



Comparison of Two Modified Lavender Aromatherapy Techniques as Complementary Therapy for Labor Pain in Active First-Stage Labor

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Abstract

Research Objective: This study aimed to compare changes in labor pain after two modified lavender aromatherapy techniques among primiparous women in the active phase of first-stage labor. **Methodology:** A quantitative quasi-experimental, non-randomized two-group pretest-posttest design was used. Fifty participants were divided into an inhalation-massage group (n = 25) and an inhalation-warm-compress group (n = 25). Pain intensity was assessed before and after the interventions using the Numerical Rating Scale (NRS). Paired t-tests examined within-group changes, and an independent t-test compared mean pain reductions between groups. **Results:** Mean pain scores decreased from 7.60 to 5.20 in the inhalation-massage group and from 7.56 to 5.72 in the inhalation-warm-compress group (both $p < 0.001$). The observed mean reduction was greater in the inhalation-massage group than in the inhalation-warm-compress group (2.40 versus 1.84; $p < 0.001$). **Conclusion:** Both modified lavender aromatherapy combinations were associated with reduced labor pain. The inhalation-massage combination showed a larger observed mean reduction, although the findings should be interpreted within the limitations of a non-randomized quasi-experimental study.

Keywords: *Active phase labor; labor pain; lavender aromatherapy; midwifery care; non-pharmacological therapy.*

INTRODUCTION

Labor is a physiological process involving the expulsion of the fetus, placenta, and membranes from the uterus at term pregnancy (Nurjasmi et al., 2023). During labor, uterine contractions and cervical dilatation commonly cause significant pain and discomfort. Labor pain is considered one of the most intense forms of pain experienced by women and may lead to anxiety, stress, fatigue, and prolonged labor if not managed appropriately (Sutiyono, 2021). Uncontrolled labor pain may trigger physiological stress responses, including increased blood pressure, pulse rate, catecholamine secretion, and hyperventilation, which can negatively affect uterine contractions and fetal well-being. Therefore, effective pain management is essential in improving maternal comfort and supporting a safe labor process (Sutiyono, 2021).

Labor pain management can be performed using pharmacological and non-pharmacological approaches. Non-pharmacological methods are widely preferred because they are simple, inexpensive, easy to apply, and have minimal side effects for both mother and fetus. One commonly used complementary therapy is lavender aromatherapy (Karatopuk & Yarıcı, 2023).

Lavender essential oil contains linalool and linalyl acetate, compounds associated with relaxation and modulation of pain perception through olfactory and limbic pathways. Clinical studies have reported reductions in perceived labor pain following lavender inhalation or massage, although the magnitude of benefit may depend on the administration method and accompanying supportive care (Yazdkhasti & Pirak, 2016; Tanvisut et al., 2018; Karatopuk & Yarıcı, 2023).

Adequate labor-pain management is an important component of respectful maternity care because severe pain may increase anxiety, physiological stress, and dissatisfaction with the childbirth

experience (Pietrzak et al., 2022). Complementary approaches should therefore be applied as supportive measures alongside routine clinical monitoring rather than as substitutes for indicated obstetric care.

Lavender inhalation may promote relaxation through olfactory stimulation, while massage and warm compresses may provide additional tactile, circulatory, and muscle-relaxation effects. Because each combined technique contains more than one component, its observed effect reflects the complete intervention rather than lavender aromatherapy alone.

Previous studies have often evaluated inhalation, massage, or warm-compress approaches separately. Direct comparison of two combined lavender techniques remains limited, particularly in Indonesian primary-care maternity settings (Utari et al., 2024). Comparing inhalation-massage with inhalation-warm compress may therefore provide practical preliminary evidence for selecting a complementary approach.

Based on preliminary observations conducted at the PONED Room of UPTD Karangnunggal Public Health Center, Tasikmalaya Regency, many laboring women experienced moderate to severe pain during the active phase of labor. This condition highlights the importance of safe and effective complementary interventions to reduce labor pain.

Therefore, this study aimed to compare changes in labor pain following inhalation-massage and inhalation-warm-compress lavender aromatherapy among primiparous women in the active phase of first-stage labor at the PONED Room of UPTD Karangnunggal Public Health Center, Tasikmalaya Regency, in 2026.

METHODS

This study employed a quasi-experimental, non-randomized two-group pretest-posttest design. It was conducted at the PONED Room of UPTD Karangnunggal Public Health Center, Tasikmalaya Regency, in 2026. Ethical approval was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Tasikmalaya (Approval No. DP.04.03/F.XVIII.1.3.1/226/2026; approved May 31, 2026). The previously stated month-specific research period was omitted to avoid inconsistency with the documented approval date.

The population comprised primiparous women in the active phase of first-stage labor who met the study criteria. Fifty participants were recruited through purposive sampling and placed into two active intervention groups, with 25 participants in each group. Eligible participants were able to communicate their pain intensity and provided written consent. Women with an obstetric emergency, clinical instability, or a contraindication to lavender exposure, massage, or warm-compress application were not included. Because allocation was not reported as randomized, the study is interpreted as a non-randomized comparison.

Pain intensity was measured using the Numerical Rating Scale (NRS) immediately before and after the assigned intervention. Both groups received lavender inhalation according to the study procedure. One group received lavender inhalation combined with massage, whereas the other received lavender inhalation combined with a warm compress. Routine intrapartum monitoring and clinically indicated care continued in both groups. Participants were observed for discomfort, skin or respiratory reactions, and maternal or fetal conditions requiring discontinuation of the complementary procedure. Data were analyzed using SPSS. Paired t-tests were used for within-group pretest-posttest comparisons, and an independent t-test compared mean pain-score reductions between groups, with statistical significance set at $p < 0.05$.

RESULTS

Labor Pain Scores Before and After Intervention.

Before the intervention, most respondents in both groups experienced moderate to severe labor pain. After administration of lavender aromatherapy, pain scores decreased in both intervention groups.

Table 1. Comparison of Labor Pain Scores Before and After Intervention

Group	Pretest Mean	Posttest Mean	SD	p-value
Inhalation– Massage	7.60	5,20	0,764	0,000
Inhalation–Warm Compress	7.56	5,72	0,651	0,000

Paired T-Test, significance level $p < 0.05$

Within-group analysis showed statistically significant reductions in pain scores in both active intervention groups (both $p < 0.001$). These findings indicate improvement after each combined intervention, but they do not isolate the contribution of lavender from that of massage or warm-compress application.

Comparison of Intervention Effectiveness

The inhalation–massage group demonstrated a greater reduction in mean pain scores compared with the inhalation–warm compress group.

Table 2. Comparison of Mean Pain Reduction Between Intervention Groups

Variable	Group	Mean	SD	SE	p-value	n
Pain Score	Inhalation–Massage	2,400	0,707	0,123	0,000	25
	iInhalation–Warm Compress	1,840	0,688	0,126		25

Independent T-Test, significance level $p < 0.05$

The inhalation-massage group showed a larger observed mean pain reduction than the inhalation-warm-compress group (2.40 versus 1.84; $p < 0.001$). This result indicates a difference between the two combined techniques within this study sample.

DISCUSSION

This study found significant within-group reductions in labor pain after both inhalation-massage and inhalation-warm-compress lavender aromatherapy. The inhalation-massage group also showed a larger observed mean reduction. Because the study was non-randomized and compared two active combinations, the findings should be interpreted as preliminary comparative evidence rather than definitive proof that one component caused the observed change.

The observed reductions may reflect several complementary mechanisms. Lavender inhalation may promote relaxation through olfactory and limbic pathways, while massage or warm compresses may reduce muscle tension, improve comfort, and modulate pain transmission through tactile stimulation and gate-control mechanisms (Modoor et al., 2021).

The findings are generally consistent with previous studies reporting lower perceived labor pain following lavender aromatherapy or supportive tactile interventions (Yazdkhasti & Pirak, 2016; Tanvisut et al., 2018; Karatopuk & Yarıcı, 2023). However, differences in intervention dose, duration, labor progression, and concurrent care should be considered when comparing results across studies.

The greater observed reduction in the inhalation-massage group may be related to the combined effects of olfactory and tactile stimulation. Massage may promote relaxation and provide competing sensory input, whereas a warm compress may primarily support local comfort and muscle relaxation.

Nevertheless, this study cannot determine whether the difference was attributable to lavender, massage technique, warm-compress application, provider interaction, or other clinical factors.

Both combined techniques may be considered supportive non-pharmacological options when used by trained providers alongside routine maternal and fetal monitoring. Selection should consider maternal preference, clinical condition, available resources, and any sensitivity to essential oils or heat.

The findings support further evaluation of complementary labor-pain approaches in maternity care. Claims of maternal-fetal safety should remain cautious because the sample was small and the manuscript did not provide detailed adverse-event data.

This study had several limitations. The sample was relatively small and drawn from one healthcare center, which limits generalizability. Group allocation was non-randomized, pain was self-reported, and the design did not include a routine-care-only group. Because both groups received lavender inhalation together with another modality, the individual effects of lavender, massage, and warm compress could not be separated. Potential differences in cervical dilatation, contraction intensity, concurrent support, and routine care may also have influenced pain scores. In addition, detailed assumption-test statistics, confidence intervals, and standardized effect-size estimates were not available in the submitted manuscript and were not reconstructed.

CONCLUSION

Both inhalation-massage and inhalation-warm-compress lavender aromatherapy were associated with significant reductions in labor pain during the active phase of first-stage labor. The inhalation-massage group showed a larger observed mean reduction than the inhalation-warm-compress group. These techniques may be considered as complementary options alongside standard intrapartum care, but the findings are preliminary and should be confirmed through randomized controlled studies with standardized intervention protocols and detailed safety monitoring.

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Informed Consent Statement: Written informed consent was obtained from all participants before data collection.

Data Availability Statement: The data presented in this study are available from the corresponding author upon reasonable request. The data are not publicly available due to ethical and privacy considerations related to participant confidentiality.

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