Journal of Health and Nutrition Research
Vol. 5, No. 2, 2026, pg. 800-807, https://doi.org/10.56303/jhnresearch.v5i2.1277
Journal homepage: https://journalmpci.com/index.php/jhnr/index

e-ISSN: **2829-9760**

Comparison of the Effectiveness of Finger Grip and Lavender Aromatherapy on Changes in Pain Post - Apendectomy

Fadli[1]*, Eko Winarto[1], Yunani[1], Fery Agusman[1]

[1] Master of Nursing Program, Universitas Karya Husada Semarang, Indonesia

Corresponding Author Email: fadlinasir1987@gmail.com

Copyright: ©2026 The author(s). This article is published by Media Publikasi Cendekia Indonesia.

ORIGINAL ARTICLES

Submitted: 09 February 2026

Accepted: 09 April 2026

Published: 01 August 2026

Keywords:

Finger Grip Relaxation, Lavender Aromatherapy, NRS, Non-Pharmacological Management Post-Appendectomy Pain

OPEN ACCESS

This work is licensed under a Creative Commons Attribution-NonCommercial-ShareAlike 4.0 International License

ABSTRACT

Post-appendectomy pain, caused by tissue trauma and inflammation, significantly impedes patient recovery and highlights the need for effective, non-pharmacological interventions to complement standard analgesics. This study aimed to evaluate and compare the effectiveness of Finger Grip Relaxation and Lavender Aromatherapy in reducing pain intensity among post-appendectomy patients. A quasi-experimental pretest-posttest design with two groups was conducted involving 30 adult patients (aged 18–65 years) at dr. H. Jusuf SK Tarakan Regional General Hospital. Participants were selected using purposive sampling and assigned to either the Finger Grip Relaxation group (n = 15) or the Lavender Aromatherapy group (n = 15). Each intervention was administered for 30 minutes daily over two consecutive days. Pain intensity was measured using the Numeric Rating Scale (NRS; 0–10). Due to non-normal data distribution confirmed by Shapiro–Wilk tests, data were analyzed using the Wilcoxon signed-rank test for within-group changes and the Mann–Whitney U test for between-group comparisons ($\alpha = 0.05$). Both interventions yielded a statistically significant reduction in post-appendectomy pain. In the Finger Grip Relaxation group, the mean NRS score decreased from 6.60 to 4.20 ($p = 0.001$). In the Lavender Aromatherapy group, the mean NRS score decreased from 7.60 to 4.27 ($p = 0.001$). The Mann–Whitney U test revealed a significant difference in pain reduction between the two groups ($p = 0.012$), indicating that Lavender Aromatherapy produced a greater decrease in pain intensity. Descriptive analyses confirmed no significant differences in baseline characteristics (age, sex, and health history) between the groups. Both Lavender Aromatherapy and Finger Grip Relaxation serve as promising complementary options for post-appendectomy pain management. However, Lavender Aromatherapy demonstrated superior efficacy in pain reduction within this small-scale study. Future studies with randomized controlled designs and larger sample sizes are recommended to validate these preliminary findings.

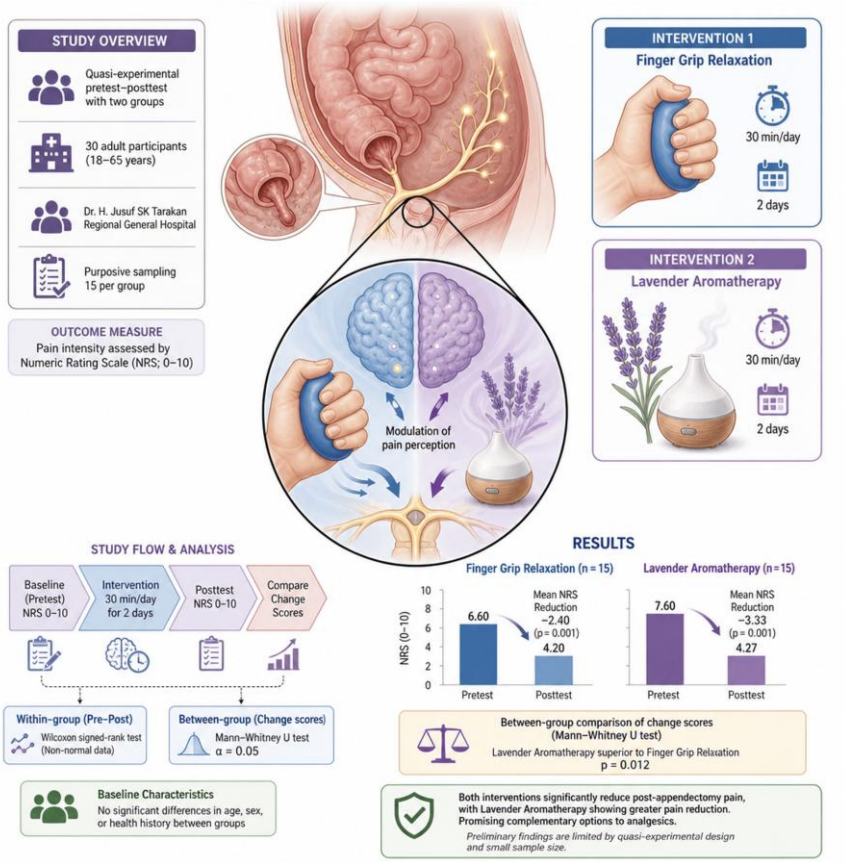
Key Messages:

- Preliminary findings suggest that both Lavender Aromatherapy and Finger Grip Relaxation are promising complementary interventions for reducing post-appendectomy pain, with lavender aromatherapy showing a greater reduction in this small-scale study.

Access this article online

Quick Response Code

GRAPHICAL ABSTRACT



INTRODUCTION

Post-appendectomy is a common surgical procedure performed in cases of acute appendicitis and is often accompanied by postoperative pain that can hinder early mobilization, prolong hospitalization, and reduce patient comfort and quality of life. This pain is primarily caused by tissue trauma and inflammatory processes at the incision site, with intensity typically ranging from moderate to severe during the first 24–48 hours post-surgery before gradually decreasing (1). Management of postoperative pain has thus far been dominated by pharmacological approaches, particularly opioid and non-opioid analgesics, which, although effective, have the potential to cause side effects such as nausea, dizziness, constipation, and the risk of dependence and drug abuse, thus encouraging the need for safe and easy-to-apply non-pharmacological interventions in nursing clinical practice (2).

Various non-pharmacological interventions have been developed to reduce post-operative pain, including relaxation techniques, distraction, cognitive behavioral therapy, and aromatherapy (3). Finger Grip Relaxation (FGR) is a simple relaxation technique that does not require special equipment and emphasizes stimulating reflex points through systematic finger gripping to reduce tension and pain perception (4). A case study of post-appendectomy patients showed a decrease in pain scale from severe to mild within 2–3 days after receiving FGR. However, the study had limitations in that the sample size was minimal, it was conducted at only one facility, and there was no comparison group, so the generalizability and strength of the evidence were still limited (5). On the other hand, lavender aromatherapy has been reported to have analgesic and anxiolytic effects through the mechanism of central nervous system modulation and anxiety reduction, with several studies showing a reduction in postoperative pain after lavender inhalation, although the variation in study design, dosage, and duration of exposure is still quite large (6).

Based on a literature review, research on the effectiveness of FGR on post-appendectomy pain is mostly descriptive or case studies with small samples and without comparative analysis, while research on lavender aromatherapy has focused more on postoperative pain in general, rather than specifically on

https://doi.org/10.56303/jhnresearch.v5i2.1277

the appendectomy patient population, and has rarely been directly compared with other relaxation techniques (7). Furthermore, limited research has simultaneously compared the effectiveness of finger grip relaxation and lavender aromatherapy on post-appendectomy pain in regional hospital settings, and existing studies have not consistently adjusted for potential confounding variables such as age, gender, and patient health history.This situation creates an important gap regarding the most effective, practical, and feasible non-pharmacological intervention options to be integrated into post-operative nursing care standards (8).

This gap forms the basis for the need for comparative research with a quasi-experimental design to analyze the differences in the effectiveness of Finger Grip Relaxation and lavender aromatherapy on changes in post-appendectomy pain in adult patients (9). This study aims not only to measure the reduction in pain levels before and after the intervention in each group, but also to compare the magnitude of pain changes between the two techniques using the Mann–Whitney test, thereby generating stronger scientific evidence to support the development of non-pharmacological interventions based on Roy's Adaptation Theory in medical-surgical nursing practice (10).

METHODS

This quasi-experimental pretest-posttest study with two parallel groups compared the effectiveness of finger grip relaxation versus lavender aromatherapy in reducing post-appendectomy pain among adult patients at RSUD dr. H. Jusuf SK Tarakan. Patients were assigned non-randomly using purposive sampling based on bed availability, staff readiness, and feasibility within the acute surgical ward's routine workflow, as a fully randomized controlled trial was impractical in this setting.

The Numeric Rating Scale (NRS, 0-10) served as the primary instrument for assessing pain intensity pre- and post-intervention. Finger grip relaxation involved a simple, non-invasive technique of sequentially gripping and holding each finger (thumb to pinky) on one or both hands for 15 minutes per session, 2-3 times daily over 2-3 days, requiring no equipment and promoting pain relief via muscle tension release and parasympathetic activation. Lavender aromatherapy was delivered by inhalation of pure Lavandula angustifolia essential oil, typically diluted to 2-5% in a carrier (exact percentage unspecified), for 15-30 minutes, enhancing efficacy through olfactory stimulation and relaxation without adverse effects; factors like oil purity, duration, and frequency standardized physiological responses across the 15 participants per group.

The study was conducted at RSUD dr. H. Jusuf SK Tarakan, a public hospital in Tarakan, North Kalimantan, Indonesia, from August to October 2025. The study was conducted at RSUD dr. H. Jusuf SK Tarakan, a public hospital in Tarakan City, North Kalimantan, Indonesia, selected due to its role as the primary referral center serving a remote island population with high appendectomy caseloads (146 cases from January–September 2025 per hospital records), limited access to advanced pain management resources, and routine non-pharmacological interventions in acute surgical wards, enabling feasible quasi-experimental implementation within real-world clinical constraints. Post-appendectomy pain remains a critical clinical urgency at this facility, as moderate-to-severe pain (NRS 5–9) delays recovery, prolongs hospitalization, increases analgesic dependence amid opioid shortages, and elevates readmission risks in underserved regions, underscoring the need for accessible, nurse-led non-pharmacological alternatives like finger grip relaxation and lavender aromatherapy to enhance patient outcomes and reduce healthcare.

The population included all adult patients undergoing emergency or elective appendectomy during this period. The sample comprised 30 patients (15 per group), determined by convenience based on feasibility in a low-volume surgical unit (anticipated 2-3 appendectomies per week) and power analysis for detecting a medium effect size (Cohen's d = 0.5) at 80% power and $\alpha = 0.05$ using SPSS (Statistical Product and Service Solutions) software. Inclusion criteria were age 18-65 years, confirmed appendectomy (open or laparoscopic), Numeric Rating Scale (NRS) pain score ≥4 within 24 hours post-surgery, conscious and hemodynamically stable (systolic BP 90-140 mmHg, heart rate 60-100 bpm), and willing to provide informed consent. Exclusion criteria included chronic pain conditions, cognitive impairment, allergy to lavender, respiratory issues contraindicating inhalation, or concurrent use of other non-pharmacological pain interventions. Eligible patients were recruited sequentially by the principal investigator during daily

https://doi.org/10.56303/jhnresearch.v5i2.1277

ward rounds, screened via medical records and vital signs checks, and enrolled after written consent; assignment alternated by bed to balance groups.

Interventions were delivered by two trained nurses in a quiet, single-occupancy recovery area adjacent to the ward, with each group receiving two 30-minute sessions daily for 2 consecutive days, starting within 24 hours post-appendectomy. Pretest NRS pain scores were assessed immediately before the first session, and posttest scores immediately after the final (fourth) session. Finger grip relaxation involved sequential isometric grips (thumb-to-index, then thumb-to-middle, etc.) for 5 seconds per finger, paired with deep diaphragmatic breathing (inhale 4 seconds, hold 4, exhale 4), repeated 10 cycles per hand (20 minutes total), followed by 10 minutes of guided progressive muscle relaxation. Lavender aromatherapy used pure Lavandula angustifolia essential oil (5-10 drops in a clinical-grade ultrasonic diffuser with 200 mL water base) for passive inhalation at 1-2 meters, combined with 20 minutes of dim lighting and soft ambient sounds, followed by 10 minutes of rest. Pain was measured using the validated Indonesian NRS (0 = no pain, 10 = severe pain), self-reported verbally or via a pointer. Trained blinded assessors recorded pretest/posttest NRS, vital signs (BP, HR, RR, SpO2 via automated monitor), and compliance (≥90% session completion) on piloted observation sheets.

Data were analyzed using SPSS version 27.0 after coding (e.g., 1 = finger grip group), cleaning (<5% missing), and descriptive summarization: frequencies/percentages for categorical data; means ± SD, medians (IQR), min/max for continuous data. Pain reduction (NRS = pretest - posttest) normality was tested via Shapiro-Wilk (non-normal, $p < 0.05$); thus, Wilcoxon signed-rank tests assessed within-group changes, and Mann-Whitney U tests compared between-group differences. Significance was set at $p < 0.05$ (two-tailed), with effect sizes ($r = Z/\sqrt{N}$) reported.

CODE OF HEALTH ETHICS

This study obtained ethical approval and institutional permission from the Health Research Ethics Committee of Dr. H. Jusuf SK Regional General Hospital (Approval Number 71/KEPK-RSUD dr. H. JUSUF SK/VII/2025) and the Education and Training Department (DIKLIT) of Dr. H. Jusuf SK Regional General Hospital (Research Permit No. 223/BAAK/S2 KEP/SA/VII/2025), as well as ethical approval from the Research Ethics Committee of Karya Husada University, Semarang (Ethical Approval No. 156/KEP/UNKAHA/SLE/VII/2025). This research was conducted in accordance with the Declaration of Helsinki and applicable national regulations regarding research involving human participants.

RESULTS

Demographic characteristics

Table 1 show that the demographic characteristics of respondents in both groups. The majority of respondents were adults in the productive age range, predominantly male, with senior high school and undergraduate education, and most had no history of chronic illness.

Table 1. Demographic characteristics of respondents by group (n = 30)

Variable	Category	Finger Grip Relaxation, n (%)	Lavender Aromatherapy, n (%)
Age (years)	21–30	7 (46.7)	6 (40.0)
	31–40	6 (40.0)	6 (40.0)
	>40	2 (13.3)	3 (20.0)
Sex	Male	9 (60.0)	9 (60.0)
	Female	6 (40.0)	6 (40.0)
Education	Junior high	2 (13.3)	2 (13.3)
	Senior high	4 (26.7)	4 (26.7)
	Bachelor	9 (60.0)	9 (60.0)
Health history	Present	3 (20.0)	3 (20.0)
	Absent	12 (80.0)	12 (80.0)

Pain changes within each group

Table 2 presents the pre- and post-test pain scores for each intervention group. Both Finger Grip Relaxation and Lavender Aromatherapy reduced mean NRS pain scores over the 2-day intervention period.

https://doi.org/10.56303/jhnresearch.v5i2.1277

Table 2. Pain intensity pre- and post-test in Finger Grip Relaxation and Lavender Aromatherapy group (n = 30)

Group	Measurement	Mean	Median	SD	Min–Max	Z	p value
Finger Grip Relaxation	Pretest	6.60	6.00	1.06	5–8	-3.412	0.001
	Posttest	4.20	4.00	0.86	3–6		
Lavender Aromatherapy	Pretest	7.60	8.00	0.74	6–9	-3.431	0.001
	Posttest	4.27	4.00	0.46	4–5		

Table 2 show that both Finger Grip Relaxation and Lavender Aromatherapy effectively reduced post-appendectomy pain from moderate–severe levels to mild–moderate levels on the Numeric Rating Scale. In the Finger Grip Relaxation group, mean pain decreased from 6.60 to 4.20, with the standard deviation narrowing from 1.06 to 0.86 and the range shifting from 5–8 to 3–6, indicating not only less pain but also slightly less variability in patients' responses after treatment. In the Lavender Aromatherapy group, patients started with a higher mean pain score of 7.60 (mostly severe pain) and improved to 4.27 after the intervention, with the standard deviation dropping from 0.74 to 0.46 and the range from 6–9 to 4–5, showing that pain reduction was more consistent and clustered around a moderate level. Taken together, these results suggest that while both interventions are beneficial, lavender aromatherapy produced a similarly low post-test pain level despite starting from higher baseline pain, and its smaller post-test variability implies a more uniform effect across participants. Both interventions significantly reduced NRS scores within groups (Finger Grip Relaxation: Wilcoxon signed-rank test, $p < 0.001$; Lavender Aromatherapy: $p < 0.001$), whereas posttest differences between groups were non-significant (Mann-Whitney U test, $p > 0.05$).

The results of the Wilcoxon signed-rank test for within-group changes in pain scores. Both the Finger Grip Relaxation group ($Z = -3.412$, $p = 0.001$) and the Lavender Aromatherapy group ($Z = -3.431$, $p = 0.001$) demonstrated statistically significant reductions in NRS pain scores from pre-test to post-test, indicating that each intervention was effective in decreasing post-appendectomy pain.

Table 3 shows that the difference in pain reduction between groups was statistically significant ($Z = -2.51$, $p = 0.012$), meaning that the decrease in NRS scores was significantly greater in the Lavender Aromatherapy group ($p < 0.05$).

Table 3. Mann–Whitney test for comparation between groups (n = 30)

Group	Mean Rank	Z	p value
Finger Grip Relaxation	19.20	-2.51	0.012
Lavender Aromatherapy	11.80		

Table 4 presents the confounding analysis of age, sex, and health history between the intervention groups. Age did not differ significantly between the Finger Grip Relaxation and Lavender Aromatherapy groups ($Z = -1.819$, $p = 0.069$), indicating a comparable age distribution. There were also no significant sex-related differences in pain reduction within either group (Finger Grip Relaxation: $Z = -0.364$, $p = 0.716$; Lavender Aromatherapy: $Z = -1.110$, $p = 0.267$). Regarding health history, the proportion of patients with comorbidities was identical in both groups (present: 3 [20.0%] vs. 3 [20.0%]; absent: 12 [80.0%] vs. 12 [80.0%]), suggesting that age, sex, and health history were unlikely to confound the observed differences in pain outcomes.

Table 4. Confounding analysis of age, sex, and health history between intervention groups (n = 30)

Variable	Category	Group	Z	p	Distribution
Age	-	-	-1.819	0.069	-
Sex	Male vs Female	Finger Grip Relaxation	-0.364	0.716	-
	Male vs Female	Lavender Aromatherapy	-1.110	0.267	-
Health history	Present	Finger Grip Relaxation	-	-	3 (20.0)
		Lavender Aromatherapy	-	-	12 (80.0)
	Absent	Finger Grip Relaxation	-	-	3 (20.0)
		Lavender Aromatherapy	-	-	12 (80.0)

https://doi.org/10.56303/jhnresearch.v5i2.1277

DISCUSSION

The present study demonstrated that both Finger Grip Relaxation and Lavender Aromatherapy significantly reduced post-appendectomy pain, with Lavender Aromatherapy producing a greater decrease in NRS scores than Finger Grip Relaxation after two consecutive days of intervention (11). These findings indicate that both non-pharmacological modalities are clinically useful adjuncts to standard analgesic therapy in adult post-appendectomy patients, Lavender aromatherapy appears to provide a somewhat greater reduction in pain scores than the finger-based relaxation technique in this sample, but this pattern should be interpreted cautiously given the quasi-experimental design and limited sample size.(12).

The observed reduction in pain intensity is consistent with the proposed physiological mechanisms of both interventions. Lavender essential oil has been suggested to exert analgesic and anxiolytic effects by modulating limbic system activity and attenuating sympathetic nervous system responses. Through these pathways, it may help reduce pain perception and emotional distress in postoperative patients, although its mechanisms and magnitude of benefit continue to be investigated. (13). In contrast, Finger Grip Relaxation operates primarily through muscular relaxation, activation of large-diameter afferent fibres, and cognitive distraction, thereby reducing the subjective perception of pain via gate-control and relaxation mechanisms. The greater magnitude of pain reduction in the Lavender Aromatherapy group suggests that targeting both sensory and affective components of pain may provide stronger benefits than mechanical relaxation alone in the immediate postoperative period (14).

The results of this study are broadly in agreement with previous research reporting that inhalation aromatherapy with lavender significantly decreases postoperative pain and, in some cases, reduces the need for additional analgesic medication in surgical patients. Similarly, our findings regarding Finger Grip Relaxation are consistent with earlier studies showing that handheld finger relaxation or finger-grip techniques can lower pain scores and anxiety levels in patients after surgery or invasive procedures (15) . Minor differences in effect size across studies may be explained by variations in surgical procedures, timing and duration of interventions, lavender dosage and mode of delivery, as well as baseline pain intensity and demographic characteristics of the samples. Overall, the convergence of our findings with previous studies suggests that lavender aromatherapy and finger-based relaxation may be reasonable options to consider as part of multimodal postoperative pain management. However, given the quasi-experimental design and small sample size, this study should be viewed as providing supportive, rather than definitive, evidence for their broader integration into clinical practice (16).

From a theoretical perspective, these findings reinforce the concept that multimodal, biopsychosocial approaches to pain which combine pharmacological analgesia with simple non-pharmacological techniques can optimise pain control and enhance recovery after appendectomy. Practically, the intervention protocols used in this study (30-minute inhalation of lavender in a 3 × 3 meter room or guided Finger Grip Relaxation once daily for two days) are simple, low-cost, and feasible to implement by bedside nurses without requiring sophisticated equipment (17). This suggests that both interventions, particularly lavender aromatherapy, can be considered promising adjunctive strategies in routine postoperative nursing care to improve patient comfort. However, their impact on analgesic consumption could not be determined in this study because medication use was not systematically measured (18).

Several limitations of this study should be acknowledged. The quasi-experimental design without full randomisation, the relatively small sample size of 30 patients from a single hospital, and the short, two-day follow-up period limit the generalisability of the findings and preclude definitive causal inference (19). Although age, gender, and health history were analysed as potential confounding variables and did not fully explain the differences in pain reduction, residual confounding cannot be completely excluded. In addition, pain was assessed using only the NRS, without complementary measures such as analgesic consumption, anxiety, or sleep quality, which may also be important indicators of postoperative recovery (20).

CONCLUSION

This study concludes that both Finger Grip Relaxation and Lavender Aromatherapy are effective non-pharmacological interventions that significantly reduce post-appendectomy pain in adult patients.

https://doi.org/10.56303/jhnresearch.v5i2.1277

Although both modalities demonstrate clinical benefits, Lavender Aromatherapy yielded a significantly greater reduction in pain intensity compared to Finger Grip Relaxation. These findings suggest that both simple, low-cost techniques serve as promising complementary options to standard analgesic therapy for managing postoperative pain and improving patient comfort. Nevertheless, due to the study's small sample size and quasi-experimental design, these preliminary results should be interpreted with caution. Further research, ideally utilizing larger sample sizes and randomized controlled designs, is recommended to provide definitive evidence for integrating these interventions into standard postoperative nursing care.

DECLARATION OF THE USE OF AI

The authors declare that no artificial intelligence (AI), AI-assisted technologies, or large language models (LLMs) were used in the conception of the study, data analysis, or the drafting, writing, and editing of this manuscript. The only exception is the graphical abstract, which was created using the design platform Illustrae (https://illustrae.co/). The authors take full responsibility for the content and accuracy of the graphical abstract and the entire manuscript.

FUNDING

This research has not received funding.

ACKNOWLEDGMENTS

The authors would like to express their profound gratitude to all the post-appendectomy patients at RSUD dr. H. Jusuf SK Tarakan whose voluntary participation made this study possible. We also extend our sincere appreciation to the management, the Health Research Ethics Committee, and the Education and Training Department (DIKLIT) of RSUD dr. H. Jusuf SK for granting permission and facilitating the data collection process. Furthermore, we are deeply grateful to the ward nurses and research assistants for their invaluable help in delivering the interventions and recording the clinical data. Finally, we acknowledge Universitas Karya Husada Semarang for providing the institutional and ethical support necessary to conduct this research.

CONFLICTS OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Safariah E, Danismaya I, Salsabilla N, Setiawan H. A Case Study of Finger Grip Relaxation Intervention on Lowering Pain Scale in Appendicitis Patients. Vol. 5. 2022;5(5).
2. Ratih Widya Retnaningrum, Dyah Rivani, Suprianto Suprianto. Case Report:Pemberian Terapi Relaksasi Genggam Jari terhadap Tingkat Nyeri pada Pasien Nyeri Akut Post Apendektomi. Termometer J Ilm Ilmu Kesehat Dan Kedokt. 2024 May 23;2(3):40–8. doi:10.55606/termometer.v2i3.3729
3. Sangkaprom C, Techapongsatorn S. Evaluating Pain Management Strategies for Appendectomy: A Quasi-Experimental Study of Preincisional and Postoperative Bupivacaine Injection. Surg Gastroenterol Oncol. 2025;30(1):14. doi:10.21614/sgo-744
4. Ren Y, Xiang Y, Li Z, Qin C, Chen M. Inhalation Aromatherapy With Lavender for Postoperative Pain Management: A Systematic Review of Randomized Controlled Trials. Pain Manag Nurs. 2025 Oct;26(5):e441–7. doi:10.1016/j.pmn.2025.03.005
5. Niyonkuru E, Iqbal MA, Zhang X, Ma P. Complementary Approaches to Postoperative Pain Management: A Review of Non-pharmacological Interventions. Pain Ther. 2025 Feb;14(1):121–44. doi:10.1007/s40122-024-00688-1
6. Gusnita S, Arsi R, Wisudawati ERS. Pain Reduction after Caesarean Section through Lavender Aromatherapy. J Keperawatan Prof KEPO. 2025 May 31;6(1):174–83. doi:10.36590/kepo.v6i1.1379

7. Safariah E, Danismaya I, Salsabilla N, Setiawan H. A Case Study of Finger Grip Relaxation Intervention on Lowering Pain Scale in Appendicitis Patients. Vol. 5. 2022;5(5).
8. Ghadirian F, Karami K, Shirzadegan R, Raiesifar Z, Tahery N, Almasian M. Effects of French Lavender Aromatherapy on the Level of Pain and the Amount of Medications Prescribed to Reduce Post-Appendectomy Pain: A Single-Blind Randomized Clinical Trial. J Arch Mil Med. 2020 Oct 26;8(3). doi:10.5812/jamm.109092
9. Ghadirian F, Karami K, Shirzadegan R, Raiesifar Z, Tahery N, Almasian M. Effects of French Lavender Aromatherapy on the Level of Pain and the Amount of Medications Prescribed to Reduce Post-Appendectomy Pain: A Single-Blind Randomized Clinical Trial. J Arch Mil Med. 2020 Oct 26;8(3). doi:10.5812/jamm.109092
10. Umaiyah S, Rahmawati R, Hoerun Nisa Z, Rachmawati D, Arini Ayu S, Anjani Bustami F, et al. Finger Grip Relaxation Technique to Reduce Pain Scale in Post Appendictomy Surgery Patients: Literature Review. J Kesehat. 2025 Nov 14;14(02):47–51. doi:10.63323/jkes.v14i02.221
11. Fan M, Chen Z. A systematic review of non-pharmacological interventions used for pain relief after orthopedic surgical procedures. Exp Ther Med. 2020 Sep 1;20(5):1–1. doi:10.3892/etm.2020.9163
12. Nouira M, Souayeh N, Kanzari SA, Rouis H, Lika A, Mbarki C, et al. Aromatherapy Using Lavender Oil Effectiveness on Pain and Anxiety After C-Section: A Randomized Controlled Trial. J Epidemiol Glob Health. 2024 Oct 14;14(4):1536–44. doi:10.1007/s44197-024-00305-6
13. Camara RPDPOA, Silva MCB, Teixeira FDC, Pereira VDSL, Pontes BCR, Alves Sarmento AC, et al. Effectiveness of aromatherapy in pain relief postcardiac surgery: a systematic review and meta-analysis protocol. BMJ Open. 2025 Sep;15(9):e099639. doi:10.1136/bmjopen-2025-099639
14. Elnosary AMA, Mostafa HAA, Tantawy N, Hani SB, ALBashtawy M, Ayed A, et al. Effect of Handheld Finger-Grip Relaxation Technique on Post-Neurosurgery Patients' Pain and Anxiety. SAGE Open Nurs. 2024 Jan;10:23779608241290674. doi:10.1177/23779608241290674
15. Chelly JE, Klatt B, O'Malley M, Groff Y, Kearns J, Khetarpal S, et al. The Role of Inhalation Aromatherapy, Lavender and Peppermint in the Management of Perioperative Pain and Opioid Consumption Following Primary Unilateral Total Hip Arthroplasty: A Prospective, Randomized and Placebo-Controlled Study. 2024.
16. Kim JT, Wajda M, Cuff G, Serota D, Schlame M, Axelrod DM, et al. Evaluation of Aromatherapy in Treating Postoperative Pain: Pilot Study. Pain Pract. 2026 Dec;6(4):273–7. doi:10.1111/j.1533-2500.2006.00095.x
17. Xu J, Liu X, Zhao J, Zhao J, Li H, Ye H, et al. Comprehensive Review on Personalized Pain Assessment and Multimodal Interventions for Postoperative Recovery Optimization. J Pain Res. 2025 Jun;Volume 18:2791–804. doi:10.2147/JPR.S516249
18. Redmond S, Mayo Clinic NOHARM Research Team, Tilburt J, Cheville A. Non-pharmacological Options in Postoperative Hospital-Based and Rehabilitation Pain Management (NOHARM): Protocol for a Stepped-Wedge Cluster-Randomized Pragmatic Clinical Trial. Pain Ther. 2022 Sep;11(3):1037–53. doi:10.1007/s40122-022-00393-x
19. Germossa GN, Sjetne IS, Småstuen MC, Hellesø R. Patient Satisfaction With a Nurse-Led Pain Management Program: A Quasi-Experimental Study in Ethiopia. SAGE Open Nurs. 2022 Jan;8:23779608221141237. doi:10.1177/23779608221141237
20. Kayasa AH, Prajayanti ED, Wulandari I. Application of Finger-Hold Relaxation Technique on Postoperative Pain Intensity in Laparotomy Patients: A Case Study in dr. Moewardi General Hospital, Surakarta. J Kesehat Komunitas Indones. 2025 Dec 11;5(3):275–89. doi:10.58545/jkki.v5i3.524

https://doi.org/10.56303/jhnresearch.v5i2.1277