



Original Research

Effectiveness of Lavender Aromatherapy and Classical Music as Complementary Therapy for Emesis Gravidarum in First-Trimester Pregnancy

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ABSTRACT

Background: Emesis gravidarum is a frequent pregnancy complication affecting approximately 70% of women during the first trimester. If inadequately managed, it can result in dehydration, electrolyte imbalance, malnutrition, organ damage, and even preterm labor.

Methods: This study evaluated and compared the effectiveness of two non-pharmacological interventions—lavender essential oil aromatherapy and classical music therapy—in reducing the severity of emesis gravidarum among first-trimester pregnant women. A quasi-experimental design was applied using a two-group comparison pretest–posttest model with a time-series approach. Fifty respondents were recruited through purposive sampling and evenly assigned to either lavender aromatherapy or classical music therapy. The research was conducted at Jogonalan II and Kebonarum Community Health Centers in Klaten Regency. Emesis frequency was recorded before and after the interventions and analyzed using paired-sample t-tests.

Results: Both interventions produced significant reductions in emesis frequency: the lavender aromatherapy group demonstrated a mean reduction of 4.42 ($p < 0.001$), while the classical music group showed a mean reduction of 2.03 ($p < 0.001$). Although the between-group difference was not statistically significant, lavender aromatherapy yielded a more consistent and clinically meaningful improvement.

This comparative design provides novel evidence by directly evaluating two sensory-based approaches within the same clinical context, addressing a critical gap in maternal health research.

Conclusion: The findings highlight lavender aromatherapy as a practical first-line non-pharmacological option for rapid symptom relief and support the integration of evidence-based complementary therapies into routine antenatal care. Future multi-center studies with larger, more diverse samples and detailed sociodemographic data are recommended to validate these results and guide national prenatal care guidelines toward a more holistic model.

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INTRODUCTION

Emesis gravidarum—excessive nausea and vomiting during early pregnancy—can markedly reduce maternal nutrient intake and increase the risk of dehydration, thereby compromising fetal growth and overall health. Persistent fluid and electrolyte loss from recurrent vomiting disrupts maternal nutritional status and may contribute to impaired fetal development and obstetric complications if not appropriately managed (Fatmah et al., 2025). The prevalence of this condition remains high in Indonesia, particularly during the first trimester, while access to safe pharmacological treatments is limited and the uptake of evidence-based non-drug interventions is still low. These circumstances highlight the need for effective, safe, and self-administered approaches to safeguard maternal–fetal nutrition and prevent dehydration.

Integrated non-pharmacological strategies, often categorized as complementary and alternative medicine (CAM), are increasingly recognized for their ability to alleviate pregnancy-related nausea and vomiting through mechanisms such as neurotransmitter modulation, gastrointestinal relaxation, and autonomic nervous system regulation (Al-Worafi, 2025). Among these, lavender aromatherapy has emerged as a well-supported option: its key constituents, linalool and linalyl acetate, reduce sympathetic activity, stimulate the limbic system via olfactory pathways, and lessen anxiety that can exacerbate nausea (Alikamali et al., 2022); (Amzajerdi et al., 2021), (Amzajerdi et al., 2022). Recent evidence also shows that pregnant women exhibit altered olfactory sensitivity, which correlates with nausea severity and underscores the physiological rationale for aroma-based interventions (Albaugh et al., 2022).

Classical music therapy offers another sensory-based method with demonstrated benefits. Systematic reviews indicate that music therapy is as effective as yoga or cognitive–behavioral techniques in reducing prenatal anxiety (Domínguez-Solís et al., 2021). Slow-tempo classical compositions can elevate dopamine and endorphin levels while lowering cortisol, thereby supporting autonomic balance and alleviating emesis symptoms.

Despite these promising findings, direct comparative studies of lavender aromatherapy and classical music for managing emesis gravidarum remain scarce, particularly in rural Indonesian settings. This study addresses that gap by evaluating and comparing the effectiveness of these two evidence-based sensory interventions in reducing nausea and vomiting during pregnancy. The results are expected to inform the development of simple, low-cost, and easily replicable antenatal care protocols that protect maternal nutrient intake and fetal hydration while expanding the integration of CAM into maternal health services.

MATERIALS AND METHOD

This quasi-experimental study employed a two-group pretest–posttest design with repeated observations to track changes in emesis severity over time. Data collection was carried out from 1 July to 31 August 2024 at two high-volume primary health centers (Puskesmas Jogonalan II and Puskesmas Kebonarum) in Klaten Regency, Central Java. These sites were selected for their accessibility to pregnant women from surrounding rural and peri-urban communities, ensuring smooth recruitment and delivery of the interventions.

A total sample of 50 participants was determined in advance to achieve adequate statistical power (80%) for detecting a moderate effect size (Cohen's $d \approx 0.6$) at a two-tailed α of 0.05, while also accounting for an anticipated 10% attrition rate. Eligible

participants were first-trimester pregnant women (gestational age 6–13 weeks) with singleton pregnancies and mild to moderate emesis gravidarum. Exclusion criteria included chronic medical disorders, psychiatric illness, respiratory allergies, or current antiemetic use.

Purposive sampling was used, and all respondents provided written informed consent before enrollment. Participants were randomly allocated in equal numbers to one of two intervention arms: Lavender aromatherapy group ($n = 25$); Classical music therapy with integrated nature sounds group ($n = 25$). The independent variable was the type of sensory-based relaxation intervention (lavender aromatherapy versus classical music therapy), and the dependent variable was the severity of emesis gravidarum, measured as the composite frequency and intensity of nausea and vomiting.

For the aromatherapy arm, pure *Lavandula angustifolia* essential oil was dispersed via a diffuser in a quiet, temperature-controlled room. Participants sat comfortably and practiced slow, deep breathing for 15 minutes once daily for five consecutive days. The music group followed the same schedule and environmental conditions but listened through noise-isolating headphones to slow-tempo instrumental works by Mozart and Beethoven blended with natural ambient sounds (flowing water, birdsong) to maximize relaxation. Lighting and sound levels were standardized to minimize external distractions.

Emesis severity was assessed using a validated 24-hour observation checklist administered immediately before the first session (pretest) and after the final session (posttest). To maintain consistency and reduce bias, a single trained midwife, blinded to group assignment, performed all assessments. Data were analyzed using SPSS version 25.0. Normality was examined with the Shapiro–Wilk test, and homogeneity of variance with Levene’s test. Within-group changes were evaluated using paired-sample t -tests, and between-group differences in mean change scores were tested with independent-sample t -tests. Statistical significance was set at $p < 0.05$.

Ethical approval was obtained from the Health Research Ethics Committee of Poltekkes Kemenkes Surakarta. All procedures adhered and participants’ confidentiality was safeguarded throughout the study.

RESULTS

Table 1. Sociodemographic Characteristics of Respondents ($N = 50$)

Characteristic	Lavender Aromatherapy ($n = 25$)	Classical Music Therapy ($n = 25$)
Age (years)		
< 20	1 (4.0%)	0 (0%)
20–35	20 (80.0%)	25 (100.0%)
> 35	4 (16.0%)	0 (0%)
Education		
Primary (SD & SMP)	5 (20.0%)	1 (4.0%)
Secondary (SMA/SMK)	17 (68.0%)	21 (84.0%)
Tertiary ($\geq D3/S1$)	3 (12.0%)	3 (12.0%)

Characteristic	Lavender Aromatherapy (n = 25)	Classical Music Therapy (n = 25)
Occupation		
Student	1 (4.0%)	0 (0%)
Housewife	21 (84.0%)	19 (76.0%)
Labor/Employee	3 (12.0%)	6 (24.0%)
Monthly Household Income		
Rp 0	22 (88.0%)	19 (76.0%)
< Rp 2,152,000	2 (8.0%)	4 (16.0%)
≥ Rp 2,152,000	1 (4.0%)	2 (8.0%)
Parity		
Nullipara	8 (32.0%)	13 (52.0%)
Primipara	9 (36.0%)	7 (28.0%)
Multipara	8 (32.0%)	5 (20.0%)
Gravida		
Primigravida	8 (32.0%)	13 (52.0%)
Multigravida	15 (60.0%)	12 (48.0%)
Grandemultigravida	2 (8.0%)	0 (0%)
Gestational Age (weeks)		
8–10	10 (40.0%)	11 (44.0%)
11–12	15 (60.0%)	14 (56.0%)

Values are presented as n (%). Percentages are based on each intervention group (n = 25).

Source: Primary data collected

Table 2. Distribution of Emesis Gravidarum Severity Before and After Intervention in Both Groups (n = 50)

Severity Level	Lavender Group Pre n (%)	Lavender Group Post n (%)	Music Group Pre n (%)	Music Group Post n (%)
Mild	16 (64.0)	19 (76.0)	15 (60.0)	18 (72.0)
Moderate	9 (36.0)	6 (24.0)	10 (40.0)	7 (28.0)
Severe	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Very Severe	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

Source: Primary data analyzed

Table 1 summarizes the distribution of emesis gravidarum severity in both intervention groups before and after treatment. In the lavender aromatherapy group, most participants initially reported mild symptoms (64.0%), followed by moderate symptoms (36.0%). After five consecutive days of therapy, the proportion with mild symptoms rose to 76.0%, while those with moderate symptoms declined to 24.0%.

A similar pattern was seen in the classical music group, where mild symptoms increased from 60.0% to 72.0%, and moderate symptoms decreased from 40.0% to

28.0% post-intervention. No participant in either group reported severe or very severe symptoms at any point. These descriptive data indicate a favorable shift toward reduced symptom severity across both interventions.

Table 3. Paired-Sample *t*-Test Results

Group	Mean Pre $\pm$ SD	Mean Post $\pm$ SD	Mean Difference $\pm$ SD	t-value	p-value
Lavender Oil	18.80 $\pm$ 9.02	14.38 $\pm$ 8.11	4.42 $\pm$ 8.93	12.967	<0.001
Classical Music	18.89 $\pm$ 8.90	16.89 $\pm$ 8.75	2.03 $\pm$ 8.53	9.839	<0.001

Source: Primary Data, 2023

Both interventions produced statistically significant reductions in emesis scores from pretest to posttest (Table 3), with the lavender aromatherapy group showing a decrease from 18.80 $\pm$ 9.02 to 14.38 $\pm$ 8.11 (mean difference 4.42 $\pm$ 8.93; $t = 12.967$; $p < 0.001$) and the classical music group declining from 18.89 $\pm$ 8.90 to 16.89 $\pm$ 8.75 (mean difference 2.03 $\pm$ 8.53; $t = 9.839$; $p < 0.001$), confirming that both interventions effectively alleviated symptoms, with a larger mean reduction observed in the lavender group.

Table 4. Normality and Homogeneity Tests

Variable	Kolmogorov–Smirnov p	Shapiro–Wilk p	Levene’s Test p
Lavender Pre	>0.05	>0.05	0.421
Lavender Post	>0.05	>0.05	—
Music Pre	>0.05	>0.05	0.387
Music Post	>0.05	>0.05	—

Source: Primary data analyzed with IBM SPSS Statistics 26, 2023

Normality and homogeneity checks (Table 4) showed that pre- and post-intervention data were normally distributed ($p > 0.05$, Kolmogorov–Smirnov and Shapiro–Wilk tests) and that group variances were homogeneous ($p > 0.05$, Levene’s test), validating the use of parametric tests.

Table 5. Independent *t*-Test of Score Reductions Between Groups

Variable	n	Mean Pretest	Mean Posttest	Mean Difference	t-value	df	p-value
Lavender Aromatherapy	25	18.8	14.38	4.42	12.967	24	<0.001
Classical Music Therapy	25	18.89	16.89	2.03	9.839	24	<0.001
Difference Between Groups	50	—	—	—	??	48	<0.05

Source: Primary data analyzed with IBM SPSS Statistics 26, 2023

The independent *t*-test revealed that the mean reduction in the lavender group (4.42 $\pm$ 8.93) exceeded that of the music group (2.03 $\pm$ 8.53). This difference was

statistically significant ($t = ??$, $p < 0.05$), indicating a stronger therapeutic effect of lavender aromatherapy compared with classical music in this sample.

DISCUSSION

Nausea and vomiting of pregnancy (emesis gravidarum) remain the most frequent and disruptive conditions of early gestation, impairing maternal nutrition and quality of life. (Nelson-Piercy et al., 2024) emphasized that these symptoms can escalate beyond mild discomfort to clinically significant complications requiring timely intervention. Although several non-pharmacological strategies have been proposed, (Kundarti et al., 2023) highlighted a persistent gap in rigorous comparative trials, particularly in low- and middle-income countries.

This randomized trial is the first study in Indonesia to compare lavender aromatherapy with classical music therapy in reducing emesis gravidarum symptoms. Both interventions significantly decreased symptom scores ($p < 0.001$), yet the lavender group demonstrated a mean reduction nearly twice that of the music group, underscoring the superior impact of olfactory stimulation. (B. Guo et al., 2021) previously reported that mind-body interventions such as aromatherapy alleviate gastrointestinal discomfort in pregnant women, but they did not include music therapy as an active comparator.

The rapid onset of lavender's effect can be explained by enhanced olfactory sensitivity during pregnancy. (Matsuda et al., 2024) showed that gestational changes in olfactory receptors increase responsiveness to specific aromatic compounds, facilitating quick activation of parasympathetic pathways. At a biochemical level, (Safajou et al., 2025) identified linalool and linalyl acetate in lavender as potent sedative and antiemetic agents capable of dampening the vomiting reflex.

By contrast, the music intervention produced a slower, more indirect effect. (Wahyuni et al., 2024) demonstrated that classical music lowers maternal stress hormones, thereby reducing nausea through neuroendocrine modulation rather than immediate sensory suppression. Supporting this mechanism, K. Guo et al., (2024) found that auditory stimulation calms the brainstem vomiting center via hormonal and autonomic pathways that require a longer activation period.

The methodological rigor of the present trial further strengthens its conclusions. (Lowe & Steinweg, 2021) recommended strict ethical oversight and verification of statistical assumptions in clinical research; our normality and homogeneity tests (Shapiro-Wilk and Levene) satisfied these requirements and support the validity of parametric analyses.

The study directly addresses the evidence gap identified by (Vinnars et al., 2023), who noted the absence of head-to-head evaluations of distinct complementary therapies in pregnant populations. By testing two culturally acceptable, low-cost interventions within a primary-care setting, this research provides the first direct evidence of which non-pharmacological option delivers the greatest clinical benefit for emesis gravidarum.

Nursing and Public-Health Implications:

Integration into Antenatal Care

Lavender aromatherapy can be adopted as a first-line, rapid, and inexpensive non-pharmacological treatment in primary maternal-health clinics, aligning with service-quality recommendations by (Idiana et al., 2024).

Patient Empowerment through Digital Education

(Handayani et al., 2023) showed that digital education significantly improves adherence to antenatal interventions, supporting the dissemination of instructions for home use of lavender or music therapy.

Holistic Maternal Well-Being

Combining aromatherapy with mind–body relaxation methods such as prenatal yoga could enhance psychological benefits, as proposed by (Liang, 2024).

Policy and Guideline Development

The robust local evidence generated here provides a strong foundation for policy makers to incorporate lavender aromatherapy into standard antenatal care, consistent with the non-drug management strategies recommended by (Nelson-Piercy et al., 2024).

This study offers a novel contribution by directly comparing the effectiveness of lavender aromatherapy and music therapy in alleviating emesis gravidarum, an approach rarely addressed in previous maternal health research. While earlier studies have examined aromatherapy or music therapy separately (e.g., Smith & Costantine, 2022 on lavender's anxiolytic effects; Johnson et al., (2023) on music's influence on nausea), few have evaluated their relative efficacy in the same clinical context. Our findings provide the first integrated evidence that these two non-pharmacological interventions can be assessed head-to-head, thereby informing individualized treatment choices for pregnant women. Moreover, the rigorous use of SPSS-based statistical modeling ensures that the observed outcomes are both clinically and statistically robust, setting a methodological benchmark for future randomized trials.

CONCLUSION

This study confirms that both lavender aromatherapy and classical music therapy serve as effective complementary interventions for reducing the severity of emesis gravidarum in first-trimester pregnancy. Although each approach significantly alleviated symptoms, lavender aromatherapy produced a more consistent and clinically meaningful reduction in emesis scores, underscoring its potential as a preferred non-pharmacological option when rapid symptom relief is required. By directly comparing two sensory-based interventions within the same clinical context, this research fills an important gap in maternal health literature and offers a methodological template for future comparative trials.

Health-care providers are encouraged to incorporate evidence-based complementary therapies—particularly lavender aromatherapy—into routine antenatal care protocols to enhance maternal comfort and reduce dependence on pharmacological agents. Future studies should include larger, more diverse populations and detailed sociodemographic variables to explore moderating factors such as maternal age, parity, education, and occupation. Longitudinal follow-up and multi-center randomized designs are recommended to validate the present findings and to inform national guidelines on holistic prenatal care.

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