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EFFECTIVENESS OF REFLEXOLOGY MASSAGE IN REDUCING PROCEDURAL PAIN IN CHILDREN: A SYSTEMATIC REVIEW

Siti zulva[1,2*], Regidor III Dioso[2]

[1]Department of Nursing, Sekolah Tinggi Ilmu Kesehatan RS. Dustira,Bandung City, West Java, Indonesia
[2]School Of Nursing & Applied Science Lincoln University College, Petailing Jaya, Selangor Malaysia

*contact:
zulvasiti@yahoo.co.id

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Abstract

Background: Procedural pain is a frequent and clinically important issue in pediatric healthcare, commonly resulting from invasive or semi-invasive medical procedures. Inadequately managed pain can lead to immediate physiological stress as well as long-term psychological and behavioral consequences. Therefore, safe and effective non-pharmacological interventions are needed. Reflexology has been proposed as a complementary approach to reduce procedural pain in children. **Objective:** This systematic review aimed to evaluate the effectiveness of reflexology in reducing procedural pain among pediatric patients. **Methods:** A systematic review was conducted in accordance with the PRISMA 2020 guidelines. Literature searches were performed in PubMed, Scopus, ScienceDirect, and Google Scholar for studies published within the last five years. Studies were selected using the PICOS framework and included experimental designs involving children undergoing medical procedures and receiving reflexology interventions. Pain outcomes were assessed using validated instruments, including the FLACC Scale and Wong–Baker FACES Pain Rating Scale. Due to clinical and methodological heterogeneity, a narrative synthesis was conducted without meta-analysis. **Results:** Five studies met the inclusion criteria, including randomized controlled trials and quasi-experimental studies conducted in Egypt, India, and Turkey. The findings consistently showed that foot reflexology significantly reduced procedural or postoperative pain and anxiety compared with standard care or alternative interventions. Additional benefits included improved physiological stability, reduced fear, and enhanced postoperative comfort. **Conclusion:** Reflexology appears to be an effective, safe, and low-cost non-pharmacological intervention for reducing procedural pain in children.

Keywords: Non-Pharmacological Intervention, Pain Management, Pediatric Patients, Procedural Pain, Reflexology.

Introduction

Procedural pain remains a significant challenge in pediatric healthcare, as children frequently undergo invasive medical procedures such as venipuncture, vaccination injections, catheter insertion, and endoscopic examinations (Kitamura et al., 2025). These procedures often induce acute pain that can trigger adverse physiological and psychological responses. Children, particularly neonates and preschool-aged populations, experience heightened pain sensitivity due to the immaturity of their nervous systems and limited coping mechanisms, rendering effective pain management a clinical priority. Inadequately managed procedural pain has been associated with long-term consequences, including altered pain perception, behavioral disturbances, and increased vulnerability to chronic pain syndromes later in life (Kitamura et al., 2025).

Despite the availability of clinical guidelines advocating for multimodal pain management strategies, the prevalence of poorly controlled procedural pain in pediatric settings remains high. Procedural pain in children is defined as acute nociceptive pain arising during or immediately after brief medical interventions, frequently accompanied by anxiety and emotional distress (Sarman et al., 2025). Pain assessment tools such as the FLACC scale and Wong Baker FACES Pain Rating Scale consistently demonstrate elevated pain scores during these procedures when non-pharmacological interventions are not applied. The heightened pain response in children is attributed to the activation of nociceptors and central pain pathways, compounded by limited prior exposure to pain-coping experiences (Atefeh, 2025).

Unmanaged procedural pain has both immediate and long-term consequences. Acute physiological responses include increased heart rate, elevated blood pressure, heightened cortisol levels, and reduced oxygen saturation, potentially delaying recovery (Bustamante Fernández et al., 2026). Repeated exposure to untreated pain may result in medical-related fear, reduced treatment adherence, and maladaptive behavioral responses such as agitation, withdrawal, or procedural avoidance. Furthermore, children experiencing high procedural pain levels have been reported to exhibit diminished quality of life and increased reliance on pharmacological analgesia following procedures (Hsu et al., 2025).

Current procedural pain management predominantly relies on pharmacological approaches, including topical anesthetics and mild opioids (Waren et al., 2025). However, these interventions are often limited by adverse effects such as nausea, respiratory depression, and excessive sedation, particularly in younger children (Atefeh, 2025). Consequently, international guidelines, including those issued by the World Health Organization, emphasize the integration of non-pharmacological and complementary therapies as adjunctive strategies to minimize drug exposure. Nevertheless, barriers such as insufficient training among healthcare providers and time constraints in busy pediatric units frequently hinder their routine implementation (Bustamante Fernández et al., 2026).

Reflexology is a non-invasive complementary therapy involving the stimulation of specific reflex points on the feet or hands, which are believed to correspond with various organs and physiological systems (Sarman et al., 2025). Originating from traditional Chinese medicine, reflexology has been adapted into contemporary nursing practice due to its simplicity, cost-effectiveness, and minimal risk profile. In pediatric care, reflexology is typically administered for 5–15 minutes prior to or during medical procedures and is theorized to reduce pain perception through the gate control theory of pain modulation (Karatas & Dalgic, 2020).

Physiologically, reflexology is proposed to inhibit nociceptive signal transmission at the spinal level, enhance peripheral circulation, and reduce stress hormone secretion. Observable responses following reflexology interventions in children include reductions in heart rate and improved oxygenation. Emerging evidence from randomized controlled trials suggests that reflexology may significantly reduce procedural pain scores in neonates undergoing heel lance and in children subjected to invasive diagnostic procedures, with statistically significant outcomes reported ($p < 0.05$) (Yilmaz & Yilmaz Kurt, 2021).

Recent systematic reviews indicate that reflexology is effective in reducing postoperative pain among children aged 5–10 years, as evidenced by lower Wong–Baker FACES scores compared to control groups ($p < 0.001$). Additional randomized trials have reported potential benefits in alleviating abdominal pain during pediatric endoscopic procedures, although the overall quality of evidence remains limited due to methodological heterogeneity. Other studies have also documented positive effects on stress reduction and sleep quality during periods of repeated invasive procedures (Sarman et al., 2025).

Despite promising findings from individual studies, the lack of a comprehensive synthesis of recent randomized controlled trials limits the translation of reflexology into standardized pediatric clinical practice. An updated systematic review incorporating evidence from major databases such as Scopus and PubMed is therefore warranted to critically evaluate the overall effectiveness of reflexology in managing procedural pain in children. Such a review would contribute to strengthening evidence-based recommendations and support the integration of reflexology as a standardized complementary intervention in pediatric nursing care.

Method

Study Design

This study is a systematic review conducted and reported in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. The review aimed to systematically identify, critically appraise, and narratively synthesize available evidence on the effectiveness of reflexology in reducing procedural pain among children. Due to substantial clinical and methodological heterogeneity across studies, quantitative meta-analysis was not performed.

Eligibility Criteria

Studies were selected based on predefined inclusion and exclusion criteria using the PICOS (Population, Intervention, Comparison, Outcome, Study design) framework.

Inclusion criteria were as follows:

Population (P): Children aged 1 bulan –18 years undergoing invasive or semi-invasive medical procedures, such as venipuncture, injections, catheter insertion, heel lance, or diagnostic procedures.

Intervention (I): Reflexology, including foot or hand reflexology, administered before, during, or after medical procedures.

Comparison (C): Standard care, no intervention, placebo, or alternative non-pharmacological interventions excluding reflexology.

Outcome (O): Procedural pain measured using validated and reliable pain assessment tools, such as the FLACC Scale, Wong–Baker FACES Pain Rating Scale or equivalent instruments.

Study design (S): Experimental studies, including *randomized controlled trials (RCTs)* and *quasi-experimental studies*.

Exclusion criteria included:
Duplicate publications or retracted articles.
Reviews, meta-analyses, editorials, commentaries, letters to the editor, or case reports.
Studies available only as abstracts without full-text access.
Studies involving adult populations or massage interventions that were not explicitly defined as reflexology.

Literature Search Strategy

A comprehensive literature search was conducted across the electronic databases PubMed, Scopus, ScienceDirect, and Google Scholar for articles published within the last 5 years. The search strategy employed a combination of free-text keywords and controlled vocabulary (e.g., Medical Subject Headings [MeSH] in PubMed), grouped into three primary concepts:
Population: "child," "children," "pediatric," "infant," "neonate"
Intervention: "reflexology," "foot reflexology," "foot massage"
Outcome: "procedural pain," "pain," "medical procedure"
Boolean operators "AND" and "OR" were used to combine search terms. Additionally, manual screening of reference lists from relevant articles was performed to identify potentially eligible studies not captured through database searches.

Study Selection and Data Extraction

Study selection was independently performed by two reviewers in two stages. The first stage involved screening titles and abstracts for relevance. The second stage consisted of full-text assessment of potentially eligible studies. Discrepancies between reviewers were resolved through discussion until consensus was achieved.

Data extraction was independently conducted by two reviewers using a standardized data extraction form. Extracted data included author(s), year of publication, country of study, study design, sample size, participant characteristics, type and duration of reflexology intervention, type of medical procedure, pain measurement instruments, and key findings related to procedural pain outcomes.

Risk of Bias Assessment

Methodological quality and risk of bias of the included studies were independently assessed by two reviewers. The Cochrane Risk of Bias Tool (RoB 2.0) was applied to randomized controlled trials, while the Joanna Briggs Institute (JBI) Critical Appraisal Checklist was used for quasi-experimental studies. Each study was categorized as having low, moderate, or high risk of bias. Any disagreements in quality assessment were resolved through consensus discussion.

Data Synthesis

Given the substantial clinical and methodological heterogeneity among the included studies particularly regarding participant age groups, types of procedures, reflexology techniques and duration, and pain assessment tools statistical meta-analysis was not conducted. Instead, a narrative synthesis approach was employed.
Findings were summarized descriptively and organized according to type of medical procedure and age group. Results were presented in textual form and supplemented with summary tables to identify patterns, consistency of findings, and overall strength of evidence regarding the effectiveness of reflexology in reducing procedural pain in children.

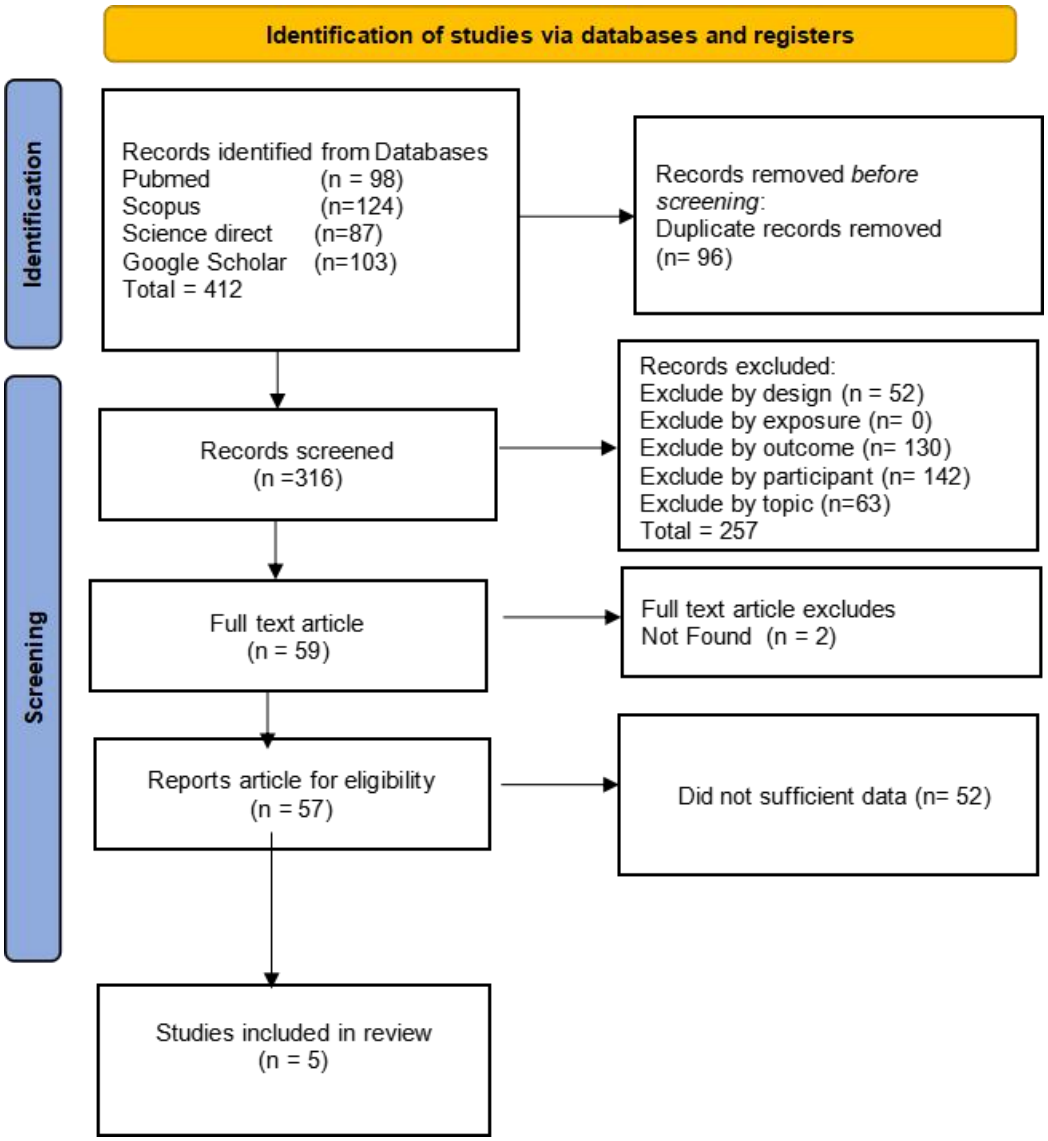

Figure 1. PRISMA flow diagram

Figure 1 illustrates the PRISMA 2020 flow diagram of the study selection process. A total of 412 records were identified through database searches (PubMed, Scopus, ScienceDirect, and Google Scholar). After the removal of 96 duplicate records, 316 records were screened based on titles and abstracts, resulting in the exclusion of 257 records that were not relevant to the review objectives. Subsequently, 59 full-text articles were assessed for eligibility, of which 54 articles were excluded due to inappropriate study design, non-pediatric populations, unclear reflexology interventions, or lack of focus on procedural pain. Ultimately, 5 studies met all inclusion criteria and were included in the final.

Results

Table 1 Result of Article Review

Author (Year)	Country	Study Design	Population & Sample	Medical Procedure	Intervention	Measurement Instruments	Main Findings
Ramadan Esmail Magor et al. (2023)	Egypt	Quasi-experimental	School-aged children with diabetes (n = 80)	Insulin injection	Foot reflexology massage prior to injection	Wong–Baker FACES Pain Rating Scale, Anxiety Scale	Foot reflexology significantly reduced pain and anxiety levels compared with standard care ($p < 0.05$).
Jadhav et al. (2024)	India	Randomized Controlled Trial	Children with thalassemia (n = 60)	Blood transfusion	Foot reflexology versus simple massage	FLACC Scale, Anxiety Scale, Vital Signs	Foot reflexology was more effective than simple massage in reducing pain and anxiety and stabilizing vital signs ($p < 0.05$).
Abd-Elaziz Mohamed et al. (2022)	Egypt	Quasi-experimental	Children undergoing surgical procedures (n = 90)	Postoperative care	Foot reflexology massage after surgery	Pain Intensity Scale, Sleep Quality Index, Fatigue Scale	Significant reductions in pain and fatigue and improvements in sleep quality were observed in the reflexology group ($p < 0.05$).
Sarman et al. (2025)	Turkey	Randomized Controlled Trial	Children after circumcision (n = 84)	Circumcision	Foot reflexology massage postoperatively	Wong–Baker FACES Pain Rating Scale, Fear Scale	The reflexology group demonstrated significantly lower postoperative pain and fear levels compared

							with the control group ($p < 0.001$).
Ogul & Yildiz (2023)	Turkey	Systematic Review	Pediatric populations (multiple studies)	Various medical procedures	Acupressure (non-reflexology)	Various pain assessment tools	Acupressure was effective in reducing procedural pain in children; this study was included as supporting evidence for non-pharmacological pain management rather than primary reflexology evidence.

Discussion

This systematic review demonstrates that foot reflexology is a promising non-pharmacological intervention for reducing procedural and postoperative pain among pediatric patients. Across the included primary studies, children who received foot reflexology consistently reported lower pain intensity compared with control or comparison groups receiving standard care or alternative interventions. These findings align with previous evidence highlighting the role of complementary therapies in pediatric pain management, particularly in minimizing pharmacological exposure (Ramadan Esmail Magor et al., 2023).

The effectiveness of foot reflexology was observed across a range of medical and procedural contexts, including insulin injections, blood transfusions, postoperative recovery, and circumcision. This consistency suggests that the analgesic benefits of reflexology are not procedure-specific but may operate through common neurophysiological pathways influencing pain perception. Similar reductions in pain scores across diverse procedures indicate the potential of reflexology as a versatile adjunct intervention in pediatric clinical practice (Jadhav et al., 2024; Sarman et al., 2025).

Several physiological mechanisms may explain the observed analgesic effects of foot reflexology. Reflexology is believed to stimulate peripheral nerve endings and mechanoreceptors in the feet, activating inhibitory pathways that reduce nociceptive transmission at the spinal level, consistent with the gate control theory of pain. In addition, tactile stimulation associated with reflexology may enhance parasympathetic activity and promote the release of endogenous opioids, contributing to pain relief and relaxation (Abd-Elaziz Mohamed et al., 2022; Sarman et al., 2025).

Beyond pain reduction, multiple studies included in this review reported significant decreases in anxiety and fear associated with medical procedures. Procedural anxiety is known to intensify pain perception and negatively affect children's cooperation and overall healthcare experience. The calming effect of foot reflexology may reduce anticipatory anxiety by providing sensory comfort and emotional reassurance, thereby addressing both physiological and psychological components of procedural distress (Ramadan Esmail Magor et al., 2023; Jadhav et al., 2024).

Comparative evidence further supports the specificity of foot reflexology as a therapeutic intervention. In the randomized controlled trial by Jadhav et al. (2024), foot reflexology was significantly more effective than simple massage in reducing pain, anxiety, and physiological instability during blood transfusion among children with thalassemia. This finding suggests that the benefits of reflexology extend beyond general touch or massage effects and are likely related to the targeted stimulation of reflex points.

The findings of this review are consistent with broader evidence on non-pharmacological pain management strategies in pediatric care. Although one included study focused on acupressure rather than reflexology, its systematic review demonstrated that targeted somatosensory stimulation effectively reduces procedural pain in children (Ogul & Yildiz, 2023) . The convergence of evidence across different complementary modalities strengthens the rationale for integrating reflexology into pediatric pain management protocols.

From a clinical and nursing perspective, foot reflexology offers several advantages. It is a low-cost, non-invasive intervention that does not require specialized equipment and can be implemented with minimal training. Its safety and acceptability make it particularly suitable for pediatric populations, where reducing medication-related adverse effects is a priority. Integrating reflexology into routine nursing care may enhance patient comfort, improve satisfaction, and support family-centered care models (Abd-Elaziz Mohamed et al., 2022; Ramadan Esmail Magor et al., 2023).

Despite the positive findings, this review also highlights important limitations. Variability in study designs, sample sizes, intervention protocols, and pain assessment tools limits the comparability of results across studies. Additionally, most studies focused on short-term outcomes, with limited evidence on the long-term effects of reflexology. Future research should prioritize large-scale randomized controlled trials with standardized methodologies and extended follow-up periods to strengthen the evidence base and support the development of clinical guidelines (Jadhav et al., 2024; Ogul & Yildiz, 2023).

Conclusion

Based on the findings of this systematic review, foot reflexology appears to be an effective and safe non-pharmacological intervention for reducing procedural and postoperative pain in pediatric patients. The included studies consistently demonstrated significant reductions in pain intensity and associated anxiety across various medical procedures, supporting the clinical value of reflexology as an adjunct to standard pediatric care. Its low cost, ease of implementation, and minimal risk make foot reflexology particularly suitable for integration into routine nursing practice. Although the evidence is promising, further high-quality randomized controlled trials

with standardized intervention protocols and long-term follow-up are needed to strengthen the evidence base and inform the development of clinical guidelines for pediatric pain management.

References

Abd-Elaziz Mohamed, E., Saber Mohamed Ismail, M., Mohamed Ahmed Ayed, M., & Ibrahim Eldemery, N. (2022). Impact of Foot Reflexology Technique on Pain intensity, Sleep Quality, and Fatigue among Children undergoing Surgical Procedures. In *Original Article Egyptian Journal of Health Care* (Vol. 13, Issue 4).

Atefeh, S. (2025). Barriers and facilitators of pain management in children: a scoping review. *BMC Anesthesiology*, *25*(1), 148. https://doi.org/10.1186/s12871-025-02941-2

Bustamante Fernández, M., Caes, L., Rossel, J. I., Díaz Díaz, G., Ruiz Valenzuela, G., Caroca Madariaga, S., Klein Vallecillo, N., Hidalgo Vilche, S., Tapia Espinoza, V., González Zamarin, M., & Strasser, K. (2026). Efficacy of psychosensory interventions for the management of pediatric pain, fear, and distress during emergency care: a systematic review and meta-analysis of randomized clinical trials. *Frontiers in Pediatrics*, *13*. https://doi.org/10.3389/fped.2025.1654835

Hsu, F. Y., Lee, Y. H., Tsai, J.-L., & Lien, A. S.-Y. (2025). Socially Assistive Robots for Pain Management and Emotional Responses in Pediatric Hospital Care: Systematic Review and Meta-Analysis. *Journal of Medical Internet Research*, *27*, e76427. https://doi.org/10.2196/76427

Jadhav, S. K., Naregal, P. M., Mohite, V. R., & Karale, R. B. (2024). Impact of Foot Reflexology Versus Simple Massage on Vital Signs, Anxiety, and Pain During Blood Transfusion Among Children With Thalassemia. *Cureus*. https://doi.org/10.7759/cureus.67876

Karatas, N., & Dalgic, A. I. (2020). Effects of reflexology on child health: A systematic review. *Complementary Therapies in Medicine*, *50*, 102364. https://doi.org/10.1016/j.ctim.2020.102364

Kitamura, S., Komiya, S., Kaneko, T., Tsuge, T., & Watanabe, J. (2025). Efficacy of Musculoskeletal Manipulation for Endoscopic Discomfort in Patients Undergoing Upper Gastrointestinal Endoscopy and Colonoscopy: A Systematic Review and Meta-Analysis. *Cureus*. https://doi.org/10.7759/cureus.96660

Ogul, T., & Yildiz, S. (2023). Effect of Acupressure on Procedural Pain in Children: A Systematic Review. *Journal of PeriAnesthesia Nursing*, *38*(6), 930-937.e1. https://doi.org/10.1016/j.jopan.2023.01.023

Ramadan Esmail Magor, N., Youssef El-Sheikh, O., Farouk Mohamed, M., & Mohamed Ahmed Ayed, M. (2023). Effect of Foot Reflexology Massage on Pain and Anxiety Levels regarding Insulin Injection among Diabetic Children. *Egyptian Journal of Health Care*, *14*(1), 1297–1312. https://doi.org/10.21608/ejhc.2023.300280

Sarman, A., Tuncay, S., & Ay, A. (2025). The impact of foot reflexology on postoperative pain and fear in children following circumcision: A randomized controlled trial. *Journal of Pediatric Urology*, *21*(6), 1675–1684. https://doi.org/10.1016/j.jpurol.2025.05.014

Waren, K., Fuadi, I., & Lestari, A. P. (2025). Sugammadex versus neostigmine for neuromuscular blockade reversal after surgery in pediatric patients: a systematic review and meta-analysis of randomized clinical trials. *Anaesthesia, Pain & Intensive Care*, *29*(5), 393–404. https://doi.org/10.35975/apic.v29i5.2869

Yilmaz, D., & Yilmaz Kurt, F. (2021). The effect of foot reflexology on procedural pain before heel lancing in neonates. *Archives de Pédiatrie*, *28*(4), 278–284. https://doi.org/10.1016/j.arcped.2021.02.015