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Peppermint Aromatherapy and Emesis Gravidarum in First-Trimester Pregnant Women: A One-Group Pretest–Posttest Study

Deka Nona Novita[1]*, Asep Kuswandi[2], Tetik Nurhayati[2], Dewi Ariyanti[2]

[1]Applied Undergraduate Nursing Study Program and Nursing Professional Education, Health Polytechnic Tasikmalaya, West Java, Indonesia
[2]Departement of Nursing, Health Polytechnic Tasikmalaya, West Java, Indonesia,
asep.kuswandi@dosen.poltekkestasikmalaya.ac.id, tetik.nurhayati@dosen.poltekkestasikmalaya.ac.id, dewiaryanti9@gmail.com

*Corresponding Author: denatanovita19@gmail.com

Abstract

Research Objective: This study aimed to examine changes in the severity of emesis gravidarum before and after inhaled peppermint aromatherapy among first-trimester pregnant women in the working area of the Purbaratu Public Health Center, Tasikmalaya City. **Methodology:** A pre-experimental one-group pretest–posttest design was used. Twenty participants with complete paired data were analyzed. Emesis gravidarum severity was measured using the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24) questionnaire before and after inhalation of two to three drops of peppermint essential oil administered once daily for three consecutive days. Paired Sample t-test analysis was used after the normality assumption was met. **Results:** The mean PUQE-24 score decreased from 9.50 (SD = 1.235) before the intervention to 3.30 (SD = 1.128) after the intervention, with a mean reduction of 6.20 points ($p < 0.001$). **Conclusion:** In this small uncontrolled study, inhaled peppermint aromatherapy was associated with a significant reduction in emesis gravidarum scores. The findings provide preliminary support for its use as a complementary approach, but controlled studies and continued maternal safety monitoring are required before routine implementation.

Keywords: *peppermint aromatherapy, emesis gravidarum, first-trimester pregnancy, PUQE-24, complementary care.*

INTRODUCTION

Emesis gravidarum, characterized by nausea and vomiting during pregnancy, is a common condition that primarily occurs during the first trimester and is associated with hormonal and physiological changes, including increased human chorionic gonadotropin (hCG) levels. It may be accompanied by dizziness, abdominal bloating, fatigue, and reduced appetite. Published estimates vary according to the population and definition used, but nausea and vomiting are frequently reported during early pregnancy (Handayani, 2021; Prawirohardjo & Wiknjosastro, 2016).

National and local reports indicate that nausea and vomiting remain important concerns during antenatal care. In the Purbaratu Public Health Center service area, the number of first antenatal care visits is relatively high. Persistent or severe symptoms require clinical assessment because progression to hyperemesis gravidarum may lead to dehydration, electrolyte imbalance, and nutritional deficiencies, with possible adverse maternal and fetal consequences (Shanty & Keswara, 2025).

Management of emesis gravidarum may involve pharmacological and non-pharmacological approaches. Peppermint (Mentha piperita) aromatherapy is one complementary option. Its aroma and principal constituents, including menthol and menthone, may promote comfort and gastrointestinal relaxation; however, mechanistic and safety claims during pregnancy should be interpreted cautiously. Peppermint aromatherapy should complement, rather than replace, clinical assessment and treatment when symptoms are severe (Lubis et al., 2019).

Previous studies have reported reductions in pregnancy-related nausea and vomiting following peppermint inhalation, although differences in design, dose, and comparison groups limit direct

conclusions regarding effectiveness. Hodijah et al. (2021) and Rizki et al. (2022) reported favorable symptom changes after aromatherapy interventions. Evidence from the Purbaratu Public Health Center service area, however, remains limited.

A preliminary assessment indicated that nausea and vomiting were common complaints among first-trimester pregnant women in the area and that peppermint aromatherapy had not been routinely used as a complementary intervention. Therefore, this study aimed to compare PUQE-24 scores before and after inhaled peppermint aromatherapy among first-trimester pregnant women in the working area of the Purbaratu Public Health Center.

METHODS

Research Type and Design

This quantitative study used a pre-experimental one-group pretest–posttest design. The design was intended to describe within-participant changes in PUQE-24 scores after peppermint aromatherapy. Because there was no control group, the study was not designed to establish definitive causality.

Table 1. Research Design

Subject	*Pre-test*	*Intervention*	*Post-test*
K	O_1	I	O_2

Description:

K: Participants

O_1: PUQE score before peppermint aromatherapy administration (pretest)

I: Peppermint aromatherapy intervention

O_2: PUQE score after peppermint aromatherapy administration (post test)

Research Location and Duration

The study was conducted in the working area of Puskesmas Purbaratu, Tasikmalaya City, Indonesia, from March 7 to March 28, 2026. The ethical approval date reported in the source manuscript should be verified before submission because it appears later than the stated data-collection period.

1. Population and Sample
   The target population consisted of 32 first-trimester pregnant women with emesis gravidarum in the working area of Puskesmas Purbaratu. Total sampling was planned for the accessible population; however, the final analysis included 20 participants who completed the intervention and had complete pretest and posttest PUQE-24 data. Eligible participants were first-trimester pregnant women experiencing nausea and vomiting who agreed to participate. Women requiring urgent management for severe symptoms, reporting peppermint hypersensitivity, or having incomplete paired data were not included in the final analysis.
2. Data Collection Technique
   Data were collected using the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24) questionnaire. Baseline PUQE-24 scores were recorded before the intervention. For the intervention, two to three drops of peppermint essential oil were placed on a cotton pad and inhaled for approximately five minutes once daily for three consecutive days. Participants were instructed not to ingest the oil and to discontinue use and contact the research team if they experienced discomfort, respiratory symptoms, or signs of an allergic reaction. Posttest PUQE-24 scores were obtained after the final intervention session. Participants continued to receive routine antenatal care.

3. Research Instrument
   The research instruments consisted of a demographic data form and the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE-24) questionnaire. PUQE-24 assesses nausea and vomiting severity over the preceding 24 hours, with total scores ranging from 3 to 15. Scores of 3–6 indicate mild symptoms, 7–12 moderate symptoms, and 13–15 severe symptoms. The instrument has been used in pregnancy-related nausea and vomiting research and demonstrated good internal consistency in a previous validation study (Cronbach's alpha = 0.846) (Birkeland et al., 2015).
4. Research Ethics
   This study followed the ethical principles of informed consent, anonymity, confidentiality, beneficence, and justice. The manuscript reports ethical approval from the Health Research Ethics Committee of the Health Polytechnic of Tasikmalaya, Ministry of Health (No. DP.04.03/F.XVIII.1.3.1/763/2026; approval date: June 9, 2026). Because the reported approval date appears later than the stated data-collection period, the authors should verify and correct the chronology before submission. Written informed consent was obtained from all participants, and participants were informed that worsening or severe symptoms required clinical assessment.
5. Data Analysis Technique
   Descriptive statistics were used to summarize participant characteristics and PUQE-24 scores. The normality of the paired score differences was assessed using the Shapiro–Wilk test. Because the normality assumption was met ($p > 0.05$), pretest and posttest scores were compared using a paired sample t-test. Statistical significance was set at $p < 0.05$, and a software output of $p = 0.000$ was reported as $p < 0.001$.

RESULTS

Univariate Analysis

Respondent Characteristics

The final analysis included 20 participants. Most were aged 20–35 years (19; 95.0%), primigravida (13; 65.0%), educated to senior high school level (12; 60.0%), and unemployed (19; 95.0%).

Table 2. Respondent Characteristics

Variable	Category	n	%
Age	20-35 years	19	95,0 %
	>35 years	1	5 %
Gravidity	Primigravida	13	65,0 %
	Multigravida	7	35,0 %
Education Level	Primary School	2	10,0 %
	Junior High School	4	20,0 %
	Senior High School	12	60,0 %
	Bachelor's–Master's degree	2	10,0 %
Employment status	Employed	1	5,0 %
	Unemployed	19	95,0 %

Mean Score of Nausea and Vomiting Before the Intervention

Table 3. Mean Score of Nausea and Vomiting Before the Intervention

	Mean	SD	*Min*	*Max*
Before Intervention	9,50	1,235	6	12

Before the intervention, the mean PUQE-24 score was 9.50 (SD = 1.235), indicating that the group average was within the moderate symptom category.

Mean Score of Nausea and Vomiting After the Intervention

Table 4. Mean Score of Nausea and Vomiting Aftrt the Intervention

	Mean	SD	*Min*	*Max*
After Intervention	3,30	1,129	6	12

After the intervention, the mean PUQE-24 score was 3.30 (SD = 1.129). Compared with baseline, the group mean decreased by 6.20 points and was within the mild symptom category.

Bivariate Analysis

Normality Test

The Shapiro–Wilk test indicated that the paired score differences were normally distributed ($p > 0.05$). Therefore, a paired sample t-test was used to compare pretest and posttest PUQE-24 scores.

Difference in Mean Nausea and Vomiting Scores Before and After the Intervention

Table 5. Difference in Mean Nausea and Vomiting Scores Before and After the Intervention

Variable	Mean	Std. Deviation	Std. Error Mean	Selisih Mean	P.Value
Pre- test	9.50	1.235	0.276	6,20	0,000
Post- test	3.30	1.128	0.252		

The mean PUQE-24 score decreased from 9.50 (SD = 1.235) before the intervention to 3.30 (SD = 1.128) after the intervention, with a mean difference of 6.20 points. The paired sample t-test indicated a statistically significant difference ($p < 0.001$). This result shows a significant within-group improvement after the intervention; however, the uncontrolled design does not exclude spontaneous symptom improvement or other concurrent influences.

DISCUSSION

Univariate Analysis

Respondent Characteristics

Maternal age is one of the factors that may influence physical and psychological conditions during pregnancy. Pregnant women who are too young are at risk of experiencing nausea and vomiting because their reproductive organs have not developed optimally and emotional maturity in dealing with pregnancy is still incomplete (Murniati et al., 2024). Meanwhile, pregnant women aged over 35 years are also susceptible to emesis gravidarum due to psychological factors, such as anxiety and stress associated with advanced maternal age (Aprianti et al., 2025).

Based on the study results, the majority of respondents were aged 20–35 years, accounting for 19 respondents (95.0%). This finding indicates that almost all respondents were within the optimal reproductive age range for pregnancy. These results are consistent with those reported by Suryaningrum et al. (2019), who stated that pregnant women experiencing nausea and vomiting are generally within the 20–35-year age group, which is characterized by relatively favorable reproductive physiological conditions. Although 20–35 years is considered the ideal reproductive age, nausea and vomiting may still occur due to hormonal changes during pregnancy.

In addition to age, gravidity status also plays a role in the occurrence of emesis gravidarum. Primigravida women are more likely to experience nausea and vomiting because their bodies have not yet adapted to the increased levels of progesterone and estrogen during the first pregnancy. Furthermore, limited experience in coping with physiological changes during pregnancy and anxiety associated with the first pregnancy may exacerbate these symptoms (Fauziah et al., 2019).

Based on the study findings, the majority of respondents were primigravida, with 13 respondents (65.0%). These findings are in line with those reported by Fauziah et al. (2019), who stated that nausea and vomiting occur more frequently among primigravida women. Their study also demonstrated a significant association between gravidity status and the occurrence of emesis gravidarum, showing that multigravida women were 6.33 times more likely not to experience emesis gravidarum compared with primigravida women. Nevertheless, multigravida women may still experience emesis gravidarum, particularly when they are exposed to fatigue, stress, or household responsibilities (Nurhidayati, 2021).

Educational level also affects an individual's ability to receive, understand, and apply health-related information. Pregnant women with secondary or higher education tend to be more receptive to non-pharmacological interventions, including peppermint aromatherapy (Notoatmodjo, 2012). Based on the study results, most respondents had completed senior high school education, accounting for 12 respondents (60.0%). This finding indicates that the majority of respondents had an adequate educational background to understand health information and comply with the intervention provided.

These findings are consistent with those reported by Pratiwi and Subarnas (2020), who stated that pregnant women with secondary or higher educational levels tend to be more responsive to alternative health interventions. Adequate educational attainment may enhance understanding of the benefits and proper use of peppermint aromatherapy, thereby improving adherence to the intervention. Therefore, educational level may serve as one of the supporting factors contributing to the success of non-pharmacological therapies in reducing the symptoms of emesis gravidarum.

In addition to educational level, occupational status may also influence the physical and psychological conditions of pregnant women. Unemployed pregnant women tend to have more time to focus on the symptoms they experience, including nausea and vomiting during pregnancy. Moreover, the lack of activity and distraction from the workplace environment may increase the perception of physical discomfort (Wulandari et al., 2024).

Based on the study results, almost all respondents were unemployed, accounting for 19 respondents (95.0%). This finding indicates that the majority of respondents were housewives who carried out their daily activities at home. These results are consistent with those reported by Sari et al. (2020), who found that unemployed pregnant women had a higher risk of experiencing emesis gravidarum compared with employed pregnant women. Therefore, occupational status may be one of the factors associated with the occurrence of nausea and vomiting during pregnancy.

Mean Score of Nausea and Vomiting Before the Intervention

Before peppermint aromatherapy, the mean PUQE-24 score was 9.50 (SD = 1.235), which falls within the moderate category. This is consistent with evidence that nausea and vomiting in early pregnancy can reach clinically meaningful intensity, particularly among primigravida women adapting to hormonal and physiological changes (Fauziah et al., 2019).

Mean Score of Nausea and Vomiting After the Intervention

After peppermint aromatherapy, the mean PUQE-24 score was 3.30 (SD = 1.129), representing a mean reduction of 6.20 points. The post-intervention mean falls within the mild category. This change suggests that peppermint inhalation may provide short-term symptom relief as a complementary intervention.

The possible mechanism is generally attributed to olfactory stimulation and the sensory effects of menthol and menthone, which may promote relaxation and reduce the perception of nausea. These mechanisms remain explanatory hypotheses and should not be interpreted as proof of a specific biological pathway in the present study (Putri et al., 2025).

The intervention was delivered for three consecutive days, allowing short-term symptom changes to be observed. Nevertheless, nausea and vomiting may also improve naturally as pregnancy progresses, and the study did not include a comparison group to separate the intervention effect from spontaneous improvement, expectation effects, or concurrent antenatal care.

Accordingly, the reduction in PUQE-24 scores should be interpreted as a significant within-group change associated with the intervention rather than definitive evidence of clinical effectiveness.

Bivariate Analysis

Normality Test

Data normality was assessed using the Shapiro–Wilk test because the sample contained fewer than 50 participants. The assessment focused on the paired differences between pretest and posttest PUQE-24 scores.

The normality test result was greater than 0.05, indicating that the distribution of paired differences did not significantly depart from normality and supporting the use of a parametric paired comparison.

A paired sample t-test was therefore used to evaluate the mean within-participant difference between measurements obtained before and after the peppermint aromatherapy intervention.

Difference in Mean Nausea and Vomiting Scores Before and After the Intervention

The analysis showed a statistically significant reduction in PUQE-24 scores, from a mean of 9.50 (SD = 1.235) before the intervention to 3.30 (SD = 1.128) afterward, with a mean reduction of 6.20 points ($p < 0.001$).

This finding is consistent with Agustini (2024), who reported reduced nausea and vomiting following self-administered peppermint aromatherapy among first-trimester pregnant women. However, differences in study design and intervention procedures should be considered when comparing findings.

The improvement may be related to olfactory stimulation, the cooling sensation of menthol, relaxation, and distraction from nausea. These possible explanations were not directly measured in this study and therefore remain theoretical.

From a clinical perspective, peppermint aromatherapy may be considered only as a complementary option for mild-to-moderate symptoms. Screening for allergy or respiratory sensitivity, clear instructions not to ingest essential oil, monitoring for adverse reactions, and prompt referral for persistent vomiting, dehydration, weight loss, or other warning signs remain essential. The small sample, absence of a control group, short observation period, possible spontaneous improvement, and unmeasured concurrent therapies limit the strength and generalizability of the findings.

Limitations

This study used a one-group pretest–posttest design with a small sample from one primary-care setting. Without a control group, the observed reduction cannot be attributed solely to peppermint aromatherapy because spontaneous improvement, expectation effects, dietary changes, routine care, or other therapies may have contributed. The follow-up period was short, and detailed inferential statistics beyond the archived p-value were not available. Future studies should use larger samples, comparison groups, standardized safety monitoring, and longer follow-up.

CONCLUSION

Among the 20 first-trimester pregnant women analyzed, most were aged 20–35 years, primigravida, educated to senior high school level, and unemployed. The mean PUQE-24 score decreased from 9.50 before peppermint aromatherapy to 3.30 after the intervention, and the within-group difference was statistically significant ($p < 0.001$). These findings indicate that inhaled peppermint aromatherapy was associated with short-term improvement in emesis gravidarum scores in this sample. Because the study had no control group, the result should be regarded as preliminary and should not be interpreted as definitive proof of effectiveness.

Peppermint aromatherapy may be considered as a complementary option alongside routine antenatal assessment for women with mild-to-moderate symptoms, provided that safety screening, clear administration instructions, and monitoring are implemented. It should not delay medical evaluation for severe or persistent symptoms. Controlled studies with larger samples and longer follow-up are recommended.

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Informed Consent Statement: Informed consent was obtained from all participants involved in this study.

Data Availability Statement: Upon reasonable request, the corresponding author can provide the data utilised in this work. Confidentiality, participant privacy, and ethical issues prevent the data from being made public.

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