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Efficacy of combined chamomile aromatherapy and LI-4 (hegu) acupressure on post-cesarean pain: A quasi-experimental study

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*Rahmah Widyaningrum[1], An Nisaa Ananda Subekti[2], Tri Hardi Miftahul Ulum[2]

[1]Nursing Profession Program, Madani University, Yogyakarta, Indonesia
[2]Bachelor of Nursing Program, Madani University, Yogyakarta, Indonesia

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Abstract

Background: Effective pain management within the first 24 hours post-cesarean section is essential for maternal recovery. Non-pharmacological approaches, such as chamomile aromatherapy and LI-4 (Hegu) acupressure, offer accessible analgesic benefits with minimal side effects. However, evidence regarding their combined efficacy in post-cesarean patients remains limited.

Purpose: This study aims to determine the effectiveness of combined chamomile aromatherapy and LI-4 acupressure in reducing pain intensity among post-cesarean women.

Methods: A quasi-experimental two-group pretest–posttest design was utilized. Twenty participants were recruited via accidental sampling and allocated into an intervention group (n=10) receiving the combined therapy, and a control group (n=10) receiving deep breathing relaxation. Data normality was tested using the Kolmogorov–Smirnov test. Data were analyzed using a paired t-test for the normally distributed intervention group and a Wilcoxon test for the non-normally distributed control group.

Results: Most respondents were aged 25–37 years (80% intervention; 60% control) and underwent elective cesarean sections (90% intervention; 70% control). In the intervention group, the paired t-test revealed p-values of 0.009, 0.104, and 0.081 at 4, 8, and 12 hours post-surgery, respectively. Conversely, the control group showed significant pain reduction at 4 and 8 hours (p=0.016 and p=0.034).

Conclusion and recommendation: The combination of chamomile aromatherapy and LI-4 acupressure demonstrates a significant effect in reducing post-cesarean pain intensity at 4 hours post-surgery, offering a viable non-pharmacological pain management intervention.

*Corresponding Author:
Nursing Profession Program, Madani University, Yogyakarta, Indonesia
Email: rahmah.widyaningrum@umad.ac.id

Introduction

According to research from the World Health Organisation (WHO, 2021), the prevalence of cesarean section (SC) deliveries is increasing globally. Currently, SC accounts for 21% of all deliveries and is projected to rise to 29% by 2030. In Indonesia, the SC delivery rate has increased from 9.8% to 17.6%. Furthermore, in the Special Region of Yogyakarta, the rate rose

from 17.6% in 2013 to 23.1% in 2018 (Riskesdas RI, 2018). One of the consequences of SC deliveries is the high-intensity pain experienced on the first day following the procedure. This discomfort occurs because the body has not yet adapted to the pain response (Collin et al., 2021). A study found that 54.5% of mothers experienced moderate pain, 31.8% experienced severe pain that was controlled, and 13.6% reported mild pain (Dey et al., 2023). Another study indicated that 95% of respondents experienced severe pain, while 5% experienced moderate pain (Herawati et al., 2023).

Post-SC pain can cause significant discomfort for mothers, disrupting daily activities and affecting the bonding experience between mother and baby. This disruption may hinder the Early Initiation of Breastfeeding (EIB), ultimately impacting the infant's immune system (Tirtawati et al., 2020). Research by Rahman et al. (2022) showed that 93.3% of mothers reported pain interfering with their Activities of Daily Living (ADL) after an SC, while 83% stated that pain disrupted breastfeeding. Additionally, 76% of infants born to mothers who had undergone an SC had a higher likelihood of becoming ill. Post- SC pain is a common issue that can hinder recovery, mobility, and infant care. Inadequate pain management may lead to increased use of pharmacological analgesics and their associated side effects (World Health Organisation, 2021; Arora et al., 2022). Therefore, effective pain management is essential to minimise the impacts of post- SC pain. Management strategies can be categorised into pharmacological and non-pharmacological therapies. Pharmacological treatments to alleviate pain may include administering analgesics such as aspirin, acetaminophen, ibuprofen, and naproxen (Alorfi, 2023). Meanwhile, non-pharmacological therapies can include acupuncture, acupressure, aromatherapy, deep-breathing techniques, warm and cold compresses, and hypnotherapy (Ali Abdraboo et al., 2020; Iswani et al., 2024).

Non-pharmacological approaches are increasingly being explored as safe complementary therapies. Chamomile aromatherapy has been shown to reduce postoperative pain and decrease the need for analgesics (Radmanesh et al., 2020). Similarly, LI-4 (Hegu) acupressure may alleviate pain by promoting endorphin release and modulating the nervous system (Fazeli et al., 2020). However, evidence regarding the effectiveness of LI-4 acupressure remains inconsistent and most studies have examined these interventions independently, limiting the understanding of their combined effects. Variations in intervention methods and timing have also contributed to inconsistent findings (Mirzaee et al., 2021). Additionally, research in the Indonesian context is still limited. Therefore, further studies are necessary to evaluate the effectiveness of combining chamomile aromatherapy and LI-4 acupressure in reducing post-cesarean pain.

In this study, the researchers administered chamomile aromatherapy alongside acupressure at the LI-4 (Hegu) point. According to Soesilawati et al. (2025), chamomile contains α-bisabolol and flavonoids, which act as anti-inflammatory and analgesic agents. Studies by Akgün and Boz (2020) have shown that the LI-4 (Hegu) point is effective in reducing post-surgical pain intensity after cesarean sections and in alleviating dysmenorrhea (menstrual pain). Previous research has commonly utilised acupressure points LI-4, LI-11, and HT-7 to reduce pain intensity; however, no studies have combined all three points simultaneously (Düzel et al., 2023). Moreover, Sugito et al. (2023) found that combining lavender aromatherapy with acupressure significantly reduced post-cesarean pain intensity ($p=0.000$). Similar findings were reported by Akgün and Boz (2020) and Sugito et al. (2023), both showing significant effects of acupressure in reducing post-cesarean pain, also with p-values of 0.000. Thus, this study aims to investigate the effectiveness of chamomile aromatherapy and LI-4 (Hegu) acupressure in reducing pain intensity among women following cesarean sections at Panembahan Senopati Regional General Hospital in Bantul.

Methods

Research design

A quantitative, quasi-experimental study utilizing a two-group pretest-posttest design was conducted to compare the effectiveness of an intervention combining chamomile aromatherapy and LI-4 (Hegu) acupressure against a control condition utilizing deep-breathing relaxation.

Setting and samples

The study was conducted in the Pergiwati ward of Panembahan Senopati Regional Hospital in Bantul from June 18 to July 18, 2025. The sample size was calculated using Slovin's formula, with a 10% allowance for potential dropouts, yielding a total sample of 58 respondents. Of this total, 29 respondents were assigned to the control group, and the remaining 29 to the intervention group. However, based on the inclusion and exclusion criteria, the final sample consisted of 20 participants, 10 in the intervention group and 10 in the control group. These participants were selected from a population of 720 individuals using incidental sampling.

The inclusion criteria were: (1) patients willing to participate as respondents; (2) post-surgical patients who were conscious and not referred to the ICU; and (3) patients who completed the pre-test, intervention, and post-test. The exclusion criteria were: (1) patients using other aromatherapy treatments; (2) patients sensitive to the smell of chamomile flowers; (3) patients with allergies or issues related to their sense of smell; (4) patients with asthma; (5) patients with wounds, swelling, fractures, or burns in the LI-4 (Hegu) area; and (6) VIP patients.

Intervention

Participants in the intervention group received combined chamomile aromatherapy and LI4 (Hegu) acupressure three times daily. The chamomile essential oil was administered by inhalation therapy using a cotton ball soaked in 3 drops of the oil. Participants inhaled the aroma for 15 to 20 minutes, keeping the cotton ball approximately 1 cm from their nose. Aromatherapy sessions were conducted three times a day, at the 4th, 8th, and 12th hours after cesarean section surgery.

For LI4 (Hegu) acupressure, gentle massage was applied to the point to help relax muscles and prevent stiffness. The LI4 point is situated between the first and second metacarpal bones, at the midpoint of the radial border of the second metacarpal, which is located between the thumb and index finger. Acupressure was applied to the LI4 point 30 times in a counterclockwise direction for 2 minutes. This was also performed three times a day at the 4th, 8th, and 12th hours after surgery, concurrently with chamomile aromatherapy.

Pain intensity was measured before and after each intervention and recorded on an observation form. Participants in the control group received deep breathing relaxation therapy three times daily. Pain intensity was also assessed before and after each intervention and documented on an observation form.

Measurement and data collection

The Numeric Rating Scale (NRS) is a widely used tool for assessing pain intensity, employing whole numbers to represent the severity of a patient's pain. This scale ranges from 0 to 10, where 0 indicates no pain, and 10 signifies unbearable, severe pain (Vitani, 2019). The NRS has been validated and shown to be reliable. According to research by Li et al. (2007), the NRS

achieved a validity coefficient (r) of 0.90, and the reliability test showed a coefficient greater than 0.95. The NRS was utilised to measure pain intensity both before and after the intervention. For data analysis, a paired t-test was applied to the intervention group, a Wilcoxon test to the control group, and a Mann–Whitney test to compare the two groups.

Data analysis

Descriptive statistics were utilized to summarize the participants' baseline demographic and clinical characteristics, including age, educational background, history of cesarean section, cesarean section classification, and parity, which were presented using frequency distribution tables. Prior to inferential analysis, the normality of the data distribution was assessed using the Kolmogorov-Smirnov test. For within-group comparisons, a parametric paired t-test was employed for the intervention group due to its normal data distribution, whereas the non-parametric Wilcoxon signed-rank test was applied to the control group due to its non-normal distribution. To evaluate the comparative differences between the intervention and control groups, the Mann-Whitney U test was conducted. All statistical analyses were executed using IBM SPSS Statistics for Windows, version 27.

Ethical considerations.

Ethical clearance was obtained from the Research Ethics Committee at Universitas Muhammadiyah Purwokerto (UMP), with ethics approval number KEPK/UMP/81/VI/2025.

Results

The calculated sample size was 58, with 29 per group. Only 40 were recruited. Two withdrew during the final intervention, and some data were invalid. Eighteen were excluded: 4 VIP patients, 4 received ICU treatment, 1 had asthma, 3 declined, and 6 were lost to follow-up due to non-adherence. The final sample analyzed was 20.

Characteristics of Respondents

Table 1. Characteristics of respondents (n=20).

Characteristic	Intervention Group		Control Group	
	Frequency	Percentage	Frequency	Percentage
Age (year)				
1. 13 – 25 years	0	0	1	10
2. 25 – 37 years	8	80	6	60
3. 37 – 49 years	2	20	3	30
Educational background				
1. Elementary school	0	0	2	20
2. Junior high school	2	20	1	10
3. Senior high school	6	60	7	70
4. University	2	20	0	0
History of SC				
1. Not yet	3	30	5	50
2. Once	6	60	5	50
3. Twice	1	10	0	0
SC Classification				
1. Ellective	9	90	7	70
2. Emergency	1	10	3	30
Parity				
1. Primipara	3	30	2	20

Characteristic	Intervention Group		Control Group	
	Frequency	Percentage	Frequency	Percentage
2. Multipara	7	70	7	70
3. Grandemultipara	0	0	1	10

Based on Table 1, most respondents were aged 25-37, with 80% in the intervention group and 60% in the control group. The majority had completed senior high school, with 60% in the intervention group and 70% in the control group. In terms of surgical history, 60% of the intervention group reported one cesarean section (SC), compared to 50% in the control group, where the remaining 50% had no SC history. Most SCs were elective, with 90% in the intervention group and 70% in the control group. Regarding parity, 70% of respondents were multiparous in both groups.

Difference in mean and p-value of pain scale before and after intervention

Table 2. Difference in mean pain scale score and p-value before and after intervention in two groups (n=20).

	4 hours			8 hours			12 hours		
Group	Pre	Post	p-value	Pre	Post	p-value	Pre	Post	p-value
Intervention	6.5±1.5	5±2.3	0.009	4.1±1.9	3.7±1.5	0.104	2.9±1.3	2.6 ±1.5	0.081
Control	5.7±0.9	4.6±1	0.016	4±1.2	3.4±1.6	0.034	3.1±1.6	2.9 ±1.4	0.317

The data presented in Table 2 indicate that the treatment administered to the intervention group at the fourth hour after surgery significantly reduced the pain scale (P = 0.009, mean difference = 1.5). In the control group, the treatments given at both the fourth and eighth hours after surgery also significantly reduced the pain scale, with P-values of 0.016 and 0.034 and mean differences of 1.1 and 0.6, respectively. However, the intervention conducted 12 hours after surgery did not have a significant effect on pain reduction, with a P-value of 0.317 and a mean difference of 0.2.

Comparison of the effect of treatment between the intervention group and the control group

Table 3. Comparison of the effect of treatment between the intervention group and the control group (n=20)

Group	P-value (4 hours)	P-value (8 hours)	P-value (12 hours)
Aromatherapy chamomile & acupressure (intervention) - deep breathing relaxation therapy (control)	0.000	0.000	0.000

The data in Table 3 show a significant difference between the intervention and control groups, as indicated by the Mann-Whitney test (p-value < 0.001).

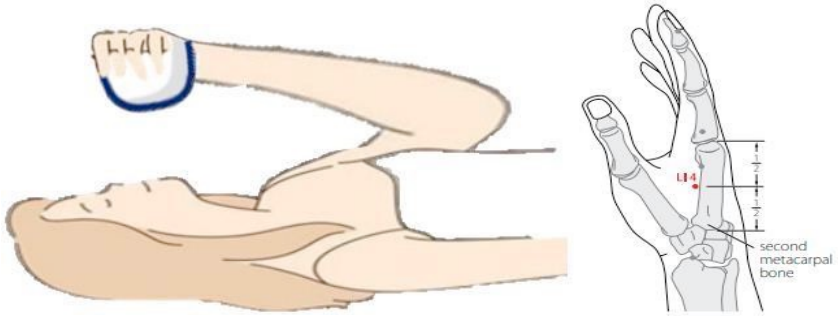

Figure 1. (a) Aromatherapy chamomile inhalation source from: https://id.pinterest.com/pin/345299496446903974/ (b) LI-4 or hegu point source from: WHO, 2019

Discussion

Based on Table 1, which covers age, educational background, history of SC, SC classification, and parity, this study aligns with Herlyssa's (2022) findings. It showed that the majority of respondents were aged 20-35 years, with 26 individuals (70.3%) in the intervention group and 20 individuals (54.5%) in the control group. The most common level of education among respondents was high school or its equivalent, with 6 individuals (60%) in the intervention group and 7 individuals (70%) in the control group. Additionally, Delyka et al. (2022) reported that their study participants were predominantly high school graduates, with 22 individuals (73.3%). Hidayah et al. (2023) found that most SC classifications were elective, accounting for 611 individuals (75.6%). Similarly, Widjayanti (2020) reported that 246 participants (63.9%) were classified as elective SC.

Table 2 shows that the treatment administered to the intervention group 4 hours post-surgery significantly reduced the pain scale (P = 0.009, mean difference = 1.5). These results are consistent with measurements taken 4 hours after surgery; however, they differ from those taken at 8 and 12 hours, as reported by Habibabad et al. (2023). Their study demonstrated a significant effect of chamomile aromatherapy on reducing post-SC pain at 6 to 12 hours, with a P-value of 0.001. Zardosht et al. (2021) also found significant effects of chamomile aromatherapy on reducing post-SC pain, reporting P-values of less than 0.01 at 4 and 8 hours, and 0.01 at 12 hours. Furthermore, Akgün and Boz (2020) found a significant effect of acupressure on reducing post-SC pain (P = 0.000). Similarly, Sugito et al. (2023) reported a significant effect of acupressure on post-SC pain reduction, also with a P-value of 0.000.

Inhalation is the fastest route of aromatherapy, primarily because olfactory receptors in the nose are directly connected to the brain via nerves. Chamomile contains active compounds such as chamazulene, apigenin, flavonoids, polyphenols, and bisabolol, which have anti-inflammatory and analgesic effects. When inhaled, these compounds stimulate olfactory receptors that send signals directly to the limbic system, including the amygdala and hypothalamus. This stimulation results in two primary outcomes: a reduction in the stress hormone (cortisol) and the release of neurotransmitters like serotonin and endogenous opioids (endorphins). Endorphins work by blocking pain signals, resulting in a natural pain-relieving effect that promotes calmness and well-being without the risk of addiction (Sugito et al., 2023). Additionally, aromatherapy activates the limbic system, which regulates emotions and pain perception, leading to relaxation and reduced anxiety (Cabral et al., 2026).

The findings of this study are consistent with measurements taken at 4 and 8 hours post-surgery, but they contrast with the 12-hour results reported by Delyka et al. (2022). Aini (2023) found that deep-breathing relaxation techniques significantly reduced post- SC pain (P = 0.001). Another study showed a significant effect of deep-breathing relaxation techniques on post- SC pain, with a P-value of 0.003. Delyka et al. (2022) also found deep breathing relaxation techniques effective for reducing post- SC pain, with a P-value of 0.000. Optimal diaphragmatic breathing can enhance oxygen and carbon dioxide exchange, improve tissue oxygenation, reduce muscle tension, and minimise the accumulation of lactic acid, which can trigger pain. Neurologically, concentrating on breathing can divert attention from pain signals (acting as a distraction) and increase bodily awareness (interoception), helping to manage emotional responses to pain, such as anxiety.

Implication and limitations

Research indicates that the combination of chamomile aromatherapy and LI-4 acupressure can significantly alleviate pain after a cesarean section. As a result, hospitals can adopt this non-pharmacological approach as a nursing care reference to enhance pain

management for mothers in labour. This practical, safe, and effective therapy can help speed recovery without causing side effects.

The limitations of the study are as follows: (1) The researcher did not examine the treatment phases of the respondents in detail, focusing solely on recording the number of nebuliser administrations per day. This may have introduced bias between the pharmacological and non-pharmacological interventions. (2) The researcher encountered limitations due to maintenance work in the inpatient ward, which resulted in a reduced number of eligible patients during the data collection period. This situation contributed to a smaller sample size for the study.

Conclusion

The combination of chamomile aromatherapy and acupressure at the LI-4 (Hegu) point during the fourth hour significantly reduced post-cesarean pain at the Panembahan Senopati Bantul Regional Hospital (RSUD), with a p-value of 0.009. However, there was no significant effect observed from chamomile aromatherapy and LI-4 (Hegu) acupressure at the eighth and twelfth hours on reducing post-cesarean section pain intensity, as indicated by p-values of 0.104 and 0.081 ($p > 0.05$).

The results of this study aim to provide accurate information that helps respondents enhance their understanding of non-pharmacological therapies for alleviating post-cesarean pain. This information may also serve as recommendations and references for hospital institutions aiming to reduce pain in post-cesarean patients, as well as provide insights for future researchers in this area.

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Author contribution

The first author prepared the manuscript for publication. The second author collected field data, while the third author assisted with revising and improving the research report. The authors made significant contributions throughout the entire research process and the preparation of the manuscript.

Conflict of interest

The author states there are no conflicts of interest in this research or the preparation of this study.

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