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Effectiveness of Combined Effleurage Massage and Lavender Aromatherapy for Back Pain in Third-Trimester Pregnant Women

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Abstract

Background: Back pain is common in the third trimester and may interfere with mobility, sleep, and maternal comfort. Combining effleurage massage with lavender aromatherapy offers a non-pharmacological approach through tactile stimulation and olfactory relaxation. Purpose: To evaluate the effectiveness of combined effleurage massage and lavender aromatherapy in reducing back-pain intensity among third-trimester pregnant women. Methods: A quasi-experimental pretest-posttest control-group study included 56 participants recruited by consecutive sampling and alternately allocated to intervention and control groups, with 28 participants per group. The intervention group received three 15-minute combined sessions on days 1, 3, and 5. Pain intensity was measured using the Numeric Rating Scale. Wilcoxon signed-rank, Mann-Whitney U, and Spearman correlation tests were used. Results: Median pain in the intervention group decreased from 5 to 2 ($p<0.001$), whereas the control group decreased from 4.5 to 3.5 without statistical significance ($p=0.083$). Pain reduction differed significantly between groups ($p<0.001$). Age ($p=0.988$) and parity ($p=0.934$) were not associated with pain reduction. Conclusion: Combined effleurage massage and lavender aromatherapy was effective in reducing back-pain intensity among third-trimester pregnant women.

Keywords: back pain, effleurage massage, lavender aromatherapy, pregnancy, third trimester

Introduction

Back pain is one of the most frequent musculoskeletal complaints during pregnancy. The global prevalence of pregnancy-related low back pain has been estimated at

approximately 40.5%, increasing to 47.8% in the third trimester. [1] Uterine enlargement, altered weight distribution, anterior shift of the center of gravity, increased lumbar lordosis, ligament laxity, and paraspinal muscle tension make symptoms more likely to intensify late in pregnancy. Individual factors such as age, parity, body mass index, physical activity, occupation, and previous back pain may also influence symptoms. [2]

Persistent back pain can restrict mobility, interfere with daily activities and sleep, increase fatigue, and reduce quality of life during pregnancy. [3] Non-pharmacological management is therefore important as an adjunct to antenatal care without increasing medication exposure. Pregnancy massage, including effleurage, has been reported to reduce back pain through muscle relaxation, sensory stimulation, and improved comfort. [4,14,16]

Lavender aromatherapy is also used to promote relaxation. Linalool, a major lavender constituent, is associated with calming effects, while inhaled aroma engages olfactory pathways and the limbic system, potentially reducing tension and pain perception. [12,15] Combining effleurage with lavender may therefore provide simultaneous physical and psychological stimulation.

Several studies have reported reduced pain following combined effleurage massage and lavender aromatherapy. [5,6,7,8] However, many previous studies used one-group designs, making it difficult to distinguish treatment effects from natural symptom fluctuation during pregnancy. Controlled evidence remains more limited. In the study area, a preliminary assessment of 15 third-trimester pregnant women found that 12 experienced back pain, with a median NRS score of 4, and none had received a structured combined intervention. This study aimed to evaluate the effectiveness of combined effleurage massage and lavender aromatherapy in reducing back-pain intensity among third-trimester pregnant women by comparing an intervention group with a control group.

Method

1. Research design

This quantitative study used a quasi-experimental pretest-posttest control-group design. Two groups were observed over the same period: the intervention group received combined effleurage massage and lavender aromatherapy, while the control group did not receive the combined intervention during the study period.

2. Setting and samples

The study was conducted from June to August 2026 within the service area of a primary health-care facility in Purwakarta Regency, West Java, Indonesia. The thesis identified a population of 98 third-trimester pregnant women with back pain. Sample size was calculated using the Slovin formula with a 10% error tolerance and increased by 10% for potential attrition, resulting in 56 participants. Participants were recruited by consecutive sampling and alternately allocated in a 1:1 ratio to 28 intervention and 28 control participants. Main eligibility criteria included gestational age 28-40 weeks, physiological back pain with NRS 1-6, singleton live pregnancy, stable maternal and fetal condition, absence of labor signs, non-obese status based on pre-pregnancy records, no lavender allergy/sensitivity, and willingness to complete the study. Women with pregnancy complications, severe pain (NRS 7-10), chronic musculoskeletal/neurological disorders, skin lesions at the massage site, aroma-triggered asthma, or current analgesic/specific back-pain therapy were excluded.

3. Intervention

The intervention group received combined effleurage massage and inhaled lavender aromatherapy three times in one week on days 1, 3, and 5. Each session lasted 15 minutes. Massage was applied to the back, particularly alongside the spine and lumbosacral area, using gentle, long, regular, rhythmic strokes with light-to-moderate pressure. Three drops of lavender essential oil were placed on cotton or an inhalation medium positioned approximately 20 cm from the participant during massage. The control group continued standard antenatal care without the combined intervention during the observation period. After completion of all study measurements, control participants could be offered one combined session.

4. Measurement and data collection

Pain intensity was measured using the 0-10 Numeric Rating Scale (NRS), where 0 indicates no pain and 10 represents the worst imaginable pain. Numeric pain scales have demonstrated good reliability and responsiveness for detecting changes in pain intensity. [13] The primary pretest score was obtained before the first session on day 1 and the primary posttest score after the third session on day 5. Age and parity were recorded as potential confounding variables. Data were obtained through interview, maternal health records/antenatal records, NRS forms, and intervention monitoring forms.

5. Data analysis

NRS scores were treated as ordinal data; therefore, the main analyses used non-parametric tests. Data were summarized using median, minimum, and maximum. Within-group pretest-posttest changes were analyzed using the Wilcoxon signed-rank test. Baseline NRS and pain-score reduction (delta) were compared between groups using the Mann-Whitney U test. Associations of age and parity with pain reduction were examined using Spearman correlation. Statistical significance was set at $\alpha=0.05$.

Results

A total of 56 participants were included in the analysis, with 28 in the intervention group and 28 in the control group. Results are presented according to pain outcomes and potential confounding variables relevant to the study objectives.

Table 1. Pain intensity before and after intervention in the intervention group

Measurement	n	Median	Minimum	Maximum
Pretest	28	5	3	6
Posttest	28	2	1	3
Reduction	28	3	1	4

Wilcoxon signed-rank test: Z=-4.68; p<0.001.

Median pain intensity in the intervention group decreased by 3 points. All 28 participants had lower posttest scores, with no ties or increases.

Table 2. Pain intensity before and after observation in the control group

Measurement	n	Median	Minimum	Maximum
Pretest	28	4.5	3	6
Posttest	28	3.5	2	7
Reduction	28	1	-1	1

Wilcoxon signed-rank test: Z=-1.732; p=0.083. Eighteen participants decreased, nine increased, and one remained unchanged.

The control group showed a one-point median reduction, but the change was not statistically significant.

Table 3. Comparison of baseline pain and pain reduction between groups

Variable	Group	Median	Mean rank	U	Z	p
Baseline NRS	Control	4.5	27.32	359	-0.566	0.571
	Intervention	5	29.68			
NRS reduction	Control	1	15.14	18	-6.329	<0.001
	Intervention	3	41.86			

Mann-Whitney U test.

Baseline NRS did not differ significantly between groups. In contrast, NRS re-

duction was significantly greater in the intervention group than in controls.

Table 4. Associations of age and parity with NRS reduction

Variable	n	Between-group balance p	Spearman r_s	p
Age	56	1	-0.002	0.988
Parity	56	1	-0.011	0.934

Between-group balance assessed using Mann-Whitney U; association with NRS reduction assessed using Spearman correlation.

Age and parity were similarly distributed between groups and were not significantly associated with the magnitude of pain reduction.

Discussion

The principal finding was a substantially greater reduction in pain in the intervention group than in the control group. All intervention participants showed lower posttest NRS scores, with the median decreasing from 5 to 2 and a significant Wilcoxon result ($p<0.001$). In the control group, the median decreased from 4.5 to 3.5, but individual changes were inconsistent and the Wilcoxon test was not significant ($p=0.083$). Baseline pain did not differ significantly between groups ($p=0.571$), indicating relatively comparable starting pain levels.

Physiologically, effleurage provides mechanical stimulation that can promote muscle relaxation, local circulation, comfort, and modulation of nociceptive transmission. Studies of effleurage among pregnant women have reported reduced back pain after treatment. [4,16] Lavender may complement this through olfactory pathways associated with relaxation and reduced emotional tension. Recent evidence also suggests that lavender may reduce anxiety, stress, and sleep disturbance during pregnancy. [12,15] Combining these approaches may therefore influence both physical and psychological dimensions of pain.

The present findings are consistent with Lestari et al., who reported reduced lower-back pain among pregnant women receiving effleurage with lavender essential oil. [5] Sanjaya et al., Wahyuni et al., and Rahayuni et al. likewise reported pain reductions after combined effleurage and lavender aromatherapy. [6,7,8] Nofriati et al. found a beneficial effect from a more complex combination of effleurage, friction massage, and lavender. [9] Suryani et al. reported that both effleurage and relaxation techniques reduced pain without a significant between-group difference, highlighting the importance of the comparator intervention in determining observed effect size. [10]

The control group included participants whose pain improved, worsened, or remained unchanged, illustrating that pregnancy-related back pain may fluctuate with activity, posture, rest, and biomechanical adaptation. [2,3] Thus, the one-point median reduction in controls cannot be interpreted as a treatment effect, particularly because p=0.083. The highly significant between-group difference in pain reduction (p<0.001), with a median reduction of 3 in the intervention group versus 1 in controls, supports an additional benefit of the combined intervention beyond natural fluctuation during the observation period.

Age and parity were not significantly associated with pain reduction (p=0.988 and p=0.934, respectively). This differs from reviews identifying age and parity as factors potentially related to pregnancy-related back pain. [2] The discrepancy may reflect the different outcome: this study assessed the magnitude of pain reduction rather than occurrence of back pain. Both variables were also similarly distributed between groups. However, because the analysis was bivariate, the findings do not establish that age and parity are definitively absent as confounders.

Clinically, combined effleurage massage and lavender aromatherapy may be considered as a complementary option in antenatal care for appropriately screened third-trimester pregnant women. The intervention should be delivered using a standardized procedure with attention to maternal-fetal safety and should not replace medical assessment when pain is severe, persistent, or accompanied by obstetric warning signs.

Limitation

The study used a quasi-experimental design with alternating allocation rather than full randomization, leaving a possibility of selection bias. Pain intensity was assessed using the NRS and therefore depended on participants' subjective perception. The intervention period was short, consisting of three sessions over five days with monitoring to day 7, so long-term durability was not assessed. Potential confounding analysis focused only on age and parity, while physical activity, gestational weight gain, sleep quality, occupation, and previous back pain may also influence symptoms. Because massage and aromatherapy were delivered as a combined intervention, their individual contributions could not be separated.

Conclusion

Combined effleurage massage and lavender aromatherapy produced a greater re-

duction in back-pain intensity than the control condition among third-trimester pregnant women. The change in the control group was not statistically significant, and neither age nor parity was associated with the magnitude of pain reduction. The combined intervention has potential as a complementary antenatal-care strategy when accompanied by appropriate screening, standardized procedures, and safety monitoring. Future studies should use randomized allocation, longer follow-up, multivariable analysis, and separate effleurage-only and lavender-only groups to clarify individual treatment contributions.

Ethical Considerations

Formal ethical clearance was not required by the academic institution for this undergraduate research. Nevertheless, the study was conducted in accordance with ethical principles for research involving human participants. All potential participants received information regarding the purpose, procedures, benefits, possible discomforts, confidentiality, and voluntary nature of participation. Written informed consent was obtained before participation, and participants were informed of their right to refuse or withdraw from the study at any time without affecting the health services they received. Participant confidentiality was maintained by using study codes instead of personal identifiers.

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Conflict of Interest

The authors declare that they have no conflicts of interest.

Author Contribution

Risty Nurdianty: Conceptualization, methodology, data collection, data analysis, interpretation of results, writing of the original draft, and manuscript revision.

Armiyanti: Supervision, methodology, validation, interpretation of results, critical review, and manuscript revision.

Maulida Lathifah: Supervision, methodology, validation, critical review, and manuscript revision.

References

1. Salari N, Mohammadi A, Hemmati M, Hasheminezhad R, Kani S, Shohaimi S, et al. The global prevalence of low back pain in pregnancy: a comprehensive systematic review and meta-analysis. BMC Pregnancy Childbirth. 2023;23:830. doi:10.1186/s12884-023-06151-x.
2. Arummega MN, Rahmawati A, Meiranny A. Faktor-faktor yang memengaruhi nyeri punggung ibu hamil trimester III: literature review. Oksitosin J Ilm Kebidanan. 2022;9(1):14-30. doi:10.35316/oksitosin.v9i1.1506.
3. Fatmarizka T, Ramadanty RS, Khasanah DA. Pregnancy-related low back pain and the quality of life among pregnant women: a narrative literature review. J Public Health Trop Coast Reg. 2021;4(3):108-116. doi:10.14710/jphtcr.v4i3.10795.
4. Wati MF, Susilawati E, Yansartika, Yunizar A. Pengaruh masase effleurage terhadap intensitas nyeri punggung bawah ibu hamil trimester III. Femina J Ilm Kebidanan. 2021;1(2):25-29. doi:10.30867/fjk.v1i2.780.
5. Lestari KP, Oktaviana AW, Sulistyowati DID, Jauhar M. Effleurage massage with lavender (Lavandula lamiaceae) essential oil aromatherapy reduces pregnant women's lower back pain. KnE Life Sci. 2022;7(2):270-284. doi:10.18502/kls.v7i2.10321.
6. Sanjaya R, Febriyanti H, Rahayu KP. Combination of effleurage massage and lavender aromatherapy on back pain in pregnant women. J Aisyah J Ilmu Kesehat. 2022;7(S1):73-78. doi:10.30604/jika.v7iS1.1203.
7. Wahyuni CO, Sari WIPE, Kurniyati. Massage effleurage kombinasi aromaterapi lavender berpengaruh terhadap nyeri punggung ibu hamil. J Midwifery. 2025;13(1):51-61. doi:10.37676/jm.v13i1.8717.
8. Rahayuni LC, Sumawati NMR, Adhiestiani NME. Pengaruh kombinasi effleurage massage dan aromaterapi lavender terhadap nyeri punggung pada ibu hamil trimester III di RS X Denpasar. J Kesehat Teknol. 2025;2(1):1-8. doi:10.64879/jkestek.v2i1.34.
9. Nofriati ASU, Artifasari A. Pengaruh pemberian kombinasi teknik effleurage, friction massage, dan aromaterapi lavender terhadap penurunan nyeri punggung ibu hamil. J Promotif Preventif. 2025;8(1):176-184. doi:10.47650/jpp.v8i1.1746.
10. Suryani, Murtiyarini I, Herinawati, Romauli. Efektivitas massage effleurage dan teknik relaksasi terhadap tingkat nyeri punggung ibu hamil trimester III di Puskesmas Kenali Besar Kota Jambi. J Akademika Baiturrahim Jambi. 2022;11(1):109-115. doi:10.36565/jab.v11i1.501.
11. Theresia FI, Hendriani D, Syamsiah, Anggraini E. The effect of acupressure and lavender aromatherapy techniques to low back pain in pregnancy. J Kebidanan. 2023;12(2):168-174. doi:10.31983/jkb.v12i2.9276.
12. Vidal-García E, Vallhonrat-Bueno M, Pla-Consuegra F, Orta-Ramírez A. Efficacy of lavender essential oil in reducing stress, insomnia, and anxiety in pregnant women: a systematic review. Healthcare. 2024;12(23):2456. doi:10.3390/healthcare12232456.
13. Euasobhon P, Atisook R, Bumrungchatudom K, Zinboonyahgoon N, Saisavoey N, Jensen MP. Reliability and responsivity of pain intensity scales in individuals with chronic pain. Pain. 2022;163(12):e1184-e1191.

doi:10.1097/j.pain.0000000000002692.

14. Kamaliyah DU, Hutabarat HA, Darmawan RK, Rismayanti, Alpiah DN. Efektivitas prenatal massage terhadap nyeri punggung ibu hamil: literature review. J Multidisiplin Indones. 2023;2(10):3505-3511. doi:10.58344/jmi.v2i10.681.
15. Agustin CS, Ferina. Linalool in lavender aromatherapy reduce labor pain. SEAJOM Southeast Asia J Midwifery. 2022;8(2):67-74. doi:10.36749/seajom.v8i2.180.
16. Fitriani D, Silviani YE. Efektivitas massage effleurage terhadap nyeri punggung ibu hamil. J Kesehat Tambusai. 2023;4(4):4975-4980. doi:10.31004/jkt.v4i4.20057.