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The Application of Hand Massage in Reducing Pain Intensity in Patients After Laparatomy Surgery in Flamboyan 5 Ward, Dr. Moewardi Regional General Hospital of Surakarta

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ABSTRACT

Background: Laparotomy is a major surgical procedure associated with significant postoperative pain. While pharmacological management remains standard, non-pharmacological therapies such as hand massage offer complementary benefits for pain reduction. **Objective:** This study aimed to evaluate the effectiveness of hand massage in reducing pain intensity among post-laparotomy patients. **Methods:** A descriptive case study design was employed involving two patients recovering from laparotomy at Flamboyan 5 Ward, Dr. Moewardi Regional General Hospital, Surakarta. The intervention consisted of a 10-minute hand massage session conducted daily for three consecutive days. Pain intensity was measured using the Numerical Rating Scale (NRS) before and after each intervention. **Results:** Both participants demonstrated a reduction in pain scores following the intervention. Patient A's pain level decreased from 6 (moderate) to 1 (mild), while Patient W's decreased from 6 (moderate) to 2 (mild). The average reduction in pain scale was 4.5 points. **Conclusion:** Hand massage is effective in reducing pain intensity in post-laparotomy patients. It represents a safe, simple, and non-invasive option for non-pharmacological pain management in nursing care.

Keywords: Hand Massage, Pain Intensity, Post-Laparotomy, Nursing Intervention, Non-Pharmacological Therapy.

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1. INTRODUCTION

Surgical cases represent a significant proportion of hospital admissions globally and in Indonesia. Data indicate that surgical cases rank 11th among 50 prevalent diseases in Indonesian hospitals, accounting for 12.8% of cases, with approximately 32% of these involving laparotomy procedures (Silpia et al., 2021). Laparotomy is a major surgical procedure involving an incision through the abdominal wall layers to access internal organs affected by conditions such as hemorrhage, perforation, cancer, or

obstruction (Utami & Khoiriyah, 2020). It is an open surgical approach used to treat complex conditions that cannot be managed effectively with medication alone (Banamtum, 2021; Subandi, 2021).

Despite its therapeutic benefits, laparotomy is a complex event that threatens a patient's biopsychosocial integrity, often triggering significant postoperative pain (Joyce, 2020). According to the World Health Organization (WHO), the volume of laparotomy surgeries worldwide has increased annually by approximately 15%, rising from 80 million procedures in 2020 to 98 million in 2021 (Subandi, 2021). In Indonesia, laparotomy remains one of the most common surgical interventions. In 2021, an estimated 1.7 million surgical procedures were performed, of which 37% were laparotomies (Sutiono, 2021). In Central Java Province, data from Dr. Moewardi Regional General Hospital (2018) indicated that laparotomy-related mortality ranked fourth among the ten leading causes of death.

Pain is the most common complication following laparotomy. Research by Rahmat (2020) found that among post-laparotomy patients, 27.1% experienced severe pain, 56.7% reported moderate pain, and 16.2% experienced mild pain. Unmanaged pain can delay healing, prolong hospitalization, and induce psychological distress such as helplessness and anxiety (Joyce, 2020; Tamsuri, 2021). Furthermore, pain often limits mobility and hinders effective communication between patients and healthcare providers (Pranowo et al., 2021). Therefore, prompt and effective pain management is crucial.

Pain management encompasses both pharmacological and non-pharmacological approaches. While pharmacological therapy involves collaboration between physicians and nurses to administer analgesics, it may be associated with delayed onset, increased costs, and potential side effects. Conversely, non-pharmacological management offers a complementary, cost-effective, and simple strategy that minimizes adverse effects (Prameswari et al., 2023). Methods include cold or heat compresses, relaxation techniques, hypnotherapy, guided imagery, distraction, transcutaneous electrical nerve stimulation (TENS), therapeutic touch, and massage.

Among non-pharmacological interventions, hand massage is effective for postoperative pain. Massage therapy stimulates subcutaneous tissue through gentle touch and pressure, promoting comfort and triggering the release of endorphins, serotonin, and dopamine, which reduce sympathetic nerve activity

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(Amelia & Saputri, 2020; Fadilah & Astuti, 2020). Silpia et al. (2021) demonstrated that hand massage significantly reduced pain intensity in post-laparotomy patients, with average pain scores decreasing from 6.40 to 1.53 ($p < 0.05$). Similarly, Amelia and Saputri (2020) reported a reduction in pain scales from 4.70 to 3.90 following hand massage at Dr. Reksodiwiryo Hospital in Padang ($p = 0.003$).

Preliminary studies at Dr. Moewardi Regional General Hospital in Surakarta revealed an increasing trend in laparotomy cases, from 70 patients in 2021 to 125 in 2022 and 150 in 2023. Observations in Flamboyan 5 Ward indicated that within a single month, 20 post-laparotomy patients experienced persistent pain despite receiving standard pharmacological therapy (e.g., intravenous NaCl 0.9%, Ranitidine, and Metamizole). This suggests that pharmacological intervention alone may be insufficient for optimal pain control.

Based on this background, there is a need to integrate non-pharmacological therapies into nursing care. Consequently, this study aims to evaluate the effect of hand massage on pain intensity in post-laparotomy patients at Flamboyan 5 Ward, Dr. Moewardi Regional General Hospital, Surakarta.

2. METHODS

This study employed a descriptive case study design to evaluate the application of hand massage in reducing pain intensity among post-laparotomy patients. The research was conducted at Flamboyan 5 Ward, Dr. Moewardi Regional General Hospital, Surakarta, Indonesia. The study period ranged from January 20 to February 22, 2025.

The participants were selected using a purposive sampling technique based on specific inclusion and exclusion criteria. The inclusion criteria comprised patients who were 24–48 hours post-laparotomy surgery, fully conscious, communicative, and willing to participate in the hand massage therapy. The exclusion criteria included patients experiencing severe pain (NRS > 7), those who had received analgesic therapy within the last six hours, and those with fractures or injuries to the hands. Two participants met the criteria: Mrs. A (52 years old) and Mrs. W (65 years old), both recovering on the second day post-laparotomy.

The intervention consisted of a standardized hand massage protocol. Hand massage was defined as gentle touch and manipulation applied to the subcutaneous tissue of the hands. Each session lasted 10 minutes (5 minutes per hand) and was conducted once daily for three consecutive

days. The intervention was scheduled at least six hours after the last administration of analgesic medication to ensure accurate measurement of pain reduction attributable to the massage.

Pain intensity was measured using the Numerical Rating Scale (NRS). The NRS is an ordinal scale ranging from 0 to 10, where 0 indicates "no pain," 1–3 indicates "mild pain," 4–6 indicates "moderate pain," and 7–10 indicates "severe pain." The validity and reliability of the NRS have been well-established in clinical settings for assessing acute postoperative pain.

Data collection was conducted in three phases: preparation, implementation, and evaluation. During the preparation phase, research instruments were prepared, and ethical approvals were secured. In the implementation phase, rapport was established with the participants, and baseline pain assessments (pre-test) were conducted. The hand massage intervention was then performed, followed by a post-intervention pain assessment (post-test). This cycle was repeated daily for three days. In the final phase, data were compiled and processed for analysis.

Descriptive analysis was used to evaluate the data. Pre-intervention and post-intervention pain scores were compared to determine the reduction in pain intensity. The results were presented narratively and in tabular form to illustrate the progression of pain levels throughout the study period.

Ethical principles were strictly adhered to throughout the research process. Ethical approval was obtained from the Head of the Nursing Profession Study Program at Universitas Aisyiyah Surakarta. Prior to participation, informed consent was obtained from all participants after explaining the study's purpose and procedures. Confidentiality was maintained by coding participant identities, and personal information was protected. The principles of anonymity, veracity, and justice were upheld to ensure the rights and safety of the participants.

3. RESULTS

This study involved two post-laparotomy patients who received hand massage therapy at Flamboyan 5 Ward, Dr. Moewardi Regional General Hospital, Surakarta. Pain intensity was measured using the Numerical Rating Scale (NRS) before and after the intervention over three consecutive days. The findings are presented in the following subsections.

Participant Characteristics

Two female participants were included in this study: Mrs. A (52 years old) and Mrs. W (65 years old). Both were on the second day of recovery following laparotomy surgery. At baseline, both participants reported moderate intermittent stabbing pain, rated 6 on the NRS. Physical examinations revealed clean surgical incisions without signs of infection or swelling. Vital signs were stable, and both participants were fully conscious and communicative.

Pain Intensity Before Hand Massage Intervention

Baseline pain assessments were conducted prior to the first hand massage session. As shown in Table 1, both participants reported a pain score of 6, categorized as moderate pain.

Table 1. Baseline Pain Scores Before Hand Massage Intervention

Date	Participant	Pain Score (NRS)	Pain Category
February 1, 2025	Mrs. A	6	Moderate
February 10, 2025	Mrs. W	6	Moderate

Pain Intensity After Hand Massage Intervention

Following the completion of three daily hand massage sessions, post-intervention pain scores were recorded. As presented in Table 2, both participants demonstrated reduced pain levels.

Table 2. Competence of participants before and after being given basic life support training

Date	Participant	Pain Score (NRS)	Pain Category
February 3, 2025	Mrs. A	1	Mild
February 12, 2025	Mrs. W	2	Mild

Progression of Pain Scores Across Intervention Days

Pain scores were measured daily before and after each hand massage session to evaluate the progression of pain reduction. Table 3 summarizes the daily changes for both participants.

Table 3. Daily Progression of Pain Scores Before and After Hand Massage

Date	Day	Mrs. A (Pre)	Mrs. A (Post)	Mrs. W (Pre)	Mrs. W (Post)
Feb 1 / Feb 10, 2025	Day 1	6	5	6	5
Feb 2 / Feb 11, 2025	Day 2	4	3	5	3
Feb 3 / Feb 12, 2025	Day 3	2	1	3	2

Note. Pre = pain score before hand massage; Post = pain score after hand massage.
Mrs. A and Mrs. W were assessed on different dates due to admission timing.

As shown in Table 3, both participants exhibited a consistent downward trend in pain scores across the three-day intervention period. Mrs. A's pain decreased from 6 (moderate) to 1 (mild), while Mrs. W's pain decreased from 6 (moderate) to 2 (mild).

Magnitude of Pain Reduction

The difference between pre-intervention and post-intervention pain scores was calculated to quantify the effect of hand massage. Results are displayed in Table 4.

Table 4. Magnitude of Pain Score Reduction Following Hand Massage

Participant	Pre-Intervention Score	Post-Intervention Score	Reduction (Points)
Mrs. A	6	1	5
Mrs. W	6	2	4
Mean Reduction			4.5

Both participants experienced clinically meaningful reductions in pain intensity. The mean reduction across both cases was 4.5 points on the NRS, indicating a substantial decrease from moderate to mild pain levels following the hand massage intervention.

4. DISCUSSION

This case study evaluated the effectiveness of hand massage in reducing pain intensity among post-laparotomy patients at Dr. Moewardi Regional General Hospital, Surakarta. The findings demonstrated a consistent reduction in pain scores from moderate to mild levels after three consecutive days of hand massage. This section discusses the physiological mechanisms underlying these findings, compares the results with existing literature, analyzes factors influencing pain perception, and outlines implications for nursing practice.

Effectiveness of Hand Massage on Pain Reduction

The primary finding of this study indicates that hand massage significantly reduced pain intensity in both participants. Mrs. A experienced a reduction from 6 to 1, while Mrs. W decreased from 6 to 2 on the Numerical Rating Scale (NRS). These results align with the Gate Control Theory of pain, which posits that non-painful input (such as touch and pressure from massage) can close the "gates" to painful input, preventing pain sensation from traveling to the central nervous system (Melzack & Wall, as cited in Fadilah & Astuti, 2020). The mechanical stimulation of subcutaneous tissues in the hands activates large-diameter nerve fibers, which inhibit

the transmission of pain signals carried by small-diameter fibers. Consequently, the perception of pain is diminished despite the presence of nociceptive stimuli from the surgical incision.

Furthermore, the reduction in pain scores supports the neurochemical hypothesis of massage therapy. Hand massage stimulates the release of endorphins, serotonin, and dopamine, which are natural analgesics and mood enhancers (Amelia & Saputri, 2020). These neurotransmitters reduce sympathetic nervous system activity, promoting a relaxation response that counters the stress and anxiety associated with postoperative pain. In this study, the intervention was scheduled six hours after the last analgesic dose, a timing chosen to assess the complementary effect of massage when pharmacological effects might be waning. The observed pain reduction suggests that hand massage serves as an effective adjunct to pharmacological management, particularly during periods where medication intervals leave patients vulnerable to breakthrough pain.

Comparison with Previous Studies

The findings of this study are consistent with prior research on non-pharmacological pain management. Silpia et al. (2021) reported a significant decrease in pain intensity among post-laparotomy patients following hand massage, with mean scores dropping from 6.40 to 1.53 ($p < 0.05$). Similarly, Amelia and Saputri (2020) found a reduction from 4.70 to 3.90 in a hospital setting in Padang. While the baseline pain scores in the current study (NRS 6) were comparable to those reported by Silpia et al. (2021), the magnitude of reduction varied slightly across participants. This variability is expected in case study designs due to individual differences in pain thresholds, psychological states, and healing rates. Nevertheless, the directional trend of significant reduction from moderate to mild pain remains consistent across studies, reinforcing the reliability of hand massage as a nursing intervention.

Factors Influencing Pain Perception

Although both participants experienced pain reduction, the extent of reduction differed (5 points for Mrs. A vs. 4 points for Mrs. W). Several factors may explain this discrepancy. First, individual pain tolerance varies with age, prior pain experiences, and psychological factors. Mrs. W (65 years old) reported restlessness and poor sleep quality prior to the intervention on Day 2, which may have heightened her pain sensitivity. Literature suggests that fatigue and anxiety can lower

pain thresholds, making pain perception more intense (Noviyanti et al., 2020). Second, environmental factors played a role. On Day 2, Mrs. A received the intervention in a slightly noisier environment, which aligns with findings by Andriani et al. (2023) that environmental stressors can modulate pain perception. Despite these variables, the cumulative effect of daily massage contributed to a progressive decline in pain scores for both patients, suggesting that repeated stimulation enhances the relaxation response over time.

Implications for Nursing Practice

The results underscore the importance of integrating non-pharmacological therapies into standard postoperative nursing care. Hand massage is a cost-effective, non-invasive, and safe intervention that nurses can easily implement without requiring specialized equipment. Given the risks associated with excessive opioid use, such as dependency and side effects, complementary therapies like hand massage offer a valuable alternative for managing moderate pain. Nurses should be trained to incorporate hand massage into pain management protocols, particularly for patients who report inadequate relief from pharmacological agents alone. Additionally, educating patients and families on simple massage techniques could empower them to participate in self-care management during recovery.

Limitations

This study has several limitations that should be acknowledged. As a descriptive case study involving only two participants, the findings cannot be generalized to the broader population. The absence of a control group limits the ability to definitively attribute pain reduction solely to hand massage, as the natural healing process and concurrent pharmacological therapy also contributed to pain relief. Future research should employ quasi-experimental designs with larger sample sizes and control groups to isolate the specific effect of hand massage. Additionally, measuring physiological indicators of pain (e.g., heart rate, blood pressure) alongside subjective scales could provide a more comprehensive assessment of the intervention's effectiveness.

5. CONCLUSION

This case study demonstrates that hand massage is an effective non-pharmacological intervention for reducing pain intensity in post-laparotomy patients. Following three consecutive days of intervention, pain scores decreased from

moderate (NRS 6) to mild (NRS 1–2) levels, with an average reduction of 4.5 points. These findings suggest that hand massage serves as a valuable adjunct to standard pharmacological management, offering a safe, cost-effective, and non-invasive option for postoperative pain control.

Nursing staff at Dr. Moewardi Regional General Hospital and similar settings should consider integrating hand massage into standard postoperative care protocols. Given its simplicity and lack of adverse effects, this intervention can be particularly beneficial during periods when pharmacological effects wane or when patients seek complementary relief. Training programs for nurses should include competency in basic massage techniques to ensure consistent and effective delivery.

While this study provides preliminary evidence of effectiveness, limitations regarding sample size and design must be acknowledged. Future research should employ quasi-experimental designs with larger sample sizes and control groups to generalize findings and isolate the specific effects of hand massage from natural healing processes. Additionally, incorporating physiological indicators of pain (e.g., vital signs, cortisol levels) alongside subjective scales would provide a more comprehensive evaluation of the intervention's efficacy.

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AUTHOR CONTRIBUTIONS

Sintya Diah Putri Astuti, and Ika Silvitasari, was responsible for conceptualization, methodology, formal analysis, original draft writing, supervision, and project administration. Sintya Diah Putri Astuti, and Isti Wulandari, contributed to data curation, article screening, data extraction, manuscript review and editing, and visualization.

CONFLICT OF INTEREST

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

DATA AVAILABILITY STATEMENT

The data are not publicly available due to privacy or ethical restrictions.

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