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Article

Integrating Aromatherapy for Enhanced Postoperative Recovery in Orthopedic Fracture Patients Experiencing Pain and Nausea: A Case Study

Gusti Ayu Putu Mira Trisnayanthi[1], Nyoman Agus Jagat Raya[2]*

[1]School of Nursing, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia
[2]Department of Nursing, Faculty of Medicine, Universitas Udayana, Denpasar, Indonesia
Correspondence: jagatraya91@unud.ac.id

ABSTRACT

Background: Fractures are common injuries that often result in postoperative pain and nausea. Managing these symptoms effectively is important for patient recovery, and aromatherapy has emerged as a non-pharmacological option.

Case Description: This study involved two adult patients who experienced pain and nausea following orthopedic fracture surgery. Each morning, the patients inhaled either lemon or lavender aromatherapy. The effects were assessed 15 minutes after administration over a period of four days using assessment and observation sheets.

Discussion: The results showed that both patients experienced a reduction in pain and nausea levels. The first patient's pain decreased from 6 to 2, and nausea from 5 to 0, while the second patient's pain decreased from 5 to 1, and nausea from 3 to 0. These findings suggest that lemon and lavender aromatherapy may be effective in alleviating postoperative pain and nausea.

Conclusion: The use of lemon and lavender aromatherapy appeared to reduce pain and nausea in these cases, indicating potential benefits as supportive nursing interventions. Further research with larger samples is needed to confirm these preliminary observations.

Keywords: Aromatherapy, Fracture, Nausea, Pain, Postoperative

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INTRODUCTION

Fracture is one of the most common types of trauma in the community and is a significant health problem, especially in the age group of ≥45 years in Indonesia. Epidemiological data shows an increase in the incidence of fractures at the age of 45-54 years reaching around 675 cases, age 55-64 years around 516 cases, age 65-74 years as many as 285 cases, and in the age group ≥75 years as many as 227 cases (Mujiadi, 2022). Fractures or fractures occur due to discontinuity of bone tissue caused by direct trauma, weakened bone conditions, the strength received by the bone, and the condition of the surrounding soft tissue (Astuti et al., 2020). Apart from physical trauma, such as accidents and falls, fractures can also occur spontaneously due to chronic diseases such as osteoporosis that weaken bone structure (Mongan, 2023).

Pain and nausea are common complaints experienced by patients after undergoing orthopedic surgery for fracture treatment. Postoperative pain is a natural physiological response, but it is the main complaint that is most feared and can interfere with patient comfort and slow down the healing process (Astuti et al., 2020).

Postoperative pain management usually uses analgesics, especially narcotics, which are effective in reducing pain. However, the use of narcotics also has significant side effects, such as causing nausea and vomiting (Taji, Parami, Putra, & Pradhana, 2024). Untreated nausea and vomiting can lead to serious complications such as dehydration, electrolyte imbalance, aspiration, increased intracranial pressure, and psychological disorders that worsen the patient's recovery process (Taji et al., 2024).

Nonpharmacologic techniques are recommended as a complement to therapy in managing postoperative pain and nausea because they are effective with minimal risk (Patel et al., 2024). Aromatherapy, one of the nonpharmacological techniques, uses essential oils that are inhaled so that they stimulate olfactory receptors and activate emotional centers in the brain, which then trigger the release of neurotransmitters such as serotonin and endorphins to reduce pain and promote relaxation (Bargi, Bahraminejad, Jafari, & Fallah, 2023; Komalasari, Roro, Suryani, & Hanum, 2024; Setiawan, Susaldi, & Tresya, 2022). Various types of essential oils such as peppermint, ginger, lavender, lemon, and others have been proven effective in reducing pain and nausea in postoperative patients (Meyer, Hutson, Morris, & McAllister, 2023; Surya, Zuriati, Zahlimar, & Poddar, 2020; Nascimento et al., 2022; Zhang et al., 2023). Several studies have shown that lemon and lavender aromatherapy significantly reduce the intensity of pain and nausea in orthopedic surgery patients, so aromatherapy is recommended as a cheap and safe complementary therapy with the benefit of increasing patient satisfaction and reducing the need for additional analgesics (Bargi et al., 2023; Surya et al., 2020; Zhang et al., 2023).

Some hospitals in the management of pain and nausea in orthopedic surgery patients still rely on pharmacological therapy and general relaxation techniques without the application of aromatherapy (Durust Sakalli & Kara, 2022). The use of aromatherapy in Indonesia is still limited, especially in direct comparison between lemon and lavender essential oils to treat postoperative pain and nausea. Based on the description above, this case study was conducted to describe the results of using lemon and lavender aromatherapy in orthopedic surgery patients with complaints of pain and nausea. This study is important to do because the management of pain and nausea after orthopedic surgery, which often requires alternatives to drugs, to increase patient comfort and speed up the recovery process. The results of this study are expected to be the basis of evidence-based nursing practice and help determine the most appropriate type of aromatherapy for the management of pain and nausea in orthopedic postoperative patients.

METHODS

This study used a descriptive case study design with an Evidence-Based Nursing (EBN) implementation approach to describe the application of lemon and lavender aromatherapy to pain and nausea in orthopedic postoperative patients. The study was conducted over four days in May 2025 in one of the hospitals in Bali. The study sample consisted of two adult patients with inclusion criteria, namely: The patient underwent orthopedic surgery due to fracture, had complaints of

postoperative pain and nausea, and was willing to participate in the aromatherapy intervention by signing an informed consent.

The intervention procedure was carried out by administering aromatherapy inhalation using lemon essential oil for patient one and lavender for patient two. The choice of aromatherapy was selected directly by the patients according to their preferred scent. The administration was carried out every morning using the inhalation method for 15 minutes using a tissue with 2 drops of aromatherapy oil. The administration of aromatherapy to patients was carried out independently without the use of an assistant. Evaluation of changes in pain and nausea levels was carried out 15 minutes after the intervention using a numerical pain scale and observation of signs of nausea. In addition to the aromatherapy intervention, patients also received pharmacological therapy in the form of intravenous ketorolac and oral paracetamol as needed, as arranged by the medical team. Data were collected through assessment sheets, direct observation by researchers, and patient medical records during the observation period. Before the intervention and research, all participants were given written informed consent, explaining the objectives, procedures, risks, and benefits of the research, as well as guaranteeing data confidentiality.

Data analysis was performed descriptively by comparing changes in pain scores and nausea symptoms before and after aromatherapy intervention in each patient. To measure pain, the Visual Analog Scale (VAS) was used, which gives a score from 0 (no pain) to 10 (very severe pain). Meanwhile, to measure nausea symptoms, the Nausea Rating Scale was used with a score of 0 (no nausea) to 5 (very severe nausea). The change in score was calculated by subtracting the score after the intervention from the score before the intervention for each patient. Observation data were presented in graphical form to facilitate understanding and drawing conclusions.

RESULTS

Case 1

Case 1 involved Mrs. S, a 68-year-old female, junior high school graduate, who previously worked as a self-employed person, and now her business is continued by her son. Mrs. S was admitted to Prima Medika Hospital on October 24, 2024, with complaints of severe pain in the leg due to a fall. X-ray examination showed a fracture in the sinistra femur, so she was referred to the hospital for orthopedic surgery on October 28, 2024, at 3:00 pm. After the surgical procedure, Mrs. S experienced severe nausea and pain after the anesthesia wore off. Before the aromatherapy intervention, Mrs. S complained of intense pain on a scale of 6 and mild nausea.

Case 2

Case 2 was Mrs. KS, a 53-year-old female, junior high school graduate, who worked as a private employee. Mrs. KS had a single accident on October 22, 2024, when she was trying to avoid a vehicle that had fallen in front of her and hit a parked car. As a result of the accident, Mrs. KS suffered an impact to the left chest, and the left leg was hit by the motorcycle. The patient was brought to the hospital in a conscious condition without complaints of nausea and vomiting. The patient underwent orthopedic surgery on October 29, 2024. Mrs. KS experienced severe nausea after surgery and pain after the effects of anesthesia wore off. The patient

reported pain in the chest area on a scale of 5 and left leg before aromatherapy intervention.

Aromatherapy Implementation

Implementation was carried out on both patients for four consecutive days using the same pain scale and nausea rating scale. The assessment results showed that patient 1 had a pain scale of 6 and a nausea scale of 5. Patient 2 felt a pain scale of 5 and a nausea scale of 3. The following is an observation as follows.

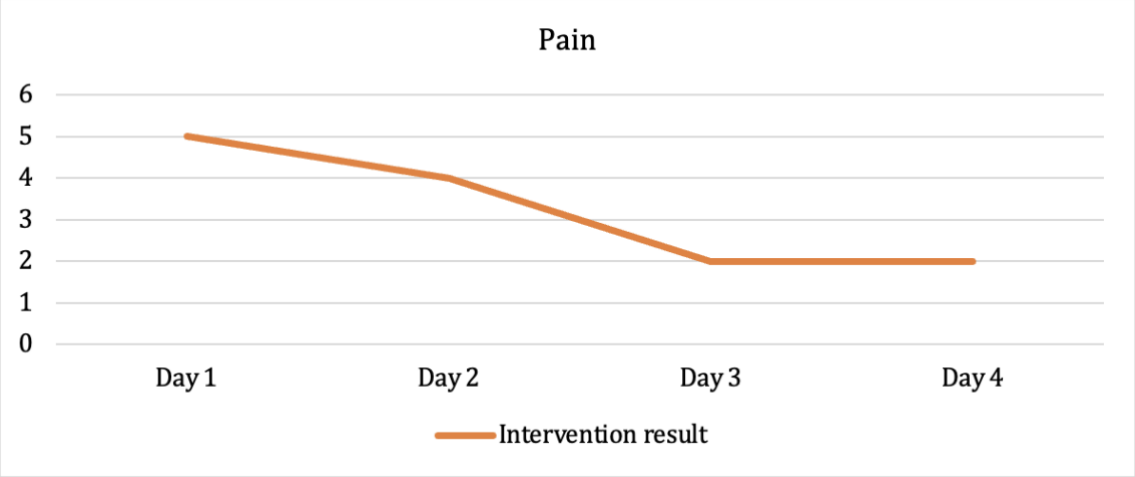

Figure 1. Changes in Pain Complaints in Case One Patients

Patient 1 said that the pain he felt had decreased, with the pain scale reaching 2. The patient also stated that he could sleep comfortably without interruption due to pain. Objectively, the patient's blood pressure was within the normal range (120/70 mmHg), and body temperature was recorded at 36.2°C.

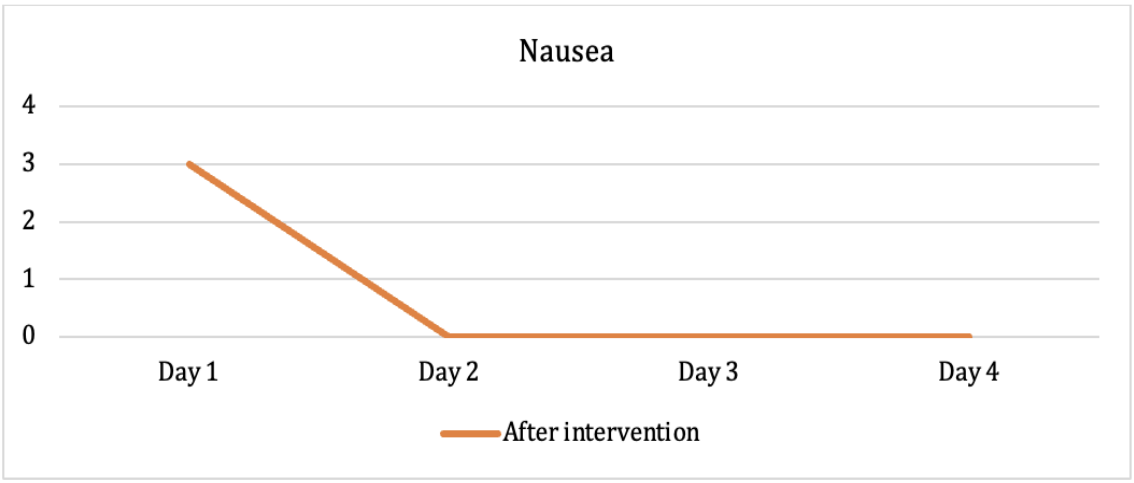

Figure 2. Changes in Nausea Complaints in Case Patient One

The patient felt quite severe nausea even after being transferred to the inpatient room. Nausea complaints that occur in patients have not been felt since the second day so that aromatherapy is given.

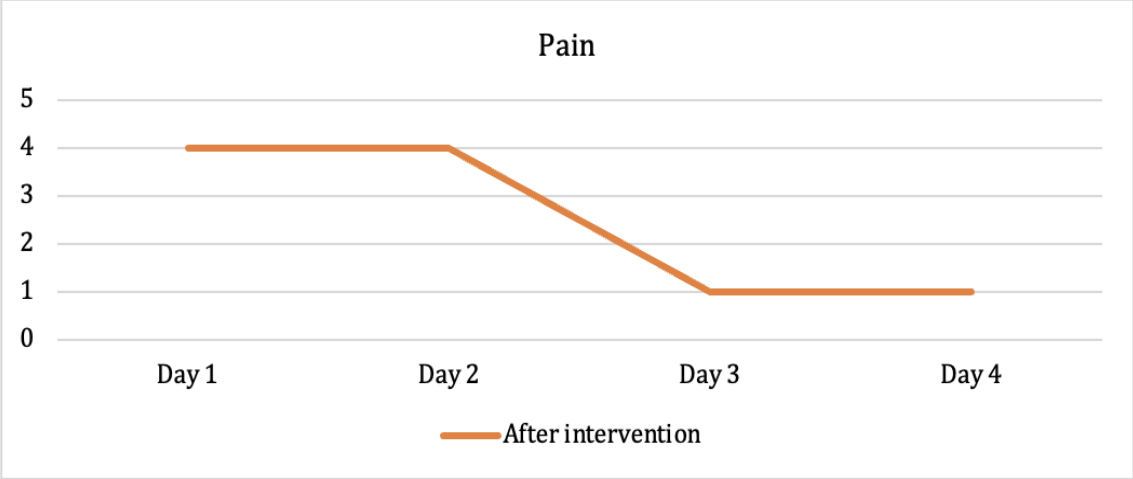

Figure 3. Changes in Pain Complaints in Patient Case Two

Patient 2 reported that his pain had decreased to a pain scale of 1 and stated that he could sleep without interruption due to pain. Objectively, the patient's blood pressure was within the normal range (116/82 mmHg), and body temperature was recorded at 36.1°C.

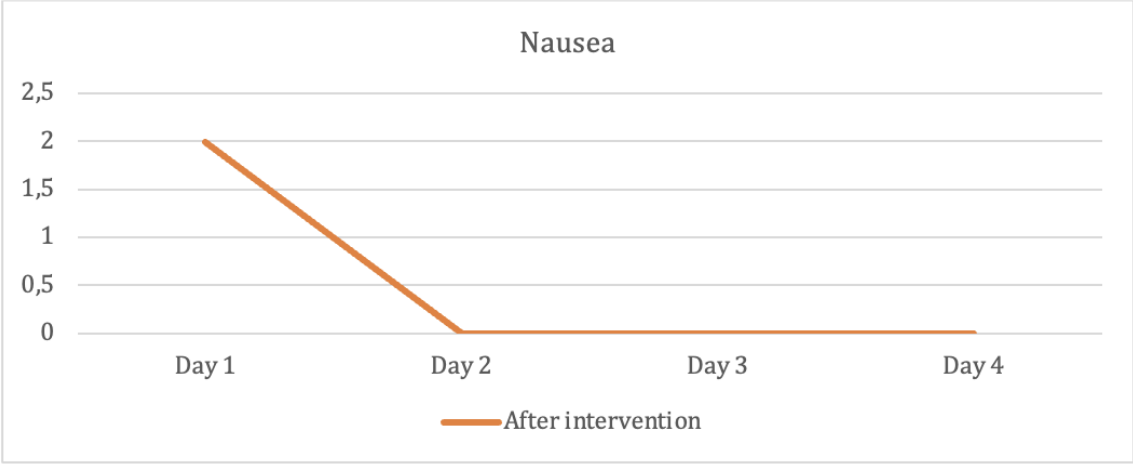

Figure 4. Changes in Nausea Complaints in Case Patient Two

The first intervention was carried out after the patient was operated on, when the patient was nauseous after the effects of anesthesia had disappeared. On the second day, the nausea complaints decreased from 3 to 0.

DISCUSSION

In both cases, Mrs. S (68 years old) and Mrs. KS (53 years old) have different demographic characteristics in terms of age and social background, but both experience pain and nausea after orthopedic surgery due to fractures. Differences in age and life experience can play a role in pain perception and response to aromatherapy interventions. The advanced age factor in Mrs. S can affect drug metabolism and immune response, which can indirectly affect the perception of pain and nausea (Amir & Rantesigi, 2021). In addition, social and psychological

backgrounds also have the potential to influence how patients respond to pain stimuli and nonpharmacological interventions such as aromatherapy.

During their treatment, both patients were also given pharmacological therapy in the form of fentanyl and ondansetron on the first day after surgery, and continued with paracetamol 500mg on the following day. This therapy cannot be separated from the pharmacological influence because fentanyl works by binding to opioid receptors in the central nervous system to reduce pain by inhibiting pain transmission (Shell et al., 2024). Other pharmacological agents, such as ondansetron, inhibit serotonin receptors involved in the process of postoperative nausea and vomiting (Tao et al., 2024). However, the use of these pharmacological therapies is not optimal if complementary therapies are not used (Ariawan et al., 2022). This happens because complementary therapies, especially aromatherapy, provide additional relaxation and analgesic effects, which can reduce the need for certain doses of drugs, as well as provide psychological comfort that supports the postoperative recovery process without severe side effects as often occurs with the use of pharmacological drugs (Boby, 2022; Nalla et al., 2023).

Effects of Aromatherapy on Patient Pain

Orthopedic postoperative pain is acute pain that arises from tissue damage and stimulation of peripheral nerve endings during surgery. The pathophysiology of this pain involves the release of inflammatory mediators such as prostaglandins, bradykinin, and cytokines that stimulate pain receptors (nociceptors) and cause pain sensations (Belbachir, Fuzier, & Biau, 2020; Utami & Khoiriyah, 2020). In addition, tissue ischemia due to impaired blood circulation and post-surgical edema also worsens pain conditions (Belbachir et al., 2020). In the context of both cases, the decrease in pain that occurs after aromatherapy is not only due to the direct effect of essential oils but also to the complex interaction between the psychological and physiological effects of aromatherapy. Lemon aromatherapy with its fresh scent can improve mood and provide a relaxing effect through stimulating the limbic system, which regulates emotions and pain perception (Utami & Khoiriyah, 2020; Fitria, Prawita, & Yana, 2021). Meanwhile, lavender aromatherapy contains compounds such as linalool, which have anxiolytic and neuroprotective effects, which can inhibit sympathetic nervous system activity and reduce the release of stress hormones such as cortisol (Rezah Andriani, 2022; Rizqi Hardhanti, 2023). Therefore, the effect of aromatherapy on pain is multifactorial, not solely as a physical analgesic but also as a modulator of stress response and pain perception.

Differences in pain intensity between the two patients can also be explained by individual factors such as pain tolerance, age, and physiological conditions. Pain is a subjective experience that is influenced by biological, psychological, and socio-cultural factors (Amir & Rantesigi, 2021). For example, patients with high pain tolerance will report lower pain intensity despite experiencing similar tissue damage. Psychological factors such as anxiety and stress can also exacerbate pain perception, and aromatherapy plays a role in reducing this anxiety, thereby decreasing pain sensation (Andriani, 2022).

Effects of Aromatherapy on Patient Nausea

Patient nausea is a common postoperative complication triggered by various factors, including anesthetic side effects, opioid use, and stimulation of receptors in the vomiting center in the brain. Lemon and lavender aromatherapy is believed to reduce nausea by affecting the limbic system and autonomic nerve centers, which regulate gastrointestinal responses and emotions (Fitria et al., 2021; Rosalinna, 2019). Aromatherapy is also able to reduce stress and anxiety that often exacerbate nausea, so that patients experience a decrease in the frequency and intensity of nausea (Taji, Parami, Putra, & Pradhana, 2024). Previous studies have shown that

essential oil inhalation can reduce the need for additional antiemetic drugs and improve postoperative patient comfort (Meyer, Hutson, Morris, & McAllister, 2023; Wang et al., 2024; Marsh, Millette, & Wolfe, 2022). This finding is in line with the results of the case study that showed a decrease in nausea after aromatherapy intervention, strengthening the evidence that aromatherapy is an effective and safe complementary therapy.

The results of direct application of lemon and lavender aromatherapy in two patients with similar conditions obtained different responses. The responses in these two cases illustrate the variability of aromatherapy effects based on individual characteristics. This study also emphasizes the importance of a personalized approach in nonpharmacological therapy, such as the choice of essential oil types that can be tailored to the patient's condition and needs for optimal results. In addition, this study adds practical evidence related to the use of aromatherapy as an independent intervention in evidence-based nursing practice, especially in a national referral hospital environment in Indonesia.

This study has several limitations in its application. First, the number of samples is very limited so that the results cannot be generalized to a wider population. Second, the assessment of pain and nausea is subjective and highly influenced by psychological factors that are difficult to strictly control in case studies. Third, the aromatherapy intervention was carried out together with the administration of pharmacological analgesics, making it difficult to separate the specific effects of aromatherapy independently. Further studies with experimental designs and larger samples are needed to test the effectiveness of aromatherapy more comprehensively and objectively.

CONCLUSION

The administration of lemon and lavender aromatherapy as part of a nonpharmacological intervention in orthopedic surgery patients with fractures showed a decrease in postoperative pain and nausea, as well as a stable vital condition. Although there are variations in pain scales influenced by individual tolerance and physiological and socio-cultural factors, aromatherapy plays a complementary role in the management of these symptoms. Future research is expected to be conducted with a larger sample and a more structured method to examine the effectiveness of aromatherapy in more depth. In addition, the application of aromatherapy can be considered as a complement to pharmacological therapy in the management of postoperative pain and nausea in orthopedic patients.

CONFLICT OF INTEREST

The authors stated there is no conflict of interest in this study.

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