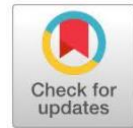# Rose aromatherapy as a complementary approach to reduce labor pain in the first stage of active labor

Jen Astika Nuari[1], Desi Hidayanti[2], Saur Sariaty[3]

[1] Midwifery Departement, Poltekkes Kemenkes Bandung, Indonesia, jen@student.poltekkesbandung.ac.id
[2] Midwifery Departement, Poltekkes Kemenkes Bandung, Indonesia, desihidayanti@staff.poltekkesbandung.ac.id
[3] Midwifery Departement, Poltekkes Kemenkes Bandung, Indonesia, saursariaty@student.poltekkesbandung.ac.id

ARTICLE INFO

ABSTRACT

Labor pain is a significant physiological and psychological stressor for women in childbirth. If unmanaged, it may lead to adverse maternal and fetal outcomes. Non-pharmacological methods such as aromatherapy offer a low-risk alternative for pain management. Rose aromatherapy, with its known relaxing and antispasmodic properties, has been proposed to reduce labor pain through inhalation. This study aimed to examine the effect of rose aromatherapy on labor pain during the first stage of active labor. This pre-experimental study used a one-group pretest-posttest design involving 36 laboring mothers in the active phase I at Garuda Public Health Center, Bandung, Indonesia. Participants received rose aromatherapy via inhalation for 10 minutes. Labor pain was measured before and after the intervention using the Numeric Rating Scale (NRS). Data were analyzed using the Wilcoxon signed-rank test. The mean labor pain score decreased from 8.58 (SD = 0.94) before the intervention to 7.25 (SD = 1.38) after, with a statistically significant difference (Z = -5.15, p < 0.001). Rose aromatherapy significantly reduces labor pain during the first active phase of labor. These findings support its use as a complementary intervention in midwifery care to enhance maternal comfort during childbirth.

Corresponding Author:

Jen Astika Nuari
Midwifery Departement, Poltekkes Kemenkes Bandung
Makmur Street No.23, Pasteur, Sukajadi, Bandung City, West Java 40161: (022) 2031548
Email: jen@student.poltekkesbandung.ac.id

INTRODUCTION

Pregnancy and childbirth are physiological conditions experienced by the mother. Changes that occur are not a disease. There are some of the mothers cannot adapt to changes that occur, causing a problem. This problem can occur from the beginning of pregnancy until the end of the delivery process. One problem that occurs is a problem related to discomfort and anxiety. The most common discomfort in the mother is when facing labor pain. Labor pain is a physiological thing. Natural pain during labor is caused by labor contractions. That is due to a decrease in the hormone progesterone, contraction of the uterine muscles, hypoxia from the muscles that experience contractions, cervical stretching when opening, uterine corpus ischemia, and stretching the lower uterine segment.(1)

Study in high-income countries such as Finland and the UK, around 50–60% of women routinely receive inhalational or regional analgesia during labor.(2) The reported delivery rate is obtained that the average in Indonesia is 85-90% of pregnant women who will face labor experiencing severe labor pain and 7-15% are not accompanied by pain.

Pain conditions that are not well managed will cause various effects for the mother and fetus. The problems caused include old parturition, fetal distress, and pathological problems both maternal and perinatal. Old parturition is a latent phase of more than 8 hours whose labor has lasted 12 hours or more infants not yet born, accompanied by cervical dilatation on the right of the alert line to the active phase labor. Old parturition can cause mothers to be fatigue and also have an impact on the fetus, one of which is fetal distess. Fetal distress occurs because the mother cannot adapt to labor pain.(3) Effective pain management during labor is therefore crucial to mitigate these risks, as pharmacological analgesia has been shown to increase satisfaction rates and can even influence future pregnancy decisions.(4) Despite these advancements, a significant proportion of women, potentially over 40%, still report insufficient analgesic support during labor, underscoring the need for improved pain management strategies and patient-centered care.(5) Epidural analgesia, while recognized as the most effective method for pain control during labor, still faces implementation challenges in various settings.(6)

While pharmacological methods such as epidural anesthesia and opioid analgesics are widely recognized for their effectiveness in relieving labor pain, their use is often constrained particularly in low- and middle-income countries.(7) These interventions require advanced medical infrastructure, continuous monitoring, trained personnel, and are associated with potential adverse effects such as hypotension, motor block, nausea, and prolonged second-stage labor. Moreover, access to pharmacologic pain relief remains inequitable.(8) In many primary health care settings, including community health centers in Indonesia, epidural analgesia is rarely available. Even when accessible, cultural beliefs, economic limitations, and concerns about medical side effects often lead women to decline pharmacologic options.(9) These factors contribute to a persistent gap in effective pain management during labor, especially for women giving birth in resource-limited environments.

Given these challenges, there is an increasing demand for alternative, non-invasive, cost-effective, and culturally acceptable pain relief methods. One such promising approach is rose aromatherapy, a complementary therapy using essential oils derived from *Rosa damascena*. Rose essential oil has been shown to exert analgesic, antispasmodic, and anxiolytic effects through olfactory stimulation, which influences the limbic system particularly regions associated with pain perception and emotional regulation.(10) Previous clinical studies have reported that the use of rose aromatherapy during labor can significantly reduce perceived pain intensity, with pain score reductions of approximately 3–7 points on the Visual Analog Scale (VAS), particularly during active labor phases (cervical dilation of 4–10 cm). The use of rose aromatherapy can foster a feeling of calm in the physical, mind, and spiritual. Rose aromatherapy also has a local analgesic effect and antispasmodic. Based on several research results show the results that the administration of rose aromatherapy can reduce labor pain, with an average decrease in pain of 3.25 with opening 4-5cm, 5.11 at opening 6-7 cm, and 6.69 at the opening 8-10 cm.(11–13) These findings suggest that rose aromatherapy may offer an effective, non-pharmacologic option for labor pain relief that is safe, affordable, and well-aligned with the preferences of many birthing women in diverse settings.

Although several clinical studies have demonstrated that rose aromatherapy can reduce labor pain by approximately 3–7 points on the Visual Analog Scale, most Indonesian studies (e.g., Sekayu, Ciputat) used small sample sizes and quasi-experimental or pre-post designs without randomized control groups.(14,15) Meanwhile, a randomized controlled trial in 2024 investigated Damask rose aromatherapy on primiparous women during latent labor and found significantly lower pain and anxiety scores at 60 and 120 minutes post-intervention compared to placebo and control groups.(11) Furthermore, a recent 2023 meta-analysis of 14 randomized controlled trials using various essential oils (including rose) confirmed that aromatherapy can effectively reduce labor pain in 11 of those studies, though

few isolate the specific effect of rose aromatherapy, there have been no well-tested, context-specific randomized controlled trials (RCTs) evaluating the efficacy of rose aromatherapy during active phase I of labor.(16) Research in this context would provide important evidence for its application as a culturally acceptable, low-risk, and cost-effective nonpharmacological intervention. Therefore, this study aims to examine the effect of rose aromatherapy on the intensity of labor pain during the active phase I among women giving birth.

METHOD

This study employed an analytic, pre-experimental one-group pretest–posttest design, conducted at Garuda Public Health Center, Bandung, Indonesia. The study was carried out from January to May 2024, targeting laboring women in the first stage of the active phase of labor. A total of 36 pregnant women in the active phase I of labor (cervical dilation 4–7 cm) were recruited using purposive sampling. The inclusion criteria were: age between 18–35 years,singleton pregnancy with cephalic presentation, term gestation (37–42 weeks), spontaneous onset of labor, no previous cesarean section, no known allergies to essential oils, and willingness to participate by signing informed consent. The exclusion criteria included use of pharmacological analgesia during labor, high-risk pregnancy (e.g., preeclampsia, placenta previa), respiratory or neurological disorders, and olfactory impairment. The intervention consisted of rose aromatherapy administered using a diffuser containing 4 drops (approximately 0.2 mL) of *Rosa damascena* essential oil diluted in 100 mL of warm water. The diffuser was placed at a distance of approximately 30–50 cm from the participant's head. Aromatherapy was administered for 10 minutes in a calm and private labor room during the active phase of labor. No other pain relief interventions were provided during this time. Labor pain intensity was measured using the Numeric Rating Scale (NRS), which ranges from 0 (no pain) to 10 (worst possible pain). Each participant was asked to report her pain level immediately before and immediately after the 10-minute aromatherapy session. The NRS is widely validated for pain assessment in obstetric populations and is recommended by the American Pain Society. Data were analyzed using IBM SPSS Statistics version 28. A paired t-test was performed to assess the mean difference in labor pain scores before and after aromatherapy, assuming normal distribution. If the data were non-normally distributed, the Wilcoxon signed-rank test was used instead. A p-value of less than 0.05 was considered statistically significant.

RESULTS

A total of 36 participants were included in the analysis. The mean labor pain score before the intervention (pre-test) was 8.58 ± 0.94, with a median of 9.00, indicating severe pain levels during the first stage of active labor. After 10 minutes of rose aromatherapy application, the mean pain score decreased to 7.25 ± 1.38, with a median of 7.00, suggesting a moderate pain level (Table 1).

Tabel 1. Descriptive Statistics of Labor Pain Scores Before and After Rose Aromatherapy

Measurement	Mean ± SD	Median	Min–Max
Pre-test	8.58 ± 0.94	9.00	7–10
Post-test	7.25 ± 1.38	7.00	5–10

The average labor pain score decreased from 8.58 to 7.25 after administration of rose aromatherapy.

Tabel 2. Normality Test of Labor Pain Score Differences (Shapiro–Wilk Test)

Variable	W (Shapiro–Wilk)	p-value	Normality Assumption
Difference (Pre – Post)	0.935	0.024	Not normally distributed

Normality testing using the Shapiro–Wilk test revealed that the difference between pre- and post-intervention scores was not normally distributed (W = 0.935, p = 0.024). Therefore, the Wilcoxon Signed-Rank Test was applied to compare the two measurements. The test showed a statistically significant reduction in labor pain scores following rose aromatherapy (Z = −5.105, p < 0.001) (Table 3).

Tabel 3. Comparison of Labor Pain Scores Before and After Aromatherapy

Test Type	Test Statistic	df/Z-value	p-value	Interpretation
Wilcoxon Signed-Rank Test	-5.105	Z = -5.105	0.000	Significant difference (p < 0.05)

These findings indicate that rose aromatherapy effectively reduces the intensity of labor pain during the active phase of the first stage of labor. The result supports the potential use of aromatherapy as a complementary non-pharmacological intervention for pain management in maternity care settings.

DISCUSSION

This study aimed to evaluate the effect of rose aromatherapy on labor pain during the active phase I of labor. The findings demonstrate that rose aromatherapy significantly reduced the intensity of labor pain among parturient women. The average pain score decreased from 8.58 (±0.94) before the intervention to 7.25 (±1.38) after the 10-minute aromatherapy session. Given the non-normal distribution of the pain score differences (p = 0.024, Shapiro–Wilk test), the Wilcoxon Signed-Rank Test was applied, yielding a statistically significant result (Z = -5.105; p < 0.001). This confirms the hypothesis that rose aromatherapy has a measurable and meaningful impact on reducing perceived labor pain. These results align with prior research demonstrating the analgesic and anxiolytic effects of *Rosa damascena* essential oil. The reduction in pain perception can be attributed to the action of aromatic compounds stimulating the olfactory system, which in turn activates the limbic system particularly the hypothalamus and pituitary gland leading to the release of endorphins and a reduction in pain and anxiety during uterine contractions.(16) Thus, the physiological mechanisms underlying rose aromatherapy offer a credible explanation for its observed clinical effect.

Our findings align closely with several recent randomized controlled trials and meta-analyses demonstrating the effectiveness of rose (Damask rose) aromatherapy in reducing pain and anxiety during labor. Hamdamian et al. (2024) conducted a randomized trial among primiparous women during the latent phase of the first stage of labor. Inhalation aromatherapy with *Rosa damascena* significantly reduced pain and anxiety scores at 60 and 120 minutes compared to both placebo and control groups. Despite focusing on an earlier labor phase and employing a longer intervention exposure (~30 minutes), their results support the analgesic and anxiolytic effect that we similarly observed during the active phase I.(13) A 2023 meta-analysis of 14 randomized controlled trials involving various essential oils including rose report that aromatherapy consistently reduced labor pain in 11 studies, confirming its general efficacy as a non-pharmacologic method.(16) Our study echoes this aggregate evidence, specifically reinforcing the utility of rose aromatherapy in active labor. Although studies in other clinical contexts (e.g. orthopedic

surgery and cesarean sections) have highlighted rose essential oil's effectiveness in lowering both pain and anxiety levels, our findings extend this evidence into the domain of childbirth care, affirming its relevance for obstetric practice.

Unlike many prior investigations, which often focused on latent labor or postoperative pain contexts, our study is one of the few to evaluate rose aromatherapy during cervical dilation 4–7 cm, the active phase I. This specificity helps fill a gap in obstetric aromatherapy literature. Furthermore, although our study utilized a one-group pretest–posttest approach rather than a randomized trial, the magnitude and statistical significance of pain reduction ($Z = -5.105$, $p < 0.001$) are consistent with more rigorous designs, suggesting robust clinical efficacy.

While prior studies have demonstrated the analgesic potential of rose aromatherapy, variations in intervention duration, administration method, and study setting contribute to the diversity of outcomes. In our study, rose aromatherapy was administered via inhalation for 10 minutes during the active phase I (cervical dilation 4–7 cm), resulting in a significant reduction in pain scores (from a mean of 8.58 to 7.25). This relatively short intervention duration is notable when compared with other studies that applied aromatherapy for 20–30 minutes or repeatedly over longer periods.[11,12,15] Despite the brief exposure, our results suggest that even short-duration aromatherapy may be sufficient to induce a meaningful reduction in labor pain, which holds clinical value, especially in resource-limited primary care settings where extended monitoring or intervention administration may not be feasible. This contrasts with higher-level hospital settings where longer or continuous aromatherapy sessions may be more practical. Furthermore, cultural familiarity and acceptability play a crucial role in the integration of complementary therapies in maternal care. In Indonesia, particularly in community-based facilities like PHC (Puskesmas), there is a strong tradition of integrating natural and herbal remedies in perinatal care. This cultural alignment likely contributed to the acceptability and compliance observed during the study, as mothers were generally receptive to aromatherapy using rose essential oil a scent often associated with calm and spiritual wellness in local practices.

By contrast, studies conducted in Western contexts may encounter greater skepticism toward non-pharmacologic interventions due to different clinical guidelines, patient expectations, and medicalization of childbirth. This disparity highlights a critical need for rigorous, culturally sensitive research into non-pharmacological pain management strategies like rose aromatherapy, particularly in settings where pharmacological options are limited or disfavored.[17,18] Therefore, exploring the efficacy of rose aromatherapy offers a viable solution to address the existing gaps in pain management and to enhance maternal well-being during labor.[19] This is particularly pertinent given the subjective nature of pain and the potential for non-pharmacological methods like aromatherapy to offer personalized, empowering experiences for birthing individuals.[20] Such approaches not only provide comfort but also contribute to a holistic birthing experience by engaging multiple sensory pathways and potentially reducing anxiety.[21] Therefore, while rose aromatherapy may be globally applicable, its practical implementation and impact are likely enhanced in settings where traditional or holistic approaches are culturally embedded and endorsed by healthcare providers.

This highlights the importance of tailoring pain management strategies to both clinical and cultural contexts, ensuring interventions are not only effective but also acceptable and feasible within the specific infrastructure and patient beliefs of a given health system. The statistically significant reduction in labor pain following the application of rose aromatherapy suggests that this non-pharmacological intervention may be an effective and low-cost strategy to improve maternal comfort during childbirth. From a clinical standpoint, a decrease of over 1 point on the NRS scale particularly in a labor setting can be considered clinically meaningful, especially given the intervention's simplicity, safety, and acceptability. For midwives and maternity care providers, rose aromatherapy offers a practical and non-

invasive method of labor pain management that can be easily implemented in primary care settings, especially where pharmacologic pain relief is limited or culturally less acceptable. The incorporation of such complementary therapies aligns with WHO recommendations for respectful maternity care, emphasizing individualized, woman-centered approaches that enhance comfort and reduce unnecessary interventions. For patients, the use of rose aromatherapy may provide not only physical relief but also a sense of emotional calmness, helping them cope better with labor contractions. This may improve overall birth experience, increase satisfaction with intrapartum care, and potentially reduce stress-induced complications during labor.

This study, while demonstrating significant results, is not without limitations. The pre-experimental one-group pretest-posttest design limits causal inference, as the absence of a control group prevents the exclusion of external factors that may have influenced the observed reduction in pain levels. Future studies should employ randomized controlled trials (RCTs) to establish stronger causal relationships between rose aromatherapy and labor pain reduction. The sample size (n = 36), although adequate for preliminary findings, may not represent the broader population of laboring mothers in diverse geographical or socioeconomic contexts. A larger and more heterogeneous sample is recommended to enhance generalizability. The duration of aromatherapy exposure was fixed at 10 minutes, and the effects of varying doses or repeated applications were not assessed. Future research should explore dose-response relationships, including frequency, concentration, and duration of rose aromatherapy, to determine the optimal therapeutic regimen. In addition, subjective pain assessment using the Numeric Rating Scale (NRS), while standard, may be influenced by individual pain thresholds, cultural factors, or psychological states. Complementary qualitative approaches, such as maternal satisfaction or emotional responses, could enrich the understanding of aromatherapy's holistic impact. Lastly, the study was conducted in a single health center in an urban Indonesian setting, which may not reflect the conditions in rural or high-risk maternity care contexts. Multicenter studies comparing outcomes across different levels of health services and cultural backgrounds would provide a more comprehensive view of the applicability and scalability of aromatherapy interventions. Future research should also consider exploring the mechanisms of action of rose essential oil particularly its potential influence on neurochemical responses such as endorphin and oxytocin release through biochemical or physiological markers.

CONCLUSION

This study demonstrated that rose aromatherapy significantly reduced labor pain among mothers in the active phase I of labor, with a mean pain score reduction from 8.58 to 7.25 (p < 0.05). Despite this, a subset of primigravida mothers experienced no change in pain levels, possibly due to lack of prior childbirth experience and heightened anxiety. These findings suggest that rose aromatherapy may serve as a safe, culturally acceptable, and non-pharmacological intervention for labor pain management in primary healthcare settings. Further research using randomized controlled trials and larger sample sizes is recommended to explore the effect across different parity levels and to determine optimal duration and concentration of the intervention.

AUTHOR CREDIT STATEMENT
JAN: Conceptualization, Methodology, Data Collection, Formal Analysis, Writing – Original Draft, Writing – Review & Editing, Visualization; **DH, SS**: Supervision, Validation.

DECLARATION OF COMPETING INTEREST

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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