



Non-pharmacological intervention to reduce pain post-appendectomy: A rapid review of randomized controlled trial studies

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ABSTRACT

Background: Appendicitis leads to post-appendectomy pain with significant physical and mental implications, necessitating non-pharmacological pain management approaches.

Objective: This study aimed to determine which non-pharmacological interventions can effectively reduce postoperative pain following an appendectomy.

Design: A rapid review study design was employed.

Data Sources: The databases used were EBSCOhost-CINAHL and PubMed. The article search was conducted on March 14, 2022.

Review Methods: The identified articles were described using PRISMA guidelines and sorted based on inclusion criteria. These criteria included patients with appendicitis aged 18-59 years who underwent appendectomy, non-pharmacological pain management interventions, studies utilizing the Randomized Controlled Trial (RCT) method, full-text articles available, English language, and articles published between 2012-2022. Studies involving pediatric and elderly appendectomy patients, as well as studies with insignificant results, were excluded.

Results: Four articles were analyzed, revealing four types of interventions: Foot and Hand Reflexology (Massage), Lavender Aromatherapy and Almond oil (Aromatherapy), Inhalation aromatherapy with sweet-scented geranium essential oil, and Acupressure Le7. These interventions were then classified into two categories: aromatherapy-based interventions and neurostimulation-based interventions. All interventions were found to significantly reduce pain in appendectomy patients.

Conclusions: Non-pharmacological therapies, such as lavender and almond oil aromatherapy, sweet-scented geranium aromatherapy, foot and hand reflexology, and Le7 acupressure, have demonstrated positive effects in reducing long-term pain after an appendectomy.

Keywords: appendectomy; appendicitis; pain; non-pharmacological intervention

INTRODUCTION

Appendicitis is the leading cause of acute inflammation in the right lower quadrant of the abdomen and the most common cause of emergency abdominal surgery ([Smeltzer, 2018](#)).

Nursing and Healthcare Practices

- Nurses play a role in implementing and administering non-pharmacological therapies to patients who have undergone an appendectomy.
- Nurses are responsible for assessing the effectiveness of aromatherapy-based interventions, particularly lavender and almond oil aromatherapy, in reducing pain after an appendectomy.
- Nurses are involved in providing neurostimulation-based interventions to patients post-appendectomy and monitoring the outcomes of these interventions in pain management.

The standard management and treatment for acute appendicitis are surgery or surgical appendectomy (Jones et al., 2021). According to Potter and Perry (2013), appendectomy is a procedure that affects the occurrence of pain. Generally, severe pain is felt within the first 2 hours after appendectomy surgery. Pain is subjective, and the stimulus can be physical or mental, so the pain felt can drain energy and disrupt relationships between individuals, affecting the meaning of life (Potter et al., 2013). Pain also interferes with a person's functional abilities and quality of life (Berman et al., 2015).

According to Ferris et al. (2017), in the 21st century, the global incidence of appendicitis accumulated to 100,000 cases, with the highest number occurring in newly industrialized countries in Asia. In Indonesia, the incidence of acute appendicitis is around 24.9 cases per 10,000 population (Wijaya et al., 2020). Based on Indonesia's 2014 Household Health Survey, appendicitis ranks highest among abdominal emergency cases (Depkes RI, 2015). Approximately 300,000 appendectomy operations are performed every year on patients with acute appendicitis (Perez & Allen, 2018).

According to a study by Manworren et al. (2021), more than 50% of patients reported moderate to severe pain after laparoscopic appendectomy in the first three days. The non-pharmacological approach to pain management, such as relaxation, is an intervention that affects

the client's response to pain. Pain management with relaxation interventions includes deep breathing exercises, progressive relaxation, guided imagery relaxation, and meditation (Smeltzer, 2018).

In this study, we chose non-pharmacological interventions because non-pharmacological pain management is a pain relief strategy that does not involve the use of drugs but instead focuses on caring behaviors. Therefore, medical personnel, particularly nurses, play a dominant role. Thus, one of the essential aspects for nurses in dealing with pain is to develop competence and continuously enhance their understanding of non-pharmacological pain management. As a result, researchers became interested in conducting research related to non-pharmacological interventions to reduce pain in post-appendectomy patients. The research was conducted by analyzing relevant literature through a literature review.

METHODS

Design

The method used in this study is a rapid review. This method allows researchers to produce evidence in a short time, in accordance with the research objectives. The rapid review is a simplified version of a systematic review.

Search Methods

The literature identification process utilized electronic databases, namely EBSCOhost-CINAHL and PubMed. The research question, "What are the interventions to treat pain in patients with appendectomy?" formed the basis for compiling the PICO (Population, Intervention, Comparison, Outcome), which was the searching tool applied in this study. The keywords used in the article search included: "Appendectomy Patient" OR "Appendicitis" AND "Postoperative" AND "Non-Pharmacology" AND "Intervention" OR "Management" OR "Treatment" AND "Pain" OR "Acute pain."

Eligibility Criteria

The identified articles are described in PRISMA. Article selection is based on conformity with the inclusion and exclusion criteria. The inclusion criteria in this study were as follows: appendicitis patients aged 18-59 years who underwent appendectomy, non-pharmacological therapy to reduce pain, research articles using the Randomized

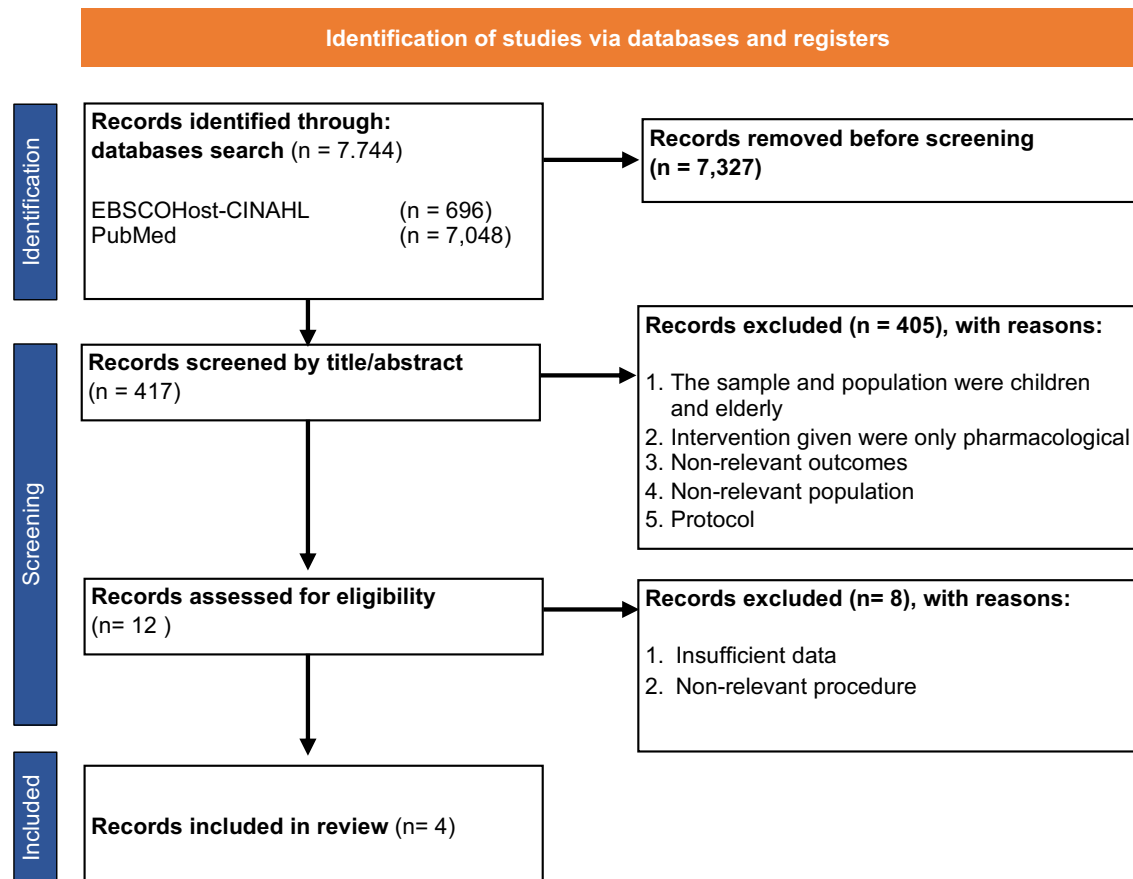


Figure 1. PRISMA Diagram of Searching Process

Controlled Trial (RCT) method, full-text articles in English, and studies conducted between 2012 and 2022. Meanwhile, articles with study samples of pediatric and elderly appendectomy patients showing insignificant results were excluded.

Data Extraction

The extracted articles include title, author, year, country, study design, population and sample, procedure, intervention, and important results (Table 1).

Data Analysis

The articles are read in full and then analyzed, classified based on interventions and outcomes in reducing pain in post-appendectomy patients. The findings are presented in a narrative form.

Ethical Consideration

This research used humans as the respondents, the author already get ethical consideration from the Ethical Health Commission Faculty of Nursing, Universitas Airlangga with the number of certificate 125/KEP/2021.

RESULTS

The initial search yielded 7,744 articles from two databases, EBSCOHst-CINAHL and PubMed. A total of 7,327 articles were eliminated because they did not meet the criteria, such as not being RCTs, lacking full text, or being published over 10 years ago. From the remaining 417 articles, a filtering process based on the title and abstract was conducted. Out of the 417 articles, 12 were selected for a more detailed reading, while the others were excluded. After reading the 12 articles in depth, 4 relevant articles were identified for further analysis. Figure 1 illustrates the selection process.

As shown in Table 1, the four identified articles were published within the last 10 years, specifically in 2013, 2020, and 2021. All of them utilized randomized controlled trials (RCTs). These articles originated from Iran, and based on the extracted data, a total of 435 participants were included in the studies. All participants underwent appendectomy surgery. The Visual Analogue Scale (VAS) was used as the instrument to measure pain in the patients across these articles. The interventions

Table 1. Data Extraction

Author, Year	Study Design	N	Intervention	Duration	Tools	Duration of Measurement Outcome	Results
Taheri, et al, 2019	RCT	38	Foot and Hand Reflexology (Massage)	20 minutes	VAS	24 hours after intervention	Foot reflexology can significantly reduce pain ($p < 0.001$) compared to hand reflexology
Ghadirian, et al, 2020	RCT	120	Lavender Aromatherapy and Almond oil (Aromatherapy)	3 minutes/ stage	VAS	30 minutes after intervention	The use of lavender aromatherapy showed significant results in reducing pain ($p < 0.001$)
Gazerani et al, 2021	RCT	120	Inhalation aromatherapy with sweetscented geranium essential oil	5 minutes	VAS	30 minutes after intervention	Effect of inhaled aromatherapy with sweet-scented geranium showed significant results in reducing pain ($p < 0.001$)
Adib-Hajbaghery & Etri, 2013	RCT	70	Acupressure appendectomy at point Le7 (right leg)	10 minutes	VAS	7 hours after intervention	Post-appendectomy pain intensity in the intervention group was significantly lower than the control group ($p = 0.02$)

investigated in the studies included foot and hand reflexology (massage), lavender aromatherapy and almond oil (aromatherapy), inhalation aromatherapy with sweet-scented geranium essential oil, and acupressure on the Le7 acupoint.

The procedure for Foot and Hand Reflexology involved applying olive oil massage to specific areas of the feet (heel, outer edge of the right foot, and inner edge of the left foot) and palms (inner right palmar arch and scaphoid tubercle on the left hand) after prior cleaning using a wet sponge (Taheri et al., 2019). Lavender aromatherapy and almond oil intervention included using two drops of french lavender extract combined with almond oil, which were then dripped onto a handkerchief. The patient inhaled the aromatherapy from the handkerchief for 3 minutes, holding it 2.5-5cm away from the patient's nose (Ghadirian et al., 2020). The sweet-scented geranium essential oil intervention involved placing 3 drops of 1% geranium essential oil onto a cotton swab. The patient then inhaled the aroma from the swab positioned 10 cm away for 5 minutes, after which the physiological pain index was recorded (Gazerani et al., 2021). Lastly, the Le7 Acupressure intervention involved wearing a bracelet or acuband on the right leg and positioning it on the Le7 acupoint (Adib-Hajbaghery & Etri, 2013).

DISCUSSION

This literature study identified two groups of interventions that were found to relieve pain in post-appendectomy patients. The first group is aromatherapy-based intervention, which includes lavender aromatherapy and geranium aromatherapy inhaler. The second group is nerve stimulation-based intervention, consisting of hand and foot reflexology massage and acupressure.

Aromatherapy-Based Intervention

The use of lavender aromatherapy has shown significant results in reducing pain for patients undergoing appendectomy (Ghadirian et al., 2020). When the fragrance is inhaled, the molecules of these substances are transmitted through the olfactory system to the limbic system in the brain, which then responds to the stimuli and causes positive psychological effects (Shirzadegan et al., 2017).

The inhalation of sweet-scented geranium aromatherapy also demonstrates significant

results in reducing pain in appendectomy patients (Gazerani et al., 2021). Olfactory receptors convert odors into nerve impulses and send them to the limbic system. When the limbic system is influenced by these nerves, the aroma can stimulate the release of neurotransmitters and endorphins in the brain, thereby creating a feeling of relaxation (Gazerani et al., 2021).

Previous research supports these findings. Metawie et al. (2015) found that lavender oil inhalation is an effective non-invasive and non-pharmacological intervention for postoperative pain management. Surya et al. (2020) discovered that lavender and rose aromatherapy can reduce pain in postoperative patients. Another study showed that aromatherapy massage with lavender and chamomile oils can reduce and control pain in burn patients (M Gallo et al., 2022).

Neurostimulation-Based Interventions

Reflexology is a massage technique that stimulates reflex points on organs, such as the palms of the hands and feet, to open energy pathways and increase comfort (Eghbali et al., 2012). A 20-minute reflexology intervention demonstrated effective results, with foot reflexology showing a decrease in pain on the VAS scale by 6.63, and hand reflexology by 5.42 (Taheri et al., 2019). Reflexology reduces pain by stimulating energy and nerve pathways, increasing blood flow and oxygenation, and triggering the release of endorphins and pain-relieving substances (Garimella & Celini, 2013). These results align with a study by El-Fadl (2021), which showed that reflexology can reduce postoperative pain in appendectomy patients. Reflexology is an economical, safe, and simple method that can be applied to postoperative appendicitis patients, suppressing endocrinological and neuroendocrinological responses that contribute to reduced pain intensity (Khorsand et al., 2015).

Acupressure was applied to the Le7 acupuncture point, known for its effectiveness in reducing acute and chronic appendicitis pain (Adib-Hajbaghery & Etri, 2013). The Le7 acupressure intervention demonstrated effective results in reducing pain on the VAS scale, with a decrease of 1.57 after 7 hours of intervention (Adib-Hajbaghery & Etri, 2013). Acupressure points P6 and Le7 in reducing

nausea, vomiting, pain, and vital signs in post-appendectomy patients. Similarly, a study on acupuncture at the L14 point for 20 minutes, with 10-second pressure and 2-second resting periods, resulted in a significant reduction in pain levels (Narimani et al., 2018).

CONCLUSION

Pain in postoperative appendicitis patients can be alleviated through aromatherapy-based interventions (lavender and almond oil aromatherapy, sweet-scented geranium aromatherapy) and neurostimulation-based interventions (foot and hand reflexology, Le7 acupressure). These interventions have been proven to have calming and analgesic effects, relieve muscle spasms, improve blood circulation, soothe nerves, and provide long-term pain relief after appendectomy. These interventions are easy to administer, have minimal complications, and offer improved care following appendectomy. The nursing implication of this study highlights the role of nurses as care providers who prioritize fulfilling patients' basic needs, ensuring their sense of security and comfort by addressing pain. This research serves as evidence-based practice in the provision of non-pharmacological therapies to reduce pain, particularly in postoperative patients. Future research should focus on addressing the challenges related to reducing pain scale and improving appendectomy wound healing duration, as these factors can impact patients' activities and sleep quality. Thus, further studies investigating effective therapies to address these issues would be beneficial. The findings of this research can serve as a valuable reference for future researchers in the field.

Declaration of Interest

The author declares that this manuscript does not have a conflict of interest with the other study or author.

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Data Availability

The datasets generated during and/or analyzed during the current study are available from the

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