Research Article

BIOMEDICAL Journal of Scientific & Technical Research

ISSN: 2574 -1241

DOI: 10.26717/BJSTR.2024.60.009381

Facilitated Tucking, for Pain Reduction in Preterm Infants: A Systematic Review

Elisa Guadalupe Cano Chi[2], Jesús Porfirio Huchim Villanueva[2], Saúl May Uitz[1]*, Genny Josefina Madera Poot[1] and Julia Alejandra Candila Celis[1]

[1]*Profesor de Carrera, Universidad Autónoma de Yucatán, México*

[2]*Estudiante de la Especialidad en Enfermería en Terapia Intensiva, Universidad Autónoma de Yucatán, México*

***Corresponding author:** Saúl May Uitz, Profesor de Carrera, Universidad Autónoma de Yucatán, México.

Email ID: saul.may@correo.uady.mx

ARTICLE INFO

Received: December 06, 2024

Published: December 16, 2024

Citation: Elisa Guadalupe Cano Chi, Jesús Porfirio Huchim Villanueva, Saúl May Uitz, Genny Josefina Madera Poot and Julia Alejandra Candila Celis. Facilitated Tucking, for Pain Reduction in Preterm Infants: A Systematic Review Biomed J Sci & Tech Res 60(1)-2024. BJSTR. MS.ID.009381.

SUMMARY

Objective: To synthesize the existing scientific evidence on the effectiveness of facilitated containment as a non-pharmacological method to reduce pain in preterm infants.

Methodology: A systematic review was carried out following the guidelines of the PRISMA declaration. The search was carried out in PubMed and EBSCO databases, Virtual Health Library (VHL), and Taylor and Francis Magazine, and was complemented with free searches in Google Scholar and reverse search strategy. The quality of the selected articles was assessed using the Cochrane tool to assess risk of bias. Finally, the level of evidence and degree of recommendation were assigned through the Scottish Intercollegiate Guidelines Network (SIGN) scale.

Results: Of the 41 scientific articles identified, 12 were eliminated during sampling, 29 were eligible for critical appraisal, and 11 were included in the final analysis. These included systematic reviews with meta-analyses, clinical trials, and cohort studies. Methodological quality was high, with a moderate risk of bias. 90% of the evidence presented a recommendation grade A, and 10% a grade B. The levels of evidence were 1++ (10%), 1+ (80%), and 2++ (10%).

Conclusion: Facilitated containment proves to be an effective method to reduce pain in preterm infants, with additional benefits in physiological parameters, crying duration, and sleep patterns. This non-pharmacological approach represents a promising and evidence-based intervention for neonatal pain management.

Keywords: Newborn Containment; Facilitated Tucking; Pain; Newborn; Premature

Abbreviations: VHL: Virtual Health Library; SING: Scottish Intercollegiate Guidelines Network; NICU: Neonatal Intensive Care Units; DeCS: Descriptors in Health Sciences; MeSH: Medical Subject Headings; PRISMA: Preferred Reporting Items for Systematic Reviews and Meta-Analyses; CF: Facilitated Containment

Introduction

Preterm infants face multiple challenges in their adjustment to life outside the womb, including frequent exposure to painful procedures as part of the intensive care necessary for their survival. In Neonatal Intensive Care Units (NICUs), pain is a constant due to the numerous invasive procedures that are routinely performed, such as blood draws, catheter insertion, and vital signs monitoring. According to Blazquez, et al. [1], premature infants can respond to these stimuli as early as 26 weeks of gestation, which shows their ability to perceive pain and hypersensitivity to painful stimuli at this early stage of development. Pain in the preterm infant has significant multi-system consequences. According to Álvarez, et al. [2], the experience of pain can induce a series of adverse physiological responses, such as the reduction of minute volume and lung vital capacity, which can trigger metabolic acidosis. It also increases cardiovascular demand by increasing blood pressure and heart rate, while at the endocrine level blood glucose and other metabolic markers are raised. The sympathetic nervous system reacts to pain by altering blood perfusion and generating changes in body temperature, effects that negatively impact the stability of the newborn. The incidence of painful procedures in these units is high, with an estimated 7.5 to 17.3 daily interventions per patient, with a higher prevalence in premature infants, who are continuously exposed to these interventions (Collados, et al. [3]).

Pain management in neonates has involved the use of pharmacological and non-pharmacological methods. However, in premature infants, the use of pharmacological analgesics presents additional risks due to the immaturity of their metabolic system, which increases the half-life of the drugs and complicates their elimination, exposing them to possible overdoses and adverse side effects (Vidal, et al. [4,5]). In contrast, nonpharmacological interventions have demonstrated benefits without these negative effects, providing tactile, vestibular, and kinesthetic stimuli that modulate the neonatate's behavioral state, promote maturation, and reduce stress (Pérez, et al. [6]). A non-pharmacological technique of growing interest is facilitated tucking, which consists of holding and positioning the newborn to provide tactile stimuli for comfort. According to Cignacco, et al. [7], this technique offers multiple benefits without requiring advanced technologies, reducing costs and reducing exposure to pharmacological interventions. In addition, facilitated containment not only decreases pain and stress, but also supports the neurological development and adaptation of the newborn to life outside the womb.

There are several studies that have shown the efficacy of facilitated containment in reducing pain in newborns (Hartley, et.al. [8]) being a simple, safe and economical technique (Hasanat et.al. [9]), on the other hand, it reduces stress levels by improving stability in various systems (Hill, et.al. [10]), and in combination with other non-pharmacological techniques, the beneficial effects are enhanced (Osborne, et al. [11]). The present study aims to conduct a systematic review on the efficacy of facilitated containment to reduce pain in preterm infants, exploring its benefits and limitations. Through this research, we seek to provide evidence for its application in neonatal clinical settings, promoting safer and less invasive care for the most vulnerable patients in NICUs.

Materials and Methods

This study is a quantitative research that is framed within a type of systematic review, in which a compilation, analysis and synthesis of information obtained from various previously published scientific sources was carried out. The research question was carried out according to the IOP (Question, Intervention and Outcome) model. Components of the research question included Facilitated Tucking, preterm infants, pain reduction (Figure 1). Once the clinical research question was formulated, a detailed protocol was established to plan the process of searching for scientific evidence, which consisted of making a detailed list of words in everyday language. These components were converted to an indexed language for documentary search, using both Health Sciences Descriptors (DeCS) [12] and Medical Subject Headings (MeSH) [13] in Spanish, English, Portuguese and French (Table 1).

Note: Source: Own elaboration Cano-Huchim 2024

Figure 1: Research Question Variables.

Table 1: Translating Research Question Elements into Indexed Language.

		Spanish	English	Portuguese	French
Population P	Preterm Infants	Premature*	Infant** Premature** "Premature Birth"[Mesh]**	Premature Newborn*	Premature*
Intervention I	Facilitated containment	Facilitated containment*	Facilitated Tucking* "Facilitated Tucking" [Mesh]**	Containment Made Easy*	Facilitated tucking*
Result O	Decreased pain	Pain*	Pain* "Pain"[Mesh]**	Dor*	Pain*

Note: Source: Own elaboration by Cano-Huchim based on *DECS **MeSH.

Search Protocol

To locate the scientific evidence, a search team was formed composed of 2 reviewers with clinical experience and previous training in the preparation of systematic reviews. A period was established for its development which comprised 3 months, these being September, October and November of the year 2024. In order to obtain high-quality articles in information, systematic tools and methods were implemented to ensure that the collection of these data was accurate, consistent and error-free.

Search Strategies

An exhaustive search was carried out for articles that will address the topic of interest which have been published from 2018 to date in the databases: Virtual Health Library (VHL) [14], PubMed [15], EBSCO [16] and Taylor and Francis journal [17]; as well as, free searches were carried out through Google Scholar [18] and vice versa. The guidelines established by the Preferred Reporting Items for Systematic reviews and Meta-Analyses (PRISMA) statement [19] were followed, and the selection or discarding of the articles found was carried out.In order to optimize the efficiency of the search, the AND operator was used, which allowed combining terms and establishing logical relationships between the key concepts that are part of the research question, based on the PIO model. Search strings were formulated: Facilitated Tucking AND Premature Birth AND Pain; Facilitated Tucking AND pain AND newborn AND neonatal (Table 2). The publications found were archived and organized using the Mendeley bibliographic manager, which was used for the generation of references, on the other hand, a search log executed in Microsoft Word was also used, in order to organize the articles found. For the eligibility and inclusion of scientific evidence, the following criteria were considered: [20-48].

Table 2: Eligible Items.

Strategy	Evidence/Year	Author/Language/ Country	Design	Conflict of interest
Facilitated Tucking AND Premature Birth AND pain	Pain relief in preterm neonates during upper airway aspiration comparing placements [20]	Andreazza G, Portuguese/ Brazil	Pre-test and Post-test	None
Facilitated Tucking AND Premature Birth AND pain	Acute Painful Procedures in the Preterm Newborn in a Neonatal Unit [21]	Sousa Rochal E, portugués/ Brazil	Cross-sectional and descriptive study	Does not mention
Facilitated Tucking AND Premature Birth AND pain	The effect of facilitated tucking position during painful procedure in pain management of preterm infants in neonatal intensive care unit: a systematic review and meta-analysis [22]	Gomes Neto M, Portuguese/ Brazil	Systematic review and meta-analysis	None
Facilitated Tucking AND Premature Birth AND pain	Efficacy of facilitated tucking combined with non-nutritive sucking on very preterm infants' pain during the heel-stick procedure: A randomized controlled trial. [23]	Perroteau A, English/ Paris	Prospective randomized controlled trial	None
Facilitated Tucking AND Premature Birth AND pain	Facilitated tucking during early neonatologist-performed echocardiography in very preterm neonates [24]	Gautheyrou L, English/ Paris	Cohort Study	None
Facilitated Tucking AND Premature Birth AND pain	Cumulative sucrose exposure for repeated procedural pain in preterm neonates and neurodevelopment at 18 months of corrected age: a prospective observational longitudinal study. [25]	Good M, English/ Canada	Prospective longitudinal observational study	None
Facilitated Tucking AND Premature Birth AND pain	The Effect of Breastfeeding, Kangaroo Care, and Facilitated Tucking Positioning in Reducing the Pain During Heel Stick in Neonates [26]	Avcin E, English/ Turkey	Quasi-experimental design	Does not mention
Facilitated Tucking AND Premature Birth AND pain	Effect of music (Brahms lullaby) and non-nutritive sucking on heel lance in preterm infants: A randomized controlled crossover trial [27]	Uematsu H, English/ Japan	Randomized controlled crossover trial.	None
Facilitated Tucking AND Premature Birth AND pain	Effects of a supportive care bundle on sleep variables of preterm infants during hospitalization [28]	Lan H-Y, English/ Taiwan	Randomized Clinical Trial	None
Facilitated Tucking AND Premature Birth AND pain	Effects of a tripartite intervention on biological stress in preterm infants during heel pricks for newborn screening: A randomized controlled trial [29]	Yin T, ingles/ Taiwán	Prospective randomized clinical trial	None
Facilitated Tucking AND pain AND newborn AND neonatal	Effects of White Noise and Facilitated Tucking During Heel Stick Sampling on the Pain Response of Healthy Term Newborns: A Randomized Controlled Study [30]	Pekyiğit A, English/ Türkiye	Randomized controlled trial	None
Facilitated Tucking AND pain AND newborn AND neonatal	Efect of non-pharmacological interventions on pain in preterm infants in the neonatal intensive care unit: a network meta-analysis of randomized controlled trials [31]	Weng Y, English/ China	Meta-analysis of randomised controlled trials	None
Facilitated Tucking AND pain AND newborn AND neonatal	Effects of non-pharmacological methods on post-operative procedural pain management in neonates admitted in the neonatal intensive care unit: A systematic review [32]	Sharma A, ingles/ India	Systematic review	None

Facilitated Tucking AND pain AND newborn AND neonatal	Pain in Preterm Infants: Different Perspectives [33]	Obeidat H, English/ United States	Review article	None
Facilitated Tucking AND pain AND newborn AND neonatal	The newborn infant parasympathetic evaluation in pediatric and neonatology: a literature review [34]	Recher M, English/ France	Journal Article: Review	None
Facilitated Tucking AND premature birth AND pain	The effect of the facilitated tucking position on pain intensity during heel stick blood sampling in premature infants: a surprising result [35]	Davari S, ingles/Iran	Crossover clinical trial	None
Facilitated Tucking AND premature birth AND pain	Pain during PICC insertion in preterm infants: the needle is not the only problema [36]	Yavanoglu Atay F, English/ Turkey	Prospective randomized controlled trial	None
Facilitated Tucking AND premature birth AND pain	The effect of gentle human touch during endotracheal suctioning on procedural pain response in preterm infant admitted to neonatal intensive care units: a randomized controlled crossover study [37]	Fatollahzade M, English/Iran	Clinical trial with a crossover design	None
Facilitated Tucking AND premature birth AND pain	Knowledge and Practice of Nurses and Associated Factors in Managing Neonatal Pain at Selected Public Hospitals in Addis Ababa, Ethiopia [38]	Wari G, English/ Ethiopia	Cross-sectional study	None
Facilited Tucking	The effect of facilitated tucking position on premature outcomes and pain intensity induced by invasive procedure in premature [39]	Salah S, English/ Egypt	Quasi-experimental	None
Facilited Tucking	Effectiveness of facilitated tucking in reducing the pain response during veinpuncture among preterm neonate admitted in NICU and postnatal ward at tertiary care hospital [40]	Sankpal S.V., ingles /India	Post-test clinical trial	None
Facilited Tucking	Crossover Study: Effect of Facilitated Tucking Position on Preterm Infants Pain and suction duration during Endotracheal Suctioning [41]	Zayed D, English/ Egypt	Randomized Controlled Clinical Trial	None
Facilited Tucking	Comparison the effect of breast milk smell, white noise and facilitated tucking applied to Turkish preterm infants during endotracheal suctioning on pain and physiological parameters [42]	Taplak S-A, English/ Turkey	Randomized Controlled Clinical Trial	None
Facilitated Tucking in preterm infants	Efficacy of facilitated tucking position and Reiki given to preterm infants during orogastric tube insertion: A randomised controlled trial [43]	Kurt Sezer, English/ Turkey	Randomized Clinical Trial	None
Facilitated Tucking in preterm infants	Comparison of facilitated tucking and oral dextrose in reducing the pain of heel stick in preterm infants: a randomized clinical trial [44]	Ranjbar, English/ Iran	Randomized Clinical Trial	None
Facilitated Tucking in preterm infants	Effect of facilitated tucking in reducing the pain response during Venipuncture among preterm neonate admitted in neonatal Intensive care unit (NICU) in a selected hospitals, Bengaluru [45]	Sudha, English/ India	Clinical trial	Does not mention
Facilitated Tucking in preterm infants	Effect of Facilitated Tucking Versus Swaddling Positions on Orogastric Tube Insertion Pain among Preterm Neonates [46]	Mohammed-Lecturer English/Alexandria	Quasi-experimental	None
Facilitated Tucking in preterm infants	Effects of Facilitated Tucking on Duration and Frequency of Crying During Rest among Hospitalized Premature Infants: A Randomized Clinical Trial [47]	Valizadeh English/ Iran	Randomized Clinical Trial	None
Facilitated Tucking in preterm infants	Facilitated tucking effective to pain relief on the preterm infants in perinatal unit in Jakarta [48]	Oktaviani E, inglés/ Indonesia	Quasi-experimental	Does not mention

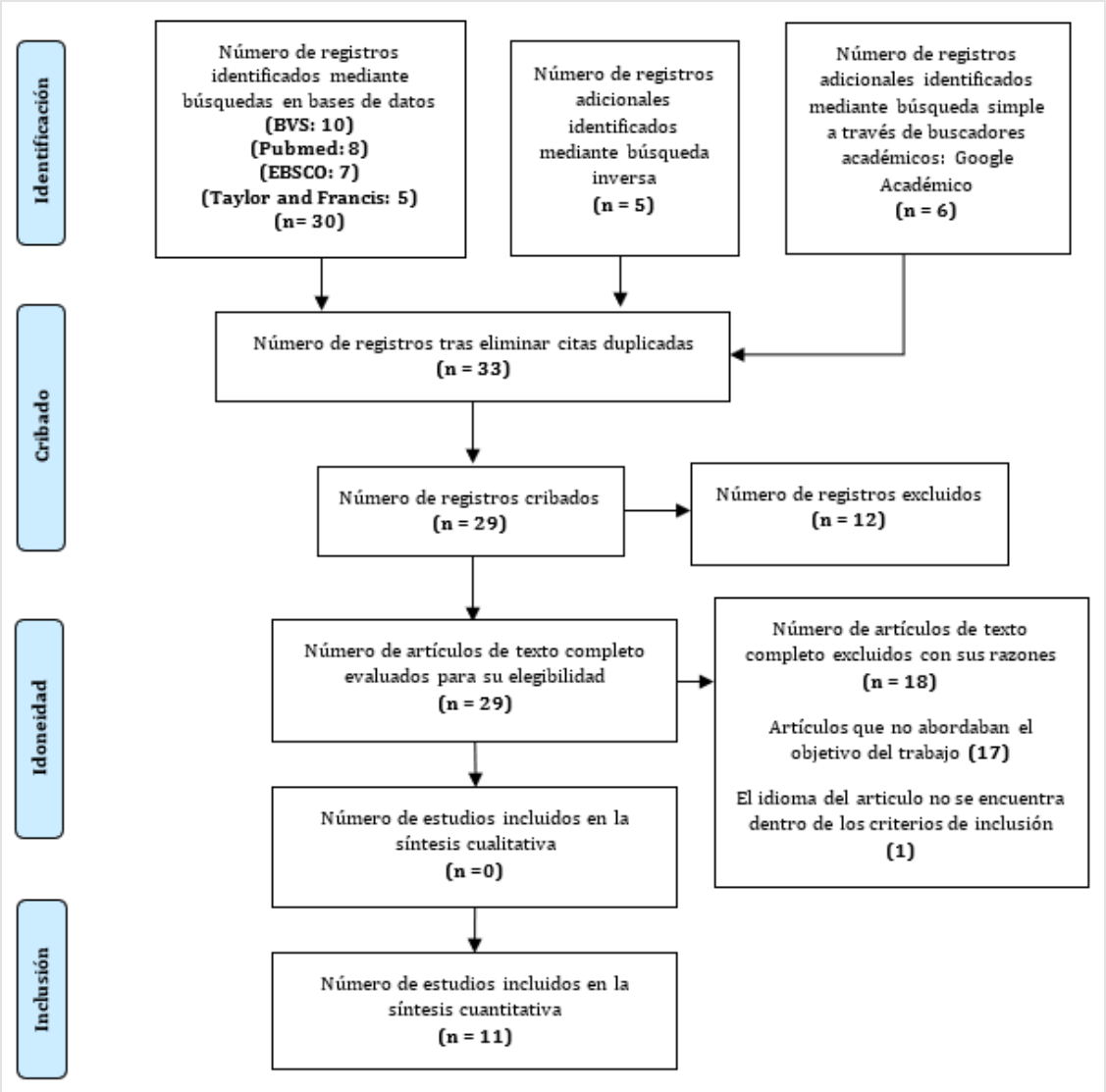
Eligibility Criteria

Articles designed as systematic reviews with meta-analyses or simple systematic reviews. Experimental scientific articles from randomized clinical trials. Quasi-experimental scientific articles from non-randomized clinical trials. Pre-experimental scientific articles such as pre-test and post-test, Observational scientific articles of the cohort type. Scientific articles that address the research topic in languages: Spanish, English and Portuguese.

Results

A total of 41 pieces of scientific evidence were identified, of which 8 were excluded for: duplicity, 4 for not retrieving the primary document, 17 for not meeting the objective, 1 for being in a language that is not within the inclusion criteria; 29 were eligible and as a result, it was decided to incorporate 11 articles in the final review, which met the established inclusion criteria (Figure 2).To determine the quality of the eligible evidence, a rigorous evaluation of the identified studies

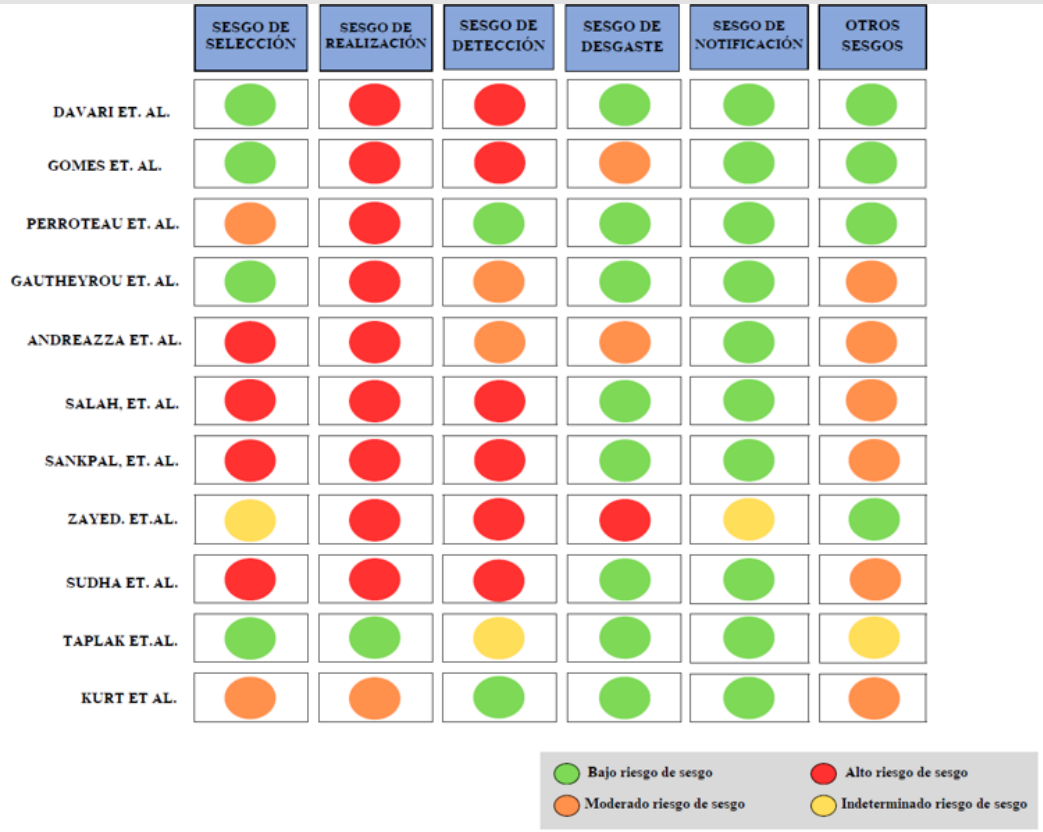
was carried out using critical reading sheets developed in the FLC 3.0 web application [49]. In these, a review of the methodology developed in the studies and its applicability in a real scenario was carried out, such as the study description, research question, method, results, conclusions, conflict of interest, and external validity.



Note: Source: Statement based on the PRISMA declaration. Cano-Huchim 2024.
Figure 2: PRISMA Declaration.

Risk of Bias

The quality of the selected articles was independently established using the Cochrane tool for the assessment of risk of bias, the results obtained after the implementation of the instrument were summarised in a figure for analysis (Figure 3). Subsequently, based on the chosen articles, a hierarchy was made, assigning the level of evidence and degree of recommendation according to the design of the included studies according to the SIGN proposal [50], which includes: 1 systematic review with meta-analysis, 7 clinical trials, 1 pre-test and post-test studies, 1 quasi-experimental study and 1 cohort study (Table 3).



Note: Source: Own elaboration.

Figure 3: Allocation for each type of risk of bias.

Table 3: Level of evidence and degree of recommendation of eligible articles according to SIGN.

Author	Degree of recommendation	Level of evidence	Risk of bias	Conclusion
Gomes M, et.al. [22]	A	1++	Moderate	This systematic review found that the facilitated flexion position appears to be superior to usual care in the management of pain during painful procedures
Perroteau a, et. al. [23]	A	1+	Low	This trial evaluated the impact of a combined strategy of facilitated wrapping and non-nutritive suction as an alternative method of pain relief when pharmacological treatments are not effective, their dose is limited daily, or other non-pharmacological treatments are not available. While infant pain assessed at the time of the procedure did not differ between strategies, we observed a remarkable effect of the combination of the swaddling method facilitated with non-nutritive suction on infant recovery three minutes after the procedure.
Davari S, et al. [35]	A	1+	Moderate	The results of the present study, in contrast to other similar studies, showed that the kneeling position facilitated alone is not enough to relieve pain in infants. These results contrast with many research findings in this area
Andreazza G, et al. [20]	A	1+	Moderate	This research provided the unit studied, through the formation of the team, with a moment of reflection on neonatal pain. Nonpharmacologic containment intervention at the time of aspiration of secretions from the airways provides pain relief when these data are evaluated dependently. The diaper containment intervention shows interference in heart rate, where patients in the Containment Group showed less variation compared to the Nest Group.
Salah S, et al. [39]	A	1+	Moderate	Facilitated containment had significantly reduced pain severity compared to the control group. In addition, the current results mentioned that less than two-thirds of the Preterm infants in the study had mild pain, while about half of them in the control group had moderate pain. In addition, the facilitated containment position decreased the change in heart rate and oxygen saturation. In addition, the time of quiet and active sleep increased, while the time of active alert and crying decreased among preterm infants.

Sankpal S, et al. [40]	A	1+	High	The study concluded that facilitated containment is a non-pharmacological, effective, simple, inexpensive, and safe pain management technique to reduce pain during the venipuncture procedure
Zayed D, et al. [41]	A	1+	High	Based on the results of this study, it was concluded that preterm infants who were in the facilitated containment position during endotracheal sucking experienced greater physiological stability, lower pain score, and shorter duration of sucking compared to preterm infants who received routine endotracheal suctioning.
Sudha, et al. [45]	A	1+	High	The study showed that facilitated containment is effective in reducing pain in preterm infants. In the present study, the researcher found that the calculated F-value was higher than the tabulated value between the experimental group and the control group. The mean difference in PIPP scores in the experimental group was low compared to that of the control group. This showed that facilitated containment was effective in reducing the pain response in the experimental group. The unpaired t-test showed a significant difference between the experimental group and the control group during and after venipuncture. The results prove that facilitated folding was effective in reducing pain among premature infants.
Taplak A, et al. [42]	A	1+	Low	Endotracheal aspiration is a painful but short-lived procedure. In our study, white noise and facilitated containment were found to be effective in relieving pain in premature infants or relaxing them prior to the endotracheal aspiration procedure, there was no difference between the groups in reducing pain during the procedure, and facilitated containment was an effective non-pharmacological method in the recovery of preterm infants after the procedure.
Kurt S, et al. [44]	A	1+	Low	The study showed that the Facilitated Tucking position during nasogastric tube insertion was especially effective in reducing pain and stress in infants. Both the Facilitated Tucking position and Reiki were determined to be effective interventions to reduce infants' pain and stress more quickly after the procedure. The results of the study contribute to the recommendation that NICU nurses should include non-pharmacological methods to decrease pain in premature infants during the procedure.
Gautheyrou et al. [24]	B	2++	Moderate	This prospective study found that EPN in the first few hours after birth was associated with mild discomfort. Laft may be proposed for very preterm infants to promote stability and reduce the subclinical increase in pulmonary arterial pressure associated with this examination. It is part of developmental care and can be used by all caregivers after a short training and can be easily performed by parents

Note: Source: Authors. Cano-Huchim 2024.

Discussion

Consistently reviewed studies highlight the efficacy of facilitated containment in reducing pain levels in preterm infants. Avcin and Kucukoglu [51] found that this technique caused significantly less pain and crying during heel puncture compared to other methods such as breastfeeding and kangaroo care ($p < 0.05$). This finding reinforces the superiority of facilitated containment as a primary intervention for pain management. Lopez, et al. [52] confirmed these results, reporting that Preterm Infant Pain Profile scores were significantly lower in the treatment group compared to the control group. This finding supports the validity of this intervention to minimize pain perception in neonates. Similarly, Oktaviani, et al. [53] observed that infants in the intervention group cried for a shorter time than those in the control group during procedures such as blood collection, highlighting the role of this technique in promoting pain management as an integral part of developmental care. Reyhani, et al. [54] also support these results, showing that the duration of crying in the neonates in the intervention group was significantly shorter compared to the control group ($p < 0.05$). This finding underscores the importance of implementing strategies such as facilitated containment to promote child growth and development by minimizing the stress derived from painful procedures.

In addition to pain, facilitated containment has also shown a positive impact on stabilizing physiological parameters, essential for the recovery and well-being of neonates. Altay and Kucukoglu [55] documented significant improvements in heart rate, oxygen saturation, body temperature, and respiratory rate in the intervention group ($p < 0.001$). These observations are consistent with the findings of Obeidat, et al. [56], who reported significant improvements in heart rate, oxygen saturation, and sleep-wake status, in addition to lower pain scores. However, Peyrovi, et al. [57] did not observe significant differences in some parameters, such as the mean time to reach a minimum pain score or changes in oxygen saturation. However, minor changes in heart rate were highlighted in the intervention group, suggesting that the effectiveness of facilitated containment may vary depending on the individual characteristics of the infants and the study conditions. A prominent aspect in the literature is the potential for facilitated containment to actively involve parents in the care of their infants.

Axelin, et al. [58] stress that this technique can be safely and effectively applied by parents during procedures such as aspiration, promoting an active role in pain management. Not only does this parental involvement improve bonding, but it may also decrease anxiety in caregivers and strengthen confidence in their ability to support the baby's well-being. Although other non-pharmacological meth-

ods, such as kangaroo and breastfeeding, have also shown efficacy in reducing neonatal pain, Avcin and Kucukoglu [51] highlighted that facilitated containment was superior in terms of crying reduction and pain scores. This positions it as a preferred option in contexts where the implementation of more complex techniques may not be feasible. While the evidence reviewed strongly supports the efficacy of facilitated containment, some studies, such as that of Peyrovi, et al. [57], identify limitations that deserve attention. These include small sample sizes, variability in methods, and differences in baseline characteristics of infants. Future research should focus on overcoming these limitations through more robust methodological designs that improve masking and/or concealment, also exploring the impact of this technique on long-term neurological development.

Conclusion

Facilitated containment has been consolidated as an effective and accessible intervention for pain management, 90% of the evidence presented a recommendation grade A, and 10%, grade B, in preterm infants. The studies reviewed support its effectiveness in reducing pain perception, making it a key strategy in the management of neonatal pain, the levels of evidence were 1++ (10%), 1+ (80%) and 2++ (10%), in intensive care units. However, further research is needed to address current limitations, such as discrepancies in observed effects and variability in neonatal response. As protocols are refined and knowledge about the underlying mechanisms of CF expands, it is expected that this technique will become standard practice in pain management in preterm infants.

Thanks

To the Faculty of Nursing of the Autonomous University of Yucatan and to our advisors for the accompaniment in carrying out this work.

Conflict of Interest

The authors declare that they have no conflict of interest whatsoever in relation to this work.

References

1. Blázquez Martinéz Laura (2015) Métodos no farmacológicos de prevención del dolor agudo en el neonato. Las Palmas.
2. Alvarez A, Baron SMG (2020) Protocolo de manejo del dolor. Servicio de Neonatologia. Buenos Aires.
3. Collados-Gómez L, Camacho-Vicente V, González-Villalba M, Sanz-Prades G, Bellón-Vaquerizo B (2018) Percepción del personal de enfermería sobre el manejo del dolor en neonatos. Enferm Intensiva 29(1): 41-47.
4. MA Vidal, E Calderón, E Martínez, A Gonzálvez, LM Torres (2005) Dolor en neonatos. Rev Soc Esp Dolor 12(2): 98-111.
5. DB Andropoulos (2018) Effect of anesthesia on the developing brain: Infant and fetus. Fetal Diagn Ther 43(1): 1-11.
6. R Pérez Villegas, E Villalobos Alarcón, K Aguayo García, M Guerrero Faquiez (2006) Valoración y estrategias no farmacológicas en el tratamiento del dolor neonatal. Rev Cubana Pediatr 78(3).
7. E Cignacco, A Axelin, L Stoffel, G Sellam, K Anand, et al. (2010) Facilitated tucking as a non-pharmacological intervention for neonatal pain relief: is it clinically feasible?: Clinical feasibility of facilitated tucking. Acta Paediatr 99(12): 1763-1765.
8. KA Hartley, CS Miller, SM Gephart (2015) Facilitated tucking to reduce pain in neonates: evidence for best practice. Adv Neonatal Care 15(3): 201-208.
9. TMA Hasanat, HM Obeidat, A Khamaiseh, HDAL Obieat, E Harb, et al. (2024) Facilitated tucking position effect on pain and comfort during heel stick in newborns. J Neonatal Nurs 30(5): 492-497.
10. S Hill, S Engle, J Jorgensen, A Kralik, K Whitman (2005) Effects of facilitated tucking during routine care of infants born preterm. Pediatr Phys Ther 17(2): 158-163.
11. CM Osborne, B Robbins (2012) Oral sucrose with facilitated tucking is effective pain control for preterm infants. J Pediatr161(1): 169-170.
12. (2024) OPS O. DeCS – Descritores em Ciências da Saúde.
13. (2024) National Library of Medicine. Medical Subject Headings (MeSH).
14. (2024) Portal Regional de la BVS. Bvsalud.org.
15. (2024) PubMed Central. National Institutes of Health (NIH).
16. (2024) Bibliotecas Académicas. EBSCO Information Services, Inc.
17. (2024) Taylor & Francis Online: Peer-reviewed Journals.
18. (2024) Google Académico. Google.es.
19. Page MJ, McKenzie JE, Bossuyt PM, Boutron I, Hoffmann TC, et al. (2021) Declaración PRISMA 2020: una guía actualizada para la publicación de revisiones sistemáticas. Revista Española de Cardiología 74(9): 790-799.
20. MG Andreazza, MNL Cat, AA Motter, y RPGVC da Silva (2020) Alívio da dor em neonatos prematuros durante a aspiração de vias aéreas superiores comparando posicionamentos. Rev Pesqui Em Fisioter 10(4): 674-682.
21. Sousa Rocha ÉC, Silva LA da, Araujo MC de, Azevedo SS de, Junqueira-Marinho M de F (2019) Procedimentos dolorosos agudos no recém-nascido pré-termo em uma unidade neonatal. Rev Enferm UERJ.
22. M Gomes Neto, IA da Silva Lopes, ACCLM Araujo, LS Oliveira, y MB Saquetto (2020) The effect of facilitated tucking position during painful procedure in pain management of preterm infants in neonatal intensive care unit: a systematic review and meta-analysis. Eur J Pediatr 179(5): 699-709.
23. Anne Perroteau, Marie-Christine Nanquette, Alexandra Rousseau, Sylvain Renolleau, Laurence Bérard, et al. (2018) Efficacy of facilitated tucking combined with non-nutritive sucking on very preterm infants' pain during the heel-stick procedure: A randomized controlled trial. Int J Nurs Stud 86: 29-35.
24. L Gautheyrou, S Durand, E Jourdes, J De Jonckheere, C Combes, et al. (2018) Facilitated tucking during early neonatologist-performed echocardiography in very preterm neonates. Acta Paediatr 107(12): 2079-2085.
25. Mariana Bueno, Marilyn Ballantyne, Marsha Campbell-Yeo, Carole Estabrooks, Sharyn Gibbins, et al. (2024) Cumulative sucrose exposure for repeated procedural pain in preterm neonates and neurodevelopment at 18 months of corrected age: a prospective observational longitudinal study. BMJ Paediatr Open 8(1): e002604.
26. E Avcin, S Kucukoglu (2021) The effect of breastfeeding, kangaroo care, and facilitated tucking positioning in reducing the pain during heel stick in neonates. J Pediatr Nurs 61: 410-416.
27. H Uematsu, I Sobue (2019) Effect of music (Brahms lullaby) and non-nutritive sucking on heel lance in preterm infants: A randomized controlled crossover trial. Paediatr Child Health 24(1): e33-e39,
28. HY Lan, L Yang, KH Hsieh, T Yin, YC Chang, et al. (2018) Effects of a sup-

portive care bundle on sleep variables of preterm infants during hospitalization. Res Nurs Health 41(3): 281-291.

29. T Yin, JJ Liaw, CH Tien, HP Wu, YC Chang, et al. (2022) Effects of a tripartite intervention on biological stress in preterm infants during heel pricks for newborn screening: A randomized controlled trial. Res Nurs Health 45(1): 34-45.
30. Pekyiğit A, Açıkgöz A (2023) Effects of White Noise and Facilitated Tucking During Heel Stick Sampling on the Pain Response of Healthy Term Newborns: A Randomized Controlled Study. Journal of Pediatric Research 10(1): 43-54.
31. Weng Y, Zhang J, Chen Z (2024) Effect of non-pharmacological interventions on pain in preterm infants in the neonatal intensive care unit: a network meta-analysis of randomized controlled trials. BMC Pediatrics 24(1): 9.
32. Sharma A, Sharma N, Chahal A (2024) Effects of non-pharmacological methods on post-operative procedural pain management in neonates admitted in the neonatal intensive care unit: A systematic review. Paediatrica Indonesiana 64(1): 65-76.
33. Obeidat HM, Dwairej DA, Aloweidi AS (2021) Pain in Preterm Infants: Different Perspectives. Journal of Perinatal Education 30(4): 185-195.
34. Recher M, Boukhris MR, Jeanne M, Storme L, Leteurtre S, et al. (2021) The newborn infant parasympathetic evaluation in pediatric and neonatology: a literature review. Journal of clinical monitoring and computing 35(5): 959-966.
35. Davari S, Borimnejad L, Khosravi S, Haghani H (2019) The effect of the facilitated tucking position on pain intensity during heel stick blood sampling in premature infants: a surprising result. J Matern Fetal Neonatal Med 32(20): 3427-3430.
36. Yavanoglu Atay F, Guran O, Sahin O, Cakmak F, Colak D, et al. (2024) Pain during PICC insertion in preterm infants: the needle is not the only problem. J Matern Fetal Neonatal Med 36(1).
37. Fatollahzade M, Parvizi S, Kashaki M, Haghani H, Alinejad-Naeini M (2019) The effect of gentle human touch during endotracheal suctioning on procedural pain response in preterm infant admitted to neonatal intensive care units: a randomized controlled crossover study. J Matern Fetal Neonatal Med 35(7): 1370-1376.
38. Wari G, Wordofa B, Alemu W, Habte T (2021) Knowledge and practice of nurses and associated factors in managing neonatal pain at selected public hospitals in Addis Ababa, Ethiopia. J Multi discip Health 14: 2275-2286.
39. Salah Eldin Mohamed Diab S (2023) The effect of facilitated tucking position on premature outcomes and pain intensity induced by invasive procedure in premature. Egypt J Health Care 14(1): 463-474.
40. Sankpal SV, Naregal PM, Mohite VR, Karale RB (2024) Effectiveness of facilitated tucking in reducing the pain response during veinpuncture among preterm neonate admitted in NICU and postnatal ward at tertiary care hospital.
41. A Zayed D, A Fathalla (2022) A Crossover Study: Effect of Facilitated Tucking Position on Preterm Infants Pain and suction duration during Endotracheal Suctioning. Egypt J Health Care 13(4): 238-250.
42. Taplak A, Bayat M (2024) Comparison the effect of breast milk smell, white noise and facilitated tucking applied to Turkish preterm infants during endotracheal suctioning on pain and physiological parameters. J Pediatr Nurs 56: e19-26.
43. Kurt Sezer H, Onal H, Degirmencioglu H, Kucukoglu S (2024) Efficacy of facilitated tucking position and Reiki given to preterm infants during orogastric tube insertion: A randomised controlled trial. J Paediatr Child Health.
44. Ranjbar A, Bernstein C, Shariat M, Ranjbar H (2020) Comparison of facilitated tucking and oral dextrose in reducing the pain of heel stick in preterm infants: a randomized clinical trial. BMC Pediatrics 20(1): 162.
45. Sudha M, Darling B (2019) Effect of facilitated tucking in reducing the pain response during venipuncture among preterm neonate admitted in neonatal intensive care unit (Nicu) in a selected hospitals, Bengaluru. IDC International Journal.
46. Mohammed-Lecturer AE-RA (2018) Effect of facilitated tucking versus swaddling positions on orogastric tube insertion pain among Preterm neonates. Journal of Nursing and Health Science 7(5).
47. Valizadeh L, Ghahremani G, Gharehbaghi M, Jafarabadi M, Farshi MR (2018) Effects of facilitated tucking on duration and frequency of crying during rest among hospitalized premature infants: A randomized clinical trial. International Journal of Pediatrics 6: 7543-7552.
48. Oktaviani E, Rustina Y, Efendi D (2024) Facilitated tucking effective to pain relief on the preterm infants in perinatal unit in Jakarta. J Keperawatan Indonesia 21(1): 9-16.
49. (2024) Fichas de Lectura Crítica FLC 3.0. Lecturacritica.com.
50. (2019) Niveles de evidencia y grados de recomendación del SIGN. Guía Salud.
51. E Avcin, S Kucukoglu (2021) The effect of breastfeeding, kangaroo care, and facilitated tucking positioning in reducing the pain during heel stick in neonates. J Pediatr Nurs 61: 410-416.
52. Lopez, P Subramanian, N Rahmat, LC Theam, K Chinna, et al. (2015) The effect of facilitated tucking on procedural pain control among premature babies. J Clin Nurs 24 (1–2): 183-191.
53. E Oktaviani, Y Rustina, D Efendi (2018) Facilitated tucking effective to pain relief on the preterm infants in perinatal unit in Jakarta. J Keperawatan Indones 21(1): 9-16.
54. Tayebeh Reyhani, Seyedeh Zahra Aemmi, Tahere Mohebbi Hassan Boskabadi (2014) The Effect of Facilitated Tucking (FT) During Venipuncture on Duration of Crying in Preterm Infants. International Journal of pediatrics 2(4): 431-435.
55. G Altay, S Küçükoğlu (2022) Effects of the facilitated tucking position in early period on physiological parameters, comfort and breastfeeding performance in late preterm infants: A randomized controlled trial. Midwifery 115: 103492-103492.
56. H Obeidat, I Kahalaf, LC Callister, ES Froelicher (2009) Use of facilitated tucking for nonpharmacological pain management in preterm infants: a systematic review: A systematic review. J Perinat Neonatal Nurs 23(4): 372-377.
57. H Peyrovi, M Alinejad-Naeini, P Mohagheghi, A Mehran (2014) The effect of facilitated tucking position during endotracheal suctioning on physiological responses and coping with stress in premature infants: a randomized controlled crossover study. J Matern Fetal Neonatal Med 27(15): 1555-1559.
58. A Axelin, S Salanterä, L Lehtonen (2006) Facilitated tucking by parents' in pain management of preterm infants-a randomized crossover trial. Early Hum Dev 82(4): 241-247.

ISSN: 2574-1241

DOI: 10.26717/BJSTR.2024.60.009381

Saúl May Uitz. Biomed J Sci & Tech Res

Submission Link: https://biomedres.us/submit-manuscript.php