative, but not all conditions are 100% curable. The main objective is to improve the child's quality of life, providing them with the greatest comfort and functionality possible.

*Corresponding author

Paula Andrea Ahumada Rodriguez, Estudiante de Fisioterapia de la Universidad Nacional de Colombia.

Received: March 25, 2026; **Accepted:** March 31, 2026; **Published:** April 13, 2026

Keywords: Cerebral Palsy, Pain, Pediatrics, Rehabilitation, Physiotherapy

Introduction

Cerebral palsy is described as a group of neurological disorders that mainly affect motor function, coordination and therefore body movement. It can be caused by brain damage during fetal development, childbirth or in the first years of life. These motor alterations trigger symptoms such as muscle spasticity, physical effort, inadequate posture or the presence of contractures, which lead to pain processes, which can be acute or chronic, and affect different parts of the body, such as the extremities, back or neck [1-3].

It is important to highlight that pain in children with cerebral palsy (CP) can be difficult to detect and diagnose, since many of them have difficulties communicating and expressing their pain verbally. Therefore, caregivers and health professionals should be attentive to non-verbal cues, such as changes in the child's behavior, posture or facial expression, as their presence can have a significant impact on their quality of life. and in their ability

to carry out daily activities. Additionally, pain can have negative psychological effects, such as anxiety and depression, which can further increase the perception of pain [4-7].

Therefore, pain management in children with CP must be multidisciplinary and adapted to the individual needs of the child. This may include pharmacological treatments, such as pain relievers and muscle relaxants, as well as non-pharmacological therapies, physical therapy and occupational therapy [7,8].

Relevance of Physiotherapy in the Neurological Part

Physiotherapy emerges as a fundamental pillar in the comprehensive approach to children with cerebral palsy (CP) due to its ability to intervene in the neuromotor and sensory dysfunctions that characterize this condition. In the neurological context, physical therapy plays a crucial role by focusing on the restoration and optimization of neuromuscular function, as well as promoting the patient's quality of life. The interaction between physiotherapy and neurology is nourished by a holistic approach that seeks to understand the complexities of CP and adapt interventions to the individual needs of each patient [9,10].

Description of the Interaction and Evaluation

The interaction between physical therapy and neurology is realized through a comprehensive evaluation that ranges from a detailed medical history to specialized physical tests. This comprehensive evaluation focuses on understanding the nature and extent of the patient's motor and sensory dysfunctions, including muscle tone, sensation, movement patterns, and motor function. Standardized tools, such as pain rating scales and measurements of motor function, are used to quantify and monitor patient progress over time. Effective communication with the patient and their family plays a fundamental role in this process, since it allows us to understand their needs, expectations and therapeutic goals, thus facilitating the creation of a personalized treatment plan and the promotion of adherence to it [11].

Pain in children with CP is a significant problem that can affect their quality of life and their ability to perform daily activities. Human body movement being the object of study of physiotherapy and seeing its impact within this pathology and how it can generate pain in children directly or indirectly, this research will seek to describe, based on a narrative review, The focus of physical therapy on the pain of pediatric cerebral palsy. From here we will seek to describe the pain assessment instruments used and the physiotherapeutic interaction methods proposed in the evidence.

Methodology

Type of Study

This is a retrospective documentary review, which includes a search, extraction and description of the evidence found, based on the categories and objectives proposed within it [12].

Search

A retrospective documentary search was carried out. With search in databases, PubMed, OVID, PeDro and Scielo, using connectors (AND) (OR); with the MESH terms Cerebral Palsy, Pediatrics, Pain Management, Rehabilitation, Chronic Pain and Physical therapy.

Inclusion and Exclusion Criteria

- Pediatric population
- English, French, Portuguese or Spanish language, which have a
- Physiotherapeutic intervention
- Population with cerebral palsy

Exclusion Criteria

- Studies of more than 9 years
- That the treatment is not focused on pain
- That the intervention is not applied to physiotherapy

Analysis Measures

Based on the search, the selection process is carried out in the following order: reading titles, reading summaries and finally

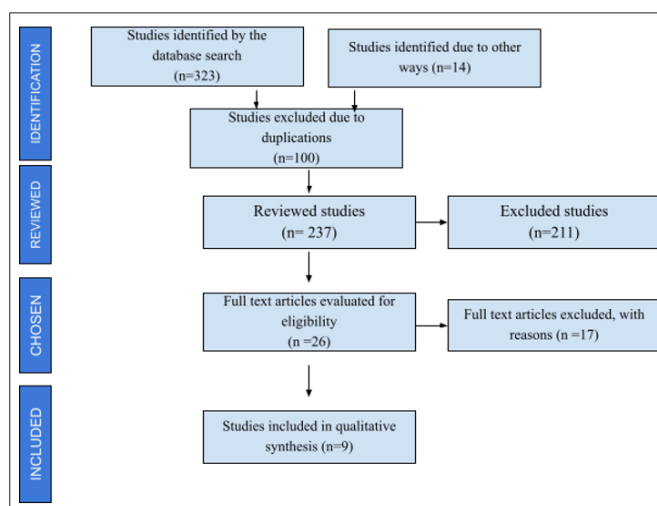
reading the full text. The information was collected using the PICO format (participants, intervention, comparison and results), the search was carried out from 2004 to the most recent date of 2023, taking into account the search algorithms.

Results

Generalities

From the search by algorithms, a total of (n=337) articles were obtained, of which due to duplication they were eliminated (n=100), after reading the title they were eliminated (n=211), leaving a total of (n=26), of which (n= 16) were excluded after reading the full text. A total of (n=9) articles were included in the research that met the inclusion criteria.

Of the 9 articles that were analyzed, 1 was a systematic review, 1 was a theoretical review, 2 were mixed pilot studies (quantitative-qualitative), 2 were case studies, 1 was a multicenter randomized controlled trial (RCT) and finally 1 study qualitative.



Graph 1: Description of the Bibliographic Search

Location

The places where studies relevant to these topics are being carried out, 2 were found in the United States, 3 in Australia, 1 in South Africa, 1 in China, 1 in Spain and 1 in Sweden [13-21].

Population

Within the population that is the object of study are divided into 4 large categories by age; 3-18; 1-3; 8-19 and 3-21. Mostly institutionalized in the school environment.

Types of Cerebral Palsy

Most of the studies do not specify the type of paralysis, Cerebral Palsy is mentioned in seven of the studies, spastic cerebral palsy in one of the studies. Studies and cerebral palsy and dyskinesia in one study [13-21].

Table 1: Generalities of the Results Found in the Analysis of the Studies (Authors, Location, Year, Type of Paralysis, Ages and Type of Study)

Authors	Location Year	Type of Paralysis	Ages	Type of Study
Kimberly A. et al.	Washington 2004	Cerebral palsy	Childrens	Theoretical Review
Nilsson et al.	Göteborg, Sweden . 2011	Cerebral palsy	3-17 years	Mixed quantitative and qualitative pilot stage.
Natasha Lannin	sydney 2006	Cerebral palsy	3-18 years	Systematic review
Mary Swiggum	Houston 2010	Cerebral palsy	Childrens	Theoretical review
Can Zhang	China 2020	spastic cerebral palsy	1-3 years	Multicenter randomized controlled trial
Marta Badia	Spain 2012	Cerebral palsy	8-19 years	Study of cases
Katarina Ostojic	Australia 2022	Cerebral palsy	9-18 years	Mixed, (quantitative-qualitative)
Clare McKinnon	Australia 2020	Cerebral palsy and dyskinesia.	Children and adolescents	Qualitative study
Ensa Johnson	South Africa 2019	Cerebral palsy	3-21 years	Study of cases

Physiotherapeutic Evaluation of Pain in Cerebral Palsy

From the extraction of information, four categories are recognized that manage to encompass the different methods of physiotherapy evaluation of pain, such as self-report, behavioral scales, physiological measures and functional measurement scales, however, it is important to clarify that many of these evaluations do not directly rate pain, this is because research talks about pain as a consequence of movement alterations or as a product of said alterations, which is why they use other types of scales to evaluate, according to the interactions, changes in the sensation of pain.

Self-Report

Within the review of two investigations, for self-report those measures that are more subjective and non-quantifiable are identified, such as the use of the semi-structured and structured interview used by two investigations, where verbal responses, written questionnaires and pain adjective descriptors, or non-verbal behaviors, such as facial expression scales and drawings, were obtained. A pain survey that included the presence of chronic pain (yes/no), pain intensity (Faces Pain Scale - Revised), pain location on the body chart, and pain interference (Pain Interference Scale Pediatric Patient Reporting Outcomes Measurement Information System) [14,17]. (fifteen)

They also made use of quantifiable methods such as self-report scales, one of the investigations used methods such as asking participants to rate the intensity of pain (0-10) and the intensity of anxiety (0-10) using rating scales. unique integer numeric [14]. Others used less subjective scales such as the Children's Hospital of Eastern Ontario Pain Scale (CHEOPS), the Observational Scale of Behavioral Distress (OSBD), and the Procedural Rating Scale – revised (PRS) [13]. Visual analog scale (VAS), color analog scale (CAS) The Non- Communicating Children's Pain Checklist Postoperative Version (21) In one of the investigations, pain was evaluated by the two items of the Bodily subscale Child Health Pain and Discomfort Questionnaire [20]. and finally, we have these two scales the Children's Hospital of Eastern Ontario Pain Scale and the Face, Legs, Activity, Cry, and Consolability Behavioral Pain Assessment Scale [14].

Physiological Measures

The physiological measures were used as a method of pain evaluation, justifying their change when said symptom appears and it becomes difficult to carry out a self-report or an observational report that manages to identify the presence of pain. Within these

measures, heart rate vagal tone, blood pressure, oxygen saturation, palmar sweating and neuroendocrine response [14,15,21].

Functional Measurement Scales

Within the review, the patient's functional measurement scales were identified as a reference for the improvement of pain in motor activities, then we speak of the Ashworth scale for measuring Spasticity; Goniometry as a measure of range of motion; The Pediatric scale evaluation of disability inventory (PEDI) Gross motor function classification system (GMFCS) [16,18].

Physiotherapeutic Interaction in Pain in Cerebral Palsy

The extraction of data from the studies allowed us to identify the different physiotherapeutic interactions that are applied within pain management, for a better description of the data, these were divided by therapeutic modalities, within these the physical, kinetic, neurofacilitative modalities, modalities alternatives, health education and technological modalities.

Physical Modalities

According to the evidence reviewed, there are three studies that refer to the use of electrostimulation, however they do not present the protocol for its application; One of the authors mentions the use of electrical stimulation for 30 minutes, six times a day, for 3 days after placing botulinum toxin (BTX-A) [16,18,19].

Kinetic Modalities

Hippotherapy or horse therapy, and therapeutic massage were recognized as subcategories.

Physical Exercise

In four of the articles, physical exercise is mentioned as a therapeutic strategy; within this one, one of the authors talks about all physical exercise, without discriminating; In two of the studies, they specify work on flexibility, specifically for the modulation of tone and the management of ranges of movement as a preventive measure for the presence of pain Finally, one of the investigations refers to therapist-assisted stretching [14,16,18,19].

Aquatic Therapy

Only one of the studies included in the review mentions the use of aquatic therapy as a therapeutic strategy, aimed on the one hand at the analgesic effect since it reduces the sensitivity of nociceptors and on the other hand at strengthening, elasticity in the tissues,

reducing the load, or joint tension, allowing movements with greater amplitude [14].

Hippotherapy

Hippotherapy was mentioned by one of the studies, this is a way to modulate the sensory and neuromotor system, in this part, especially the management of posture is discussed, this as a way to prevent or manage pain, caused by bad postures given by the pathology [18].

Therapeutic Massage

Within this category there are three investigations that make use of it within the therapeutic interaction, one of these only mentions Pediatric Massage, without making any characterization or specification of it; In two other investigations, management is discussed as a tactile massage, using cold oil, with longitudinal, transverse and circular movements. It is performed from right to left in a caudo-cephalic direction as a way to modulate tone and work on pain [15,17].

Neurofacilitators

Three of the investigations use neurofacilitation strategies as a method of improving neuromotor skills, which lead to a reduction in pain, one of them working from neurodevelopment (TND) posture, therasuit, Vojta. Another of the authors works on motor training and posture and finally we talk about biofeedback [14,16].

Alternative

Within the review, two articles were found that referred to the use of alternative therapies such as acupuncture, distraction, visualization, preparation for hypnosis, thought interruption, suggestion, self-declarations of coping, memory change and training of the parents [14,18].

Health Education

Two of the investigations made use of health education as a preventive therapeutic strategy for pain, one of them starts from the identification of certain postures, behaviors or body postures that could be indicating pain; and the second talks about family therapy and psychosocial interventions (CBT and family education) [14,17].

Technological

Finally, we have the use of technology as a therapeutic method in one of the studies, this makes use of a pilot handle device (Mio Link) that transmits heart rate data via Bluetooth, while a visual stimulus is performed (work of art and auditory (interactive). The application displays layers of concentric circles that change color and contract or expand with changes in the baseline, the auditory stimulus as well. It follows this principle of change and is done once a day for 10 minutes for 4 weeks [15].

Discussion

The narrative review carried out on the physiotherapeutic management of pain in children with cerebral palsy (CP) highlights several key points in the evaluation, approach and interdisciplinary treatment of this condition. As this is a set of neurological disorders that affect movement and coordination, it presents a challenge in pain management due to the multiple associated complications, such as muscle spasticity, contractures and inadequate postures, taking into account that these They are factors that contribute to pain and therefore significantly affect the quality of life of pediatric patients.

It is surprising in the results that the approach that some authors have been strongly proposing, such as Gillian Chumbley

contributed to research highlighting the relevance of narrative analysis for understanding the subjective experiences of pain in children with neurological conditions, including cerebral palsy; and even Dianne J. Russel propose a discursive, narrative analysis of the painful situation, which this research was not able to demonstrate in any of the research reviewed. It is surprising, yes, that authors like Rochani et al. even propose a greater conceptual fabric, without the subjective/narrative approach of boys and girls with CAP being able to permeate these [22-24].

On the other hand, although pain occurs persistently in patients with this pathology, the number of studies found during the review that specifically talk about the role of physiotherapy is few, the country with the most studies is Australia, followed by the United States. The ages of the populations range from 4 to 21 years old, according to the ages established in each country to describe the age of majority. No cases are reported before the age of four, probably due to the patient's ability to report pain and although crying and alteration of physiological signs, in studies, are considered methods of pain assessment, there is talk of greater subjectivity. for those ages. On the other hand, it should be noted that, within the research, the vast majority of authors do not classify cerebral palsy, only two of them talk about spastic cerebral palsy and cerebral palsy and dyskinesia, therefore which cannot correlate therapeutic management with a specific condition within the pathology [17,19].

Regarding the evaluation instruments identified within this research, they are classified into three groups: those instruments that talk about reporting based on self-report, physiological measures, and functional measurement scales. Although the vast majority of research uses specific self-reports to rate pain, researchers consider that they may fall short, or could be very subjective in their results, therefore, evaluation instruments are proposed that do not directly rate the pain, but rather the physiological responses generated by it, or the alterations in motor control, as a consequence of the movement alterations. or as a product of said alterations, therefore, they use other types of scales to evaluate, according to the interactions, the changes in the sensation of pain [13-15,17,20,21].

Finally, this review highlights, within the physiotherapy interaction, several modalities that have been shown to be effective in pain management in this population; Kinetic modalities, such as physical exercise and aquatic therapy, are particularly significant but useful over time, these interventions not only directly address pain by improving flexibility and modulating muscle tone, but also contribute to rehabilitation general of the patient. It is important to note that several studies observe significant improvements in activity levels, pain intensity, and pain interference in patients.

Conclusions

Although significant improvements in the quality of life of children with cerebral palsy can be achieved through these physical therapy interventions, it is important to note that in many cases the pain can be chronic and persistent. Some underlying conditions may not be completely curable and require long-term management to relieve symptoms. Rehabilitation is an essential part of pain management in cerebral palsy. Therapists can work to improve functionality and reduce physical limitations that contribute to pain. A comprehensive approach with a team of health professionals, including physicians, therapists, pain specialists, and other experts, may be essential to effectively address holistically meet the child's needs and improve their overall well-being.

Relevance

This text highlights the importance of physical therapy in pain management in children with pediatric cerebral palsy. Through a narrative review, an exhaustive search of articles was carried out using various databases and specific inclusion criteria. The methodology used ensures the quality and relevance of the information collected.

The results of the review highlight two broad categories of physiotherapy intervention: pain assessment and interaction for pain management. Among the intervention modalities mentioned are therapeutic massage, relaxation training, biofeedback, and other interventions focused on motor function. The studies reviewed show positive results regarding pain management in pediatric patients with cerebral palsy, which underlines the effectiveness of physiotherapy interventions.

The conclusions highlight that the focus on pain care in children with cerebral palsy seeks to be preventive, curative and rehabilitative. It is recognized that not all conditions are completely curable, but the primary goal is to improve the child's quality of life by providing the greatest comfort and functionality possible. This comprehensive approach reflects the importance of physical therapy as a fundamental part of the treatment in these cases, contributing not only to pain management, but also to the general well-being and functional development of children with pediatric cerebral palsy.

Researching pain in children with cerebral palsy is crucial from a professional perspective for several fundamental reasons that impact both the clinical setting and the well-being of patients and their families. Below, I argue the importance of this research based on a narrative review:

- **Underestimation and Undertreatment of Pain:** There is a tendency to underestimate pain in children with cerebral palsy due to difficulties in communicating and expressing pain. This leads to undertreatment and unnecessary suffering, affecting the child's quality of life and their ability to participate in daily activities.
- **Impact on Quality of Life:** Chronic pain significantly affects the quality of life of children with cerebral palsy, as well as that of their families. Investigating the characteristics of pain, its frequency, intensity and triggering factors can provide crucial information to improve pain management and, therefore, the quality of life of these patients.
- **Personalized Management Strategies:** Each child with cerebral palsy may experience pain uniquely due to differences in the severity of the disability, the type of cerebral palsy, and other associated medical conditions. Detailed investigation can identify specific pain patterns that allow for the development of personalized and effective management strategies.
- **Ethical and Legal Aspects:** Understanding pain in these children is crucial from an ethical and legal point of view. There are fundamental rights to adequate medical care and pain relief, which may not be met if the experience of pain in this vulnerable population is not fully understood.
- **Advances in Treatment and Care:** Robust research can lead to significant advances in the treatment of pain in children with cerebral palsy, including the development of new pharmacological therapies, non-pharmacological interventions and multidisciplinary care protocols.
- **Professional Training and Awareness:** Research in this field is essential for the training of health professionals, including physicians, nurses, physical and occupational therapists,

who need to be adequately informed about how to identify, evaluate and manage pain in this population.

In summary, researching pain in children with cerebral palsy after a narrative review not only contributes to scientific knowledge, but also has direct implications for improving clinical care, patients' quality of life, and compliance with rights. fundamental doctors. It is an opportunity to advance the comprehensive and personalized care of these children, ensuring that they receive the appropriate treatment and support necessary to optimize their well-being.

In addition, it is important to highlight that there is no specific evidence on pain in children under 4 years of age in cerebral palsy (pediatrics). In general, only forms of treatment are found but not specific evaluations of pain in pediatrics for these ages.

Limitations and Future Considerations

Despite the positive results observed in this review, it is important to point out some limitations; most of the studies reviewed present variability in terms of design, sample size and methodology, which may affect the generalization of the results, in addition, the Lack of specificity in some studies on the types of CP and the exact interventions used highlights the need for more detailed and standardized investigations, it would be useful to further explore the long-term impact of these interventions on the quality of life of pediatric patients with PC.

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