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**Complementary therapy to reduce pain intensity to treat chronic pain in fracture patients:
A systematic review**

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Abstract

Background: Patients with fractures often experience significant pain. Complementary therapies are considered helpful in reducing pain levels in those suffering from fractures. The aim of this systematic review is to explore the impact of complementary therapy on pain reduction in fracture patients.

Purpose: To assess the impact of complementary therapy affects fracture patients' levels of pain.

Method: A systematic review approach in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Articles were gathered from online databases including Google Scholar, PubMed, and ScienceDirect, with full-text publications in English from 2012 to 2023. Among these, four were published in China and two in Iran. Quality evaluation was conducted using the Joanna Briggs Institute (JBI) Critical Appraisal Skills Program. The severity of pain in the six studies was measured using the standard Visual Analogue Scale (VAS).

Results: The review included six articles, which demonstrated that complementary therapies can reduce pain in fracture patients. Various complementary intervention techniques were utilized in the studies, including foot intervention, reflexology, auricular acupressure, and elbow intervention therapy. Before and after the interventions, the mean pain intensity scores were 5.72 ± 0.97 in the intervention group and 5.66 ± 0.92 in the control group.

Conclusion: Complementary intervention therapy can significantly reduce pain in patients with fractures. However, additional research is needed to confirm these findings and explore other complementary therapy methods.

Keywords: Complementary Intervention Therapy; Fracture; Pain; Randomized Controlled Trial; Visual Analog Scale.

INTRODUCTION

Pain is a common experience following surgery, often resulting from tissue damage and leading to acute discomfort that aids in the body's recovery. This surgical damage triggers reactions in the pain matrix, causing not only pain but also feelings of fear, anxiety, and frustration, along with sensitization of pain pathways both peripherally and centrally (Small & Laycock, 2020). About 70% of patients report experiencing severe pain within the first 24 hours post-surgery. Such intense pain can lead to

increased blood pressure, shortened hospital stays, impaired lung function, heightened risk of drug dependence, and potentially serious conditions like pneumonia or tachycardia (Imani, Nasiri, Akbari, & Safdari, 2020). Although prescription medications are the most common pain management method, up to 80% of patients still report postoperative discomfort (Simon, 2012).

The side effects of medications and issues like the unavailability of effective pain relief have led

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nursing systems to explore non-pharmacological pain management methods (DeKeyser, Cohen, & Wagner, 2001). Nurses have two main approaches to managing pain: pharmacological and non-pharmacological. Non-pharmacological methods offer nurses an autonomous strategy, often used in managing chronic pain. However, there is a growing need to develop these methods further, particularly for acute postoperative pain, due to concerns over the side effects associated with pharmaceutical treatments (Small et al., 2020).

Complementary and alternative interventions can be effective for pain management and improving patient adherence to treatment (Rambod, Sharif, Mohammadi, Pasyar, & Rafii, 2014). These include traditional treatments combined with therapies such as body and mind therapy, acupuncture, relaxation therapy, and complementary intervention therapy to reduce postoperative discomfort (Bauer et al., 2010). Complementary intervention therapy, a widely accepted non-drug approach, involves therapeutic manipulation of the body to maintain flexibility, using hands or mechanical devices (Vickers & Zollman, 2020). This therapy is recognized as a successful complementary and alternative treatment, helping osteoarthritis patients relax and enhancing their quality of life (Ali, Rosenberger, Weiss, Milak, & Perlman, 2017). It also has the potential to improve sleep quality when used as a relaxation technique (Rambod et al., 2021).

A randomized clinical trial investigated the effects of foot complementary intervention on pain severity and anxiety in patients post-surgery for a tibial shaft fracture. The findings indicated that patients who underwent this surgery experienced reduced pain and anxiety. As a result, complementary intervention is recommended as a suitable, noninvasive treatment in orthopedic surgeries, particularly following tibial shaft fracture procedures. Additionally, a study on the effect of non-

pharmacological therapy on postoperative pain in patients having tibia plating surgery found that foot reflexology significantly reduced postoperative pain in these patients, making it an effective method for reducing discomfort and anxiety in orthopedic surgery (Imani et al., 2020). These reviews highlight the benefits of complementary intervention therapy in managing pain for fracture patients, sparking interest in conducting a systematic review to further examine its impact. This review will compile findings from recent studies on the effectiveness of complementary intervention therapy in reducing pain levels in fracture patients.

RESEARCH METHOD

A systematic review guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines. The literature was gathered from databases including Google Scholar, Pubmed, and Science Direct. The search used English keywords such as "complementary intervention therapy," "pain," "fracture," and "RCT." Inclusion criteria were based on the PICO framework: Population = fracture patients, Intervention = complementary intervention therapy, Comparison = between complementary intervention therapy and other control techniques, and Outcome = pain intensity. Exclusion criteria included observational studies, study protocols, and review articles. The first author conducted the initial screening, while the other authors completed the content analysis screening. Data were extracted to create a table summarizing the authors, purpose, method, and results. Articles had to be full-text, available in either Indonesian or English, and published within the last eleven years (2012-2023). The initial search identified 8,982 articles, and after applying the selection criteria, 6 articles were included in the review.

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RESEARCH RESULTS

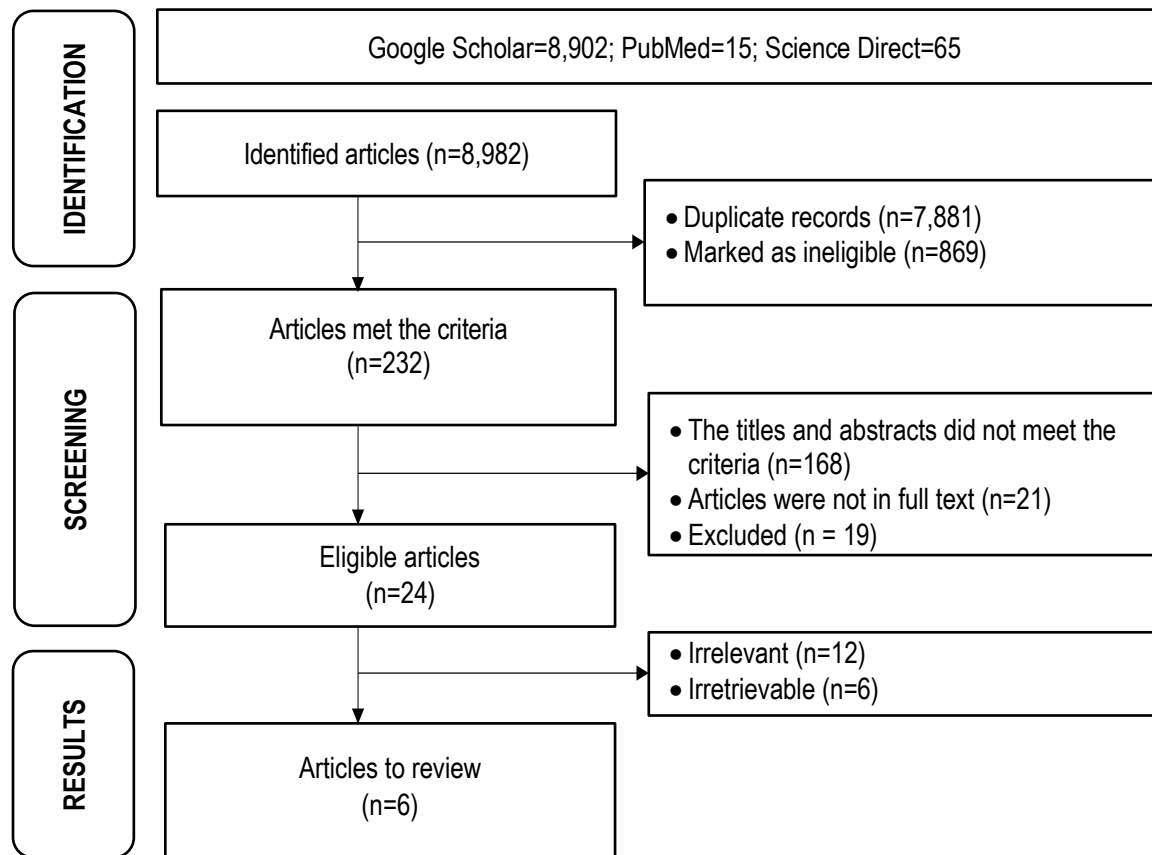


Figure 1. PRISMA Flow Diagram

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Table 1. Summary of The Article's Review

(Author, Year)(Country)	Purpose	Method	Results
(Qiu, Wang, & Wang, 2022) (China)	To improve the treatment effect of supracondylar fracture of the humerus, the application value of elbow press combined with Zhongtong Ling paste in postoperative swelling and pain in children with supracondylar fracture of the humerus is analyzed.	A clinical study utilizing a randomized controlled trial design with two groups (control & intervention) with pretest-posttest (n=41 peer grup)	In children with supracondylar humerus fractures, a combination of elbow complementary intervention and conventional therapy effectively reduces postoperative pain. Before, one month, and three months after the intervention, the patients' level of pain was measured using the Visual Analogue Scale (VAS). With a p-value < 0.001, the research group (n = 41) had a mean VAS score of 5.66±2.12, whereas the control group (n = 41) had a mean VAS score of 7.88±1.61.
(Imani et al., 2020) (Iran)	To evaluate the effect of foot reflexology massage on postoperative pain in patients undergoing plating surgery for tibia fracture.	Randomized clinical trial with two groups (control & intervention) with pretest-posttest (n =48 peer grup)	Baseline pain levels in the treatment group were 8.4±0.9 and 8.1±0.9, respectively, prior to intervention; following intervention, pain scores in this group decreased to 6.9±1.1 and 8.1±1.0, respectively (P<0.001). At various points following surgery, such as 2, 4, 6, 12, and 24 hours, there was also a notable decrease in postoperative pain levels.
(Yu, Ma, Zhang, Liu, Zhang, & Xu, 2021) (China)	To analyze the influencing factors of postoperative pain in patients presenting with emergency orthopedic trauma, and to determine the effect of high-quality nursing on pain.	Prospective randomized controlled trial with two groups (control & intervention) with pretest-posttest (n=39)	The SEFT education approach reduces pain perception. The research group (n=39) had a mean VAS score of 7.31±1.39 before the procedure, and it was 5.84±1.10 one day later. The control group (n = 39) had a mean VAS score of 7.22±1.30 before the procedure and 6.44±1.35 on the first postoperative day. A statistically significant difference between the two groups was shown by a P-value of less than 0.05.

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(Author, Year)(Country)	Purpose	Method	Results
(Zhu, Yang, & Wang, 2023) (China)	To explore the effect of comfort nursing combined with rehabilitation training on joint function, pain level and quality of life in patients with lower extremity fractures.	Randomized controlled trial with two groups (control & intervention) with pretest-posttest (n=59)	The research group (n = 59) had a mean VAS score of 5.72±1.20 on the first post-operative day, while the control group (n = 58) had a mean VAS score of 5.90±1.34 on the same day. Between the two groups, there was no statistically significant difference (P>0.05). 12. No discernible effect of breastfeeding comfort on pain was found.
(Pasyar, Rambod, & Kahkhaee, 2018) (Iran)	To determine the effect of massage therapy on pain intensity and anxiety in patients who have undergone tibial shaft fracture surgery.	Randomized clinical trial with a pre-post design (n=33)	Receiving complementary intervention therapy reduces anxiety and discomfort in patients undergoing tibial shaft surgery. Prior to and after the intervention, the average pain intensity scores for the intervention and control groups were 5.72 + 0.97 and 5.66 + 0.92, respectively. The Friedman test revealed a significant difference between the three pain intensity ratings in the intervention group ($\chi^2 = 27.63, P < 0.001$).
(Chang, Hsu, Jong, Ho, Tsay, & Lin, 2012) (Taiwan)	To examine the adjuvant effects of auricular acupressure on relieving postoperative pain and improving the passive range of motion in patients with total knee replacement (TKR).	Randomized controlled trial. Randomly assigned to the acupressure group and the sham control group (n=31 peer grup)	When applied at particular therapeutic locations, auricular acupressure enhances knee mobility and considerably reduces the need for narcotic analgesia in TKR patients (VAS 58.66 ± 20.35). Patients in the acupressure group and the sham control group used analgesic medications at significantly different rates, as indicated by $P < 0.05$.

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DISCUSSION

Complementary intervention therapy is a nursing practice that can be effectively and independently used to alleviate pain in fracture patients (Hebble, 1975). A literature review, which included six academic studies that assessed the impact of complementary intervention therapy on fracture pain levels using randomized control trial (RCT) methods, found that this therapy successfully reduced overall discomfort. The review highlighted that RCTs were commonly employed in the research design due to their high level of evidence-based quality, which follows a hierarchy that includes study types such as cross-sectional, cohort, case control, quasi-experiment, RCT, clinical trial, systematic review, and meta-analysis. Research quality improves at higher levels of this hierarchy, and larger sample sizes contribute to more accurate and reliable findings (Lefaiver, 2012).

This systematic review confirms that complementary intervention therapy effectively reduces postoperative pain intensity. The review identified six different techniques, including reflexology therapy on the soles of the feet, reflexology on the auricular part of the ear, SEFT therapy, a combination of elbow intervention with traditional treatment, and a comprehensive approach incorporating environmental management, psychological management, pain management, and rehabilitation training.

Type of Complementary intervention Therapy

The auricular acupressure method, which involves applying finger pressure to specific acupoints on the ear after treatment, has been found to be both simple and safe to use in perioperative healthcare settings. This study followed professional guidelines for acupuncture practice. Despite the balanced distribution of age, gender, and Body Mass Index (BMI) across the groups, indicating good randomization, we further controlled for BMI in the statistical analysis to enhance the validity of our results, as BMI can influence the requirement for postoperative pain relief. Potential biases were minimized by employing a double-blind study design, which ensured that both patients and data collectors were adequately blinded, thereby enhancing the reliability of the primary outcomes (Chang et al., 2012).

Foot reflexology, a traditional therapeutic practice dating back centuries, has also demonstrated potential health benefits as a complementary intervention therapy. The technique involves applying pressure to various points on the soles of the feet for ten minutes (Nesami, Shorofi, Zargar, Sohrabi, Baradari, & Khalilian, 2014). Another study involved a foot complementary intervention where each leg was massaged for five minutes (totaling ten minutes) using sweet almond oil, a commonly used lubricant in complementary therapies. The patient's foot was elevated on a pillow during the intervention, with pressure applied by the therapist's fingers and thumbs to specific areas of the foot, progressively increasing in intensity. This method was repeated on both heels and toes, with five to ten repetitions per session (Wang, Lu, Chou, Liang, & Chan, 2004).

Complementary intervention therapy has shown a more significant impact on reducing postoperative pain, particularly in the context of fracture care. This non-pharmacological treatment is practical and suitable for use in hospital settings to alleviate pain in fracture patients and can be administered with ease and flexibility (Adams, White, & Beckett, 2010). The simplicity and affordability of complementary intervention techniques make them a valuable resource in non-pharmacological treatments for fracture patients, highlighting the importance of this approach in nursing practice.

The therapeutic effect of complementary intervention therapy is largely due to the stimulation of the brain's motor neurons, which triggers the release of transmitters like acetylcholine. This activation leads to the involvement of calcium in maintaining protein integrity within muscle cells. The interaction of calcium and troponin C activates myosin in skeletal muscles, helping to reduce muscle tension and improve function. Complementary intervention enhances chemical, neuromuscular, and muscular activity by facilitating the interaction of actin and myosin filaments in smooth muscle. The process is driven by calcium ions and ATP, which convert to ADP to provide energy for muscle contraction in the limbs (Thanakiatpinyo, Suwannatrai, Khumkaew, Wiwattamongkol, Vannabhum, & Kuptniratsaikul, 2014).

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Measurement of Pain Levels

Pain is a subjective experience typically caused by actual or potential tissue injury. One of the most commonly used tools to measure pain is the Visual Analogue Scale (VAS), which graphically represents the levels of pain a patient may experience on a linear scale. This study found that patients who underwent surgery for a tibial shaft fracture experienced reduced anxiety and pain. Similar findings were reported in another study, where pain severity decreased in male patients undergoing arthroscopic knee surgery after a brief complementary intervention on the healthy foot, hands, and upper shoulder (Eghbali, Lellahgani, Alimohammadi, Daryabeigi, & Ghasempour, 2010). A systematic review also supports the idea that complementary intervention therapy can reduce anxiety and pain after surgery (Kukimoto, Ooe, & Ideguchi, 2017). Another study echoed these findings, suggesting that complementary intervention helps alleviate acute postoperative pain (Boitor, Gélinas, Lalonde, & Thombs, 2017). Additional research confirms that complementary intervention therapy can effectively reduce pain (Bauer, Cutshall, Wentworth, Engen, Messner, Wood, & Sundt, 2010; Adams et al., 2010).

Complementary intervention therapy has been shown to be effective three days after surgery, as pain levels begin to decrease around this time. Foot complementary intervention therapy was effective just two hours after surgery, as pain levels started to drop (Pasyar et al., 2018). Acupressure was found to be effective on the third day post-surgery. The general advantages of this therapy include its relevance to the topic, a detailed explanation of the interventions, and a systematic evaluation of the results.

CONCLUSION

Patients with fractures may experience reduced pain severity after undergoing progressive complementary intervention therapy. The effectiveness of progressive muscle relaxation techniques can vary based on the specific type of complementary intervention used, the frequency of the sessions, the duration of each session, and the timing of pain assessment after fracture surgery. Despite these variations in complementary intervention methods, all studies consistently reported significant positive effects of complementary intervention therapy in reducing pain intensity in patients with fractures.

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