

Implementation of Lavender Aromatherapy for Post-Caesarean Section Mothers Experiencing Acute Pain

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Abstract:

A Caesarean section is a surgical procedure through the abdominal wall and uterus to remove the fetus, which generally causes more severe postpartum pain than standard delivery. Pain due to surgery, if not immediately addressed, will hinder the mother's recovery process and the baby's breastfeeding process. One effort that can be done to reduce pain is with non-pharmacological methods, one of which is through the administration of lavender aromatherapy. This study aimed to explore the implementation of lavender aromatherapy administration for post-caesarean section mothers experiencing acute pain in the Lotus Room of Dr. Haryoto Lumajang Regional Hospital. The method used in this study was a case study involving one participant who met the inclusion criteria, namely a post-CS patient treated in the Lotus Room of Dr. Haryoto Lumajang Regional Hospital, exhibiting 5 out of 6 significant signs and symptoms of acute pain with a moderate to severe pain scale. Data was collected on March 18-20, 2025, using interviews, observation, and documentation techniques. The measurement instrument for the level of pain reduction was the Numeric Rating Scale (NRS) and the observation sheet for outcome criteria. Aromatherapy was implemented using a diffuser with five drops of lavender essential oil twice daily for 20 minutes. The study results showed a reduction in pain levels, with the following criteria: pain complaints decreased from 8 (severe) to 2 (mild), decreased grimacing, decreased anxiety, decreased protective behavior, improved pulse rate, and improved sleep quality. Pain management with one of the lavender aromatherapy interventions can reduce pain from 8 to 2 on NRS.

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INTRODUCTION

Childbirth represents a profound physiological event that may occur via the natural vaginal route or necessitate surgical intervention through an abdominal incision, commonly termed a cesarean section (CS). As a major abdominal operation involving incisions through multiple tissue layers, including the uterus, CS is inherently associated with significantly greater postoperative pain compared to uncomplicated vaginal delivery (Larsson et al., 2021; Sulistiorini et al., 2022). This elevated pain burden stems directly from the surgical trauma inflicted during the procedure, establishing CS as a distinct clinical scenario requiring specialized pain management strategies to support maternal recovery and neonatal care (Langenaeken & Lavand'homme, 2025).

The consequences of inadequately managed acute pain following cesarean delivery extend far beyond immediate discomfort, creating a cascade of adverse effects for both mother and infant. For the mother, unrelieved pain severely restricts mobility, as movement exacerbates incisional discomfort and impedes essential postoperative ambulation (Javes, 2025). This functional limitation critically compromises the mother's ability to perform Activities of Daily Living (ADL), directly

impacting infant care. Consequently, reduced maternal mobility disrupts breastfeeding initiation and maintenance, leading to diminished infant nutrition and hindering the development of early affectionate bonds, which are essential for infant emotional security and maternal-infant attachment (Alshamandy et al., 2023).

Post-cesarean section pain is clinically classified as acute pain, originating from tissue damage caused by surgical incisions in the abdominal wall and uterus (Veef & Velde, 2022). This pain category encompasses complex physiological responses, including inflammatory processes and nerve sensitization, as well as significant psychological dimensions. The acute nature of this pain means it typically peaks within the first 24-72 hours post-surgery, demanding timely intervention during this critical window to prevent progression into more complex pain states or prolonged recovery trajectories that could extend the immediate postpartum challenges (Pilewska-Kozak et al., 2024).

The physical manifestations of uncontrolled post-cesarean pain are often overt and distressing, including visible grimacing, pallor, diaphoresis (excessive sweating), vocalizations such as crying or screaming, and measurable hemodynamic alterations like tachycardia and hypertension. Beyond these observable signs, the psychological toll is equally concerning, with untreated pain significantly increasing the risk of anxiety, depression, and heightened stress responses during the vulnerable postpartum period (Anjelia, 2021). These combined physical and psychological burdens not only diminish maternal well-being but also elevate the risk of postoperative complications, including delayed wound healing and thromboembolic events due to immobility (Wang et al., 2025).

Given these multifaceted risks, effective pain management is a cornerstone of safe, high-quality post-cesarean care. While pharmacological analgesics remain fundamental, their use is often limited by side effects such as sedation, nausea, respiratory depression, and potential interference with maternal alertness for infant care (Cheng et al., 2024). Consequently, integrating evidence-based non-pharmacological therapies alongside conventional analgesia has emerged as a vital strategy to enhance pain control, reduce opioid requirements, and promote holistic maternal recovery without compromising safety or mother-infant interaction (Nori et al., 2022).

Among non-pharmacological approaches, aromatherapy presents a promising, low-risk adjunctive modality. This therapy utilizes volatile aromatic compounds derived from plant essential oils, with *Lavandula angustifolia* (lavender) demonstrating particular efficacy in relieving pain and anxiety (Nouira et al., 2024). The primary bioactive constituents of lavender oil—linalool and linalyl acetate—exert their effects through interaction with the central nervous system, specifically modulating activity in the limbic system (Antonelli & Donelli, 2020). This neurophysiological action facilitates the reduction of neural excitability, promotes muscle relaxation, and diminishes psychological tension, thereby addressing the sensory and affective components of acute postoperative pain through a non-invasive mechanism (Marchand, 2024).

Therefore, this study specifically aims to explore the practical implementation and clinical integration of lavender aromatherapy as an adjunctive intervention for managing acute pain in mothers recovering from cesarean section. By investigating its application within standard post-cesarean care protocols, the research seeks to evaluate whether this accessible, evidence-based complementary therapy can effectively alleviate pain intensity, improve maternal functional mobility, enhance psychological well-being, and ultimately support optimal maternal-infant outcomes during the critical immediate postoperative period, offering a valuable tool for nurses in comprehensive postpartum pain management (Ghalgar et al., 2025).

STUDY DESIGN

This research was conducted in the Lotus Room of Dr. Haryoto Lumajang Regional General Hospital from March 18 to 20, 2025, with the implementation of nursing interventions over a 3-day period. Data collection used interview, observation, and documentation techniques. This research employs a qualitative approach and utilizes a case study design. The sample used was one respondent with the initials Mrs. S who met the following inclusion criteria: patients with a medical diagnosis of post-cesarean section (Post SC) on the first day, experiencing acute pain nursing problems characterized by the emergence of at least 5 of the six significant criteria for acute pain according to the Indonesian Nursing Service Standards (SLKI), namely decreased pain complaints, decreased grimacing, decreased protective behavior, decreased anxiety, decreased pulse rate, decreased difficulty sleeping, patients also had a *compos mentis* level of consciousness, post-cesarean section patients who experienced moderate-severe pain, were willing to be participants by signing the consent form. Exclusion criteria: patients who have allergies or dislike aromatherapy and odors, and post-cesarean section patients who have olfactory disorders.

The provision of therapy to Mrs. S is pain management with one of the interventions of lavender aromatherapy using a diffuser with five drops of lavender essential oil. This therapy is administered twice a day for 20 minutes. Mrs. S was asked to relax by slowly inhaling lavender aromatherapy for 20 minutes. Before and after the intervention, the authors measured pain levels using a Numeric Rating Scale (NRS) to evaluate the effectiveness of the intervention. This dosage and duration are based on previous research demonstrating the effectiveness of lavender aromatherapy in reducing pain using a similar protocol. During the study period, Mrs. S also received analgesics as a collaborative intervention in pain management. Before and after the lavender aromatherapy intervention, researchers measured pain levels using the Numeric Rating Scale (NRS) to assess the effectiveness of the therapy. Additionally, vital signs such as pulse rate and blood pressure were recorded to support the evaluation of pain response. This research received formal ethical clearance from the Institutional Review Board (IRB) of the Faculty of Nursing, University of Jember, prior to the commencement of the study. The approval confirms adherence to national and international ethical standards for human subject research, including protocols for informed consent and safeguards for participant welfare.

PATIENT INFORMATION

A nursing assessment was conducted on Tuesday, March 18, 2025, at 16:00 WIB in the Lotus Room of Dr. Haryoto Lumajang Regional Hospital. Data was collected in the Lotus Room, one of the special rooms for postpartum mothers at Dr. Haryoto Lumajang Regional Hospital. The results of the nursing assessment on Mrs. S showed that the patient was 42 years old, Muslim, and had a final education in senior high school (SMA). Mrs. S is married and currently works as a housewife. The main complaint felt was Mrs. S said pain in the abdominal area of the former operation, the Caesarean section operation caused the pain, Mrs. S said the pain was like being stabbed, Mrs. S noted pain in the incision area after the Caesarean section, Mrs. S said the pain scale was on a severe pain scale with a value of 8, Mrs. S said the pain felt continuous. Based on the delivery history, Mrs. S reported that she had experienced a tight stomach since the previous day, although it was not a frequent occurrence. In response, the patient's husband immediately took Mrs. S to the Jatiroto Community Health Center, which referred her to Dr. Haryoto Lumajang Regional Hospital on March 18, 2025, at 11:00 a.m. WIB. After an examination in the emergency room, Mrs. S was

declared ready for surgery because the pregnancy had passed term. Mrs. S was transferred to the operating room at 1:00 p.m. WIB and underwent a cesarean section under general anesthesia.

Mrs. S's obstetric history indicates that she experienced menarche at age 14 with a bleeding volume of approximately 50 cc. Her menstrual cycles are regular, lasting 5 to 7 days. Each menstrual period, Mrs. S typically complains of abdominal and back pain. Her pregnancy history reveals that Mrs. S is a multigravida, meaning she has had more than one pregnancy. This pregnancy was complicated by a pregnancy that had passed term, necessitating a cesarean section. The baby was born, a girl, weighing 2,945 grams and measuring 50 cm in length. Regarding her contraceptive history, Mrs. S uses injectable contraception every three months. Her previous childbirth and postpartum history are detailed in Table 1.

Table 1. History of Pregnancy, Childbirth, and Postpartum

No.	Age (years)	Type	Childbirth		Child	
			Aid provider	Complications	Gender	Weight
1.	17	Spontaneous	Midwife	No	Female	3.4 kg
2.	10	Spontaneous	Midwife	No	Male	3.1 kg
3.	0	SC	Doctor	Past the baby's estimated due date	Female	2.9 kg

Mrs. S. showed no signs of nutritional problems. She had a good appetite, ate thrice daily, and had no history of food allergies. Her urinary elimination pattern before the illness was regular, five times daily. After hospitalization, the patient used a catheter, with a urine output of approximately 200 cc per 5 hours. Her urine was clear yellow, and she had no complaints. She had not had a bowel movement since her hospitalization.

Personal hygiene consisted of wiping in the morning and performing oral hygiene once daily, first thing in the morning after waking. The patient's sleep pattern before hospitalization was regular, with approximately 8 hours of sleep daily. However, after hospitalization, the patient complained of sleep disturbances caused by pain in the surgical wound area and restricted movement. The patient did not have any habits or behaviors that could negatively impact her health, such as smoking or consuming alcohol.

CLINICAL FINDINGS

The results of Mrs. S's supporting laboratory examination on March 18, 2025, are in Table 3.

Table 3. Laboratory Examination Results

No.	Examination	Results	Normal Value	Unit
1.	Hemoglobin	9.3	11.5-14.5	gr/dl
2.	Leukocytes	10.260	5.000-10.500	cells/mm3
3.	Erythrocytes	3.27	4.0-4.9	cells/mm3
4.	Platelets	146.000	150.000-450.000	cells/mm3
5.	Hematocrit	27	35-42	%

Based on Table 3, Mrs. S's laboratory examination results indicate that her hemoglobin, erythrocyte, platelet, and hematocrit levels are below normal. This is common in post-cesarean section mothers due to several factors. During the CS procedure, significant blood loss occurs from both the uterine blood vessels and the incised tissue, causing a decrease in hemoglobin, erythrocyte, and hematocrit levels. A platelet reduction can also be a physiological response to surgical stress

and activation of the coagulation system, especially when accompanied by active bleeding or wound healing. Meanwhile, her leukocyte levels are within normal limits. During her treatment in the Lotus Room at Dr. Haryoto Lumajang Regional Hospital, Mrs. S also received pharmacological therapy.

THERAPEUTIC INTERVENTION

Table 4. Nursing Interventions for Mrs. S with Acute Pain

Goals and Outcome Criteria (SLKI)	Goals and Outcome Criteria (SLKI)
After nursing interventions for 3x24 hours, the patient's pain level is expected to decrease with the following outcome criteria: (L.08066)	Pain Management (I.0828)
1. Pain complaints decrease (5)	Observation
2. Grimacing decreases (5)	1. Identify the location, characteristics, duration, frequency, quality, and pain intensity.
3. Protective behavior decreases (5)	2. Identify the pain scale.
4. Anxiety decreases (5)	3. Identify factors that aggravate and alleviate pain.
5. Sleep difficulties improve (5)	Therapeutic
6. Pulse rate improves (5)	4. Provide non-pharmacological techniques to reduce pain (aromatherapy).
7. Breathing patterns improve (5)	5. Facilitate rest and sleep.
8. Blood pressure improves (5)	Education
	6. Explain the causes, duration, and triggers of pain.
	7. Explain pain relief strategies.
	8. Encourage self-monitoring of pain.
	9. Teach non-pharmacological techniques such as lavender aromatherapy to reduce pain.
	Collaboration
	10. Collaboration with administering analgesics, antrain 3 x 1g and tramadol 3 x 100 mg.

One intervention that can be implemented for acute pain nursing is pain management through non-pharmacological therapy. Of the 19 interventions in pain management, the author selected 10 interventions that were appropriate for the patient's condition.

After implementing the nursing intervention for three consecutive days with Mrs. S, the results of the daily nursing evaluation, conducted after the lavender aromatherapy, were obtained. The results showed that on the first day, the pain scale reached 8 (severe pain), then after the third day, the pain decreased to 2 (mild pain). This decrease was characterized by a reduction in the patient's pain complaints, the disappearance of grimacing and restlessness, a decrease in protective behavior toward the wound area, and improvements in pulse rate, blood pressure, sleep quality, and breathing patterns.

Table 5. Results of Pain Assessment and Vital Signs of Mrs. S During 3 Days of Lavender Aromatherapy Intervention

Measurement Time	Pain Score (NRS)	Pulse	Blood Pressure	Sleep Duration (Hours)
After Intervention day 1	7 (severe pain)	101 x/minute	144/80 mmHg	4
After Intervention day 2	4 (moderate pain)	79 x/minute	132/80 mmHg	5
After Intervention day 3	2 (mild pain)	92 x/minute	125/70 mmHg	6

DISCUSSION

Based on the assessment results, it was discovered that Mrs. S had undergone a cesarean section. This surgical delivery procedure can trigger pain in the patient. The main signs and symptoms in Mrs. S included pain in the abdominal area of the surgical incision, grimacing, anxiety, protectiveness of the wound, difficulty sleeping, a pulse rate of 105 beats/minute, blood pressure of 155/85 mmHg, and a respiratory rate of 20 breaths/minute. Most mothers experience discomfort during a cesarean section. One of the discomforts is pain originating from the surgical procedure or abdominal incision (Duch et al., 2025). The author believes the relationship between facts and theory is appropriate for a nursing diagnosis of acute pain. The signs and symptoms of acute pain experienced by Mrs. S met 100% of the significant criteria for acute pain nursing.

Lavender aromatherapy was implemented for three consecutive days. Therapy was administered to Mrs. S using a diffuser with five drops of lavender essential oil. This therapy was administered twice daily, each session lasting 20 minutes. Mrs. S was asked to relax by slowly inhaling lavender aromatherapy for 20 minutes. Before and after the intervention, the authors measured pain levels using a Numeric Rating Scale (NRS) to evaluate the effectiveness of the intervention. This is in accordance with the Indonesian Nursing Intervention Standards (SIKI), which recommends pain management as the primary intervention for patients with acute pain, along with supporting interventions such as aromatherapy (Winarsih & Widadi, 2024). According to the authors, lavender aromatherapy plays a supportive role in reducing pain. However, lavender aromatherapy is effective in reducing pain intensity in post-cesarean sections.

After implementing pain management with lavender aromatherapy for three days, Mrs. S's pain scale showed a gradual decrease. On the first day, the pain decreased from an 8 to a 7, still considered severe. On the second day, the pain intensity again reduced from a 5 to a 4, considered moderate. Meanwhile, on the third day, the pain decreased from a 3 to a 2, which is regarded as mild. These data indicate that lavender aromatherapy effectively reduced pain intensity throughout the intervention.

According to Rahmawati & Yuniarti (2020), lavender aromatherapy has been shown to significantly reduce pain. This is because lavender aromatherapy is an alternative treatment for post-cesarean section pain relief. Inhalation of the aromatherapy chemical components enters the limbic system, where they are processed and inhaled. Inhaling the aroma opens the olfactory bulb, which then travels to the limbic system and the brain, where the limbic system is the center of emotions such as pain, pleasure, anger, fear, and depression. This causes the body to release neurotransmitters, such as endorphins, which act as natural analgesics, helping to reduce pain perception. After administering lavender aromatherapy, a reduction in pain was measured on the pain scale, as shown in Figure 1.

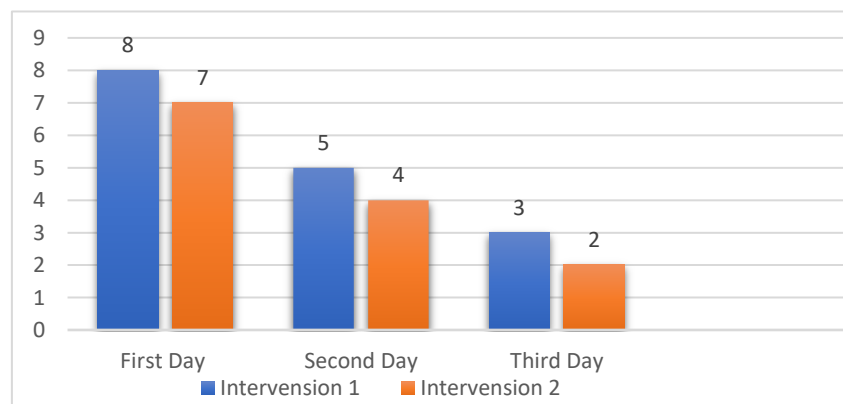


Figure 1. Patient's Pain Scale

According to Figure 1, pain intensity decreased after lavender aromatherapy. The author believes the intervention provided to Mrs. S aligns with the theory in the Indonesian Nursing Intervention Standards (SIKI) guidebook. Lavender aromatherapy can help reduce pain intensity in post-cesarean section patients by relaxing the brain and alleviating feelings of stress (Faizah & Silalahi, 2025).

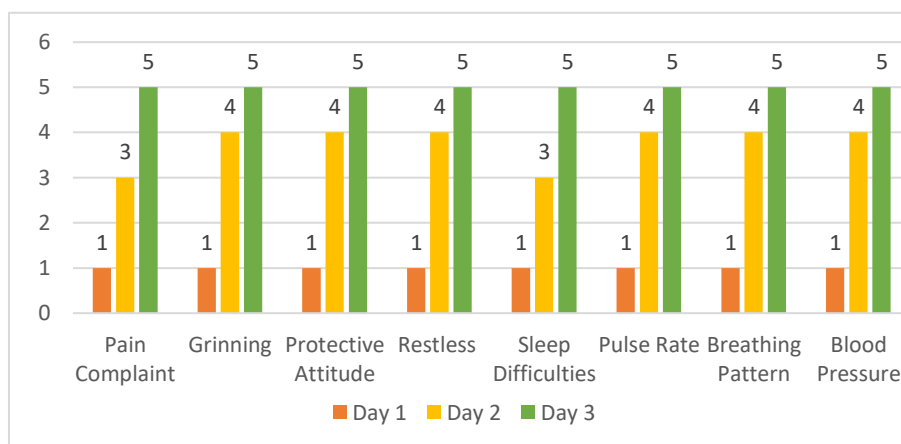


Figure 2. Patient's Clinical Condition

Post-cesarean section pain falls into the category of acute pain, where physiological and psychological changes occur due to surgical procedures that cause tissue damage. The pain occurs 12-36 hours after surgery and tends to decrease by the third day, with pain intensity ranging from severe to moderate and lasting less than three months. According to the authors, this theory aligns with the clinical condition experienced by Mrs. S. This is evident from Mrs. S's complaints of severe pain on the first postoperative day, which then decreased to mild pain on the third day. This phenomenon supports the theory that postoperative pain is typically acute, appearing within 12-36 hours after the procedure and gradually improving over a few days as the tissue heals. Thus, facts and theory support each other in explaining post-cesarean section pain (Moussa & Ogle, 2022).

The pain can cause sleep disturbances due to changes in serotonin metabolism, cytokine expression, and disruptions to the circadian rhythm. The retinohypothalamic system directly stimulates the suprachiasmatic nucleus (SCN), which is responsible for regulating the sleep-wake cycle. This, in turn, can worsen the patient's health (Li et al., 2022). According to the authors, Mrs.

S's sleep disturbance was caused by pain, which not only causes physical discomfort but also has systemic effects, disrupting sleep patterns through changes in metabolism and biological functions.

Pain can trigger physiological responses, including sympathetic responses such as increased heart rate, pale skin, and elevated blood pressure. Furthermore, pain can also trigger parasympathetic responses such as rapid and irregular breathing, weakness, and fatigue. Psychologically, pain can cause restlessness, anxiety, facial expressions indicating discomfort, such as grimacing, and protective behaviors toward the painful body part (Davydov, 2021). According to the authors, this theory aligns with Mrs. S's clinical condition. Pain not only impacts the physical but is a complex condition that triggers various physiological and psychological responses. Therefore, pain management must be carried out comprehensively, focusing on the physical aspects and considering the emotional and mental impacts that can worsen the patient's condition.

This study has several limitations that should be acknowledged. First, it is a single case report without a control group, so the results cannot be generalized. Second, during the intervention, the patient also received pharmacological analgesics, which could be a confounding factor in assessing the effectiveness of pure lavender aromatherapy. Nevertheless, Mrs. S experienced a 6-point reduction in pain score on the Numeric Rating Scale (from 8 to 2) during the three-day intervention. This suggests that lavender aromatherapy has the potential to provide substantial analgesic effects as a supportive therapy.

Physiologically, the main component of lavender essential oil, linalool, acts on the limbic system in the brain, which regulates emotions and pain perception. This limbic system activation stimulates the release of endorphins, neurotransmitters that function as the body's natural analgesics, thereby helping to reduce pain perception and induce a relaxing effect (Antonelli & Donelli, 2020). This mechanism supports the pain reduction results observed in patients. While lavender aromatherapy cannot replace pharmacological therapy, it may be an effective non-pharmacological intervention for reducing acute post-cesarean pain. Further research, utilizing experimental designs and larger sample sizes, is necessary to strengthen the evidence for the effectiveness of aromatherapy.

CONCLUSION

Nursing problems in Mrs. S, namely acute pain, are characterized by the appearance of 100% of significant signs and symptoms, including the patient complaining of pain, the patient grimacing, restlessness, protective behavior, increased pulse, difficulty sleeping, and 2 of 7 minor symptoms, namely increased blood pressure and changes in breathing patterns. Implementation of pain management and administration of lavender aromatherapy is carried out through a diffuser by adding five drops of lavender essential oil given 2 times a day in 20 minutes for three days, the pain scale decreased from a scale of 8 (severe pain) to a scale of 2 (mild pain) after 3 days of aromatherapy administration and the level of pain decreased as evidenced by complaints of pain, grimacing, restlessness, protective behavior, decreased difficulty sleeping, improved pulse rate, blood pressure, and breathing patterns. Lavender aromatherapy can function as a non-pharmacological therapy for post-cesarean pain. This therapy can be applied as a pain reduction therapy. The calm environment provides a more focused environment for treatment. Further research using a control group is recommended to compare the effectiveness of lavender aromatherapy. This is essential for strengthening the scientific evidence and determining the role of lavender aromatherapy as an optimal complementary therapy in post-cesarean pain management.

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CONFLICT OF INTEREST

The authors declare that there are no conflicts of interest, either financial or non-financial, in this research. This research on the effects of lavender aromatherapy was conducted independently and was not funded by aromatherapy product manufacturers or other parties with commercial interests.

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