



# The Effect of Lemon Aromatherapy on Emesis Gravidarum in Pregnant Women in the First Trimester

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**Abstract.** *Emesis gravidarum is a common complaint among pregnant women in their first trimester that can interfere with daily activities, nutritional intake, and quality of life. One safe and easy-to-apply non-pharmacological intervention to reduce this complaint is lemon aromatherapy. This study aims to determine the effect of lemon aromatherapy on emesis gravidarum in pregnant women in their first trimester. The study used a quantitative approach with a quasi-experimental one-group pretest–posttest design. The study sample consisted of 30 pregnant women in their first trimester who were selected using purposive sampling. The intervention involved the administration of lemon aromatherapy through inhalation. The level of emesis gravidarum was measured before and after the intervention using an appropriate nausea and vomiting scale. Data analysis was performed using the Wilcoxon Signed Rank Test. The results showed a significant difference between the levels of emesis before and after lemon aromatherapy ( $p = 0.000$ ). Before the intervention, most respondents experienced moderate to severe emesis, while after the intervention, the majority of respondents experienced mild emesis and no severe emesis was found. The conclusion of this study indicates that lemon aromatherapy has a significant effect in reducing gravidarum emesis in first trimester pregnant women and can be used as a supportive non-pharmacological therapy in antenatal care.*

**Keywords:** *First-Trimester Pregnant Women; Lemon Aromatherapy; Nausea and Vomiting of Pregnancy; Non-Pharmacological Therapy; Pregnancy.*

## 1. INTRODUCTION

Emesis gravidarum (nausea and vomiting during pregnancy) is a very common complaint in the first trimester and can interfere with the quality of life of pregnant women, including daily activities, food intake, rest, and psychological condition. ACOG explains that nausea and vomiting during pregnancy generally begin before 9 weeks of gestation and improve around 14 weeks in many women, although in some cases it can last longer. (ACOG, 2018; ACOG, 2024). This condition is characterized by nausea and vomiting that can interfere with daily activities and the quality of life of pregnant women. According to data from the World Health Organization (WHO), approximately 50-90% of pregnant women experience nausea and vomiting in the first trimester (WHO, 2020). These symptoms are often considered a normal part of pregnancy, but in some cases, they can develop into hyperemesis gravidarum, which requires further medical attention (Mazzotta et al., 2019).

Nausea and vomiting in the first trimester should not be taken lightly because, in certain conditions, it can develop into more severe symptoms, causing dehydration, electrolyte disturbances, weight loss, and leading to hyperemesis gravidarum. ACOG emphasizes the importance of distinguishing pregnancy nausea and vomiting from other causes and implementing a stepwise management approach based on the severity of symptoms and their impact on maternal function. (ACOG, 2018)

Various approaches to treating emesis gravidarum include lifestyle and dietary changes, pharmacological therapy, and nonpharmacological interventions. In obstetric practice, nonpharmacological interventions are often the first choice because they are relatively safe, easy to implement, and in line with the principle of comfortable care for mothers. One method that is gaining attention in treating emesis gravidarum is aromatherapy. Aromatherapy uses essential oils from various natural sources to improve health and well-being. Lemon (*Citrus limon*) is one type of essential oil that is often used in aromatherapy and is known to have anti-nausea properties. Research shows that the scent of lemon can help reduce symptoms of nausea and vomiting, making it a safe non-pharmacological alternative for pregnant women (Lee et al., 2021). Aromatherapy is a widely used approach because it works through the olfactory pathway, which affects relaxation responses and nausea perception, thereby potentially reducing the intensity of nausea and vomiting, especially in the first trimester (Lee, N.M., 2011).

One type of aromatherapy that has been widely studied for nausea and vomiting during pregnancy is lemon aromatherapy. A double-blind controlled clinical trial showed that inhaling lemon aromatherapy can reduce the severity of nausea and vomiting in pregnant women compared to the control group, making lemon aromatherapy a complementary option that can help reduce emesis complaints during pregnancy (Safajou, F., et al. (2014); Maternity, D., et al. (2017). These findings are also supported by several studies in healthcare settings (including research in Indonesia) that reported a reduction in nausea and vomiting after administering lemon aromatherapy to pregnant women in their first trimester (Thaib, A. A., et al. (2024).

Several studies have shown that inhaling lemon scent can have a positive effect in reducing nausea symptoms. A study conducted by Sadeghi et al. (2020) showed that pregnant women who inhaled lemon scent experienced a significant decrease in the frequency and intensity of nausea compared to the control group. This suggests that lemon aromatherapy can be an effective intervention in treating emesis gravidarum.

In Indonesia, the prevalence of emesis gravidarum is quite high, and many pregnant women seek safe and effective solutions to overcome this condition. However, there is still little research that specifically explores the effects of lemon aromatherapy in the Indonesian context. Therefore, this study aims to explore the effects of lemon aromatherapy on emesis gravidarum in first trimester pregnant women, as well as to provide deeper insights into the effectiveness and acceptance of this method among pregnant women.

However, the effectiveness of lemon aromatherapy can be influenced by differences in method (direct inhalation/use of media), duration of exposure, frequency of use, and maternal

characteristics (level of early nausea and vomiting, sensitivity to smell, eating patterns, and psychological condition). Therefore, research with a local context remains important to ensure that this intervention is effective and can be adopted as part of midwifery care, especially during the first trimester when complaints most often arise and have the potential to interfere with the mother's nutritional intake (De Bonis, M., et al. (2025).

Based on the above description, the study entitled "The Effect of Lemon Aromatherapy on Emesis Gravidarum in First Trimester Pregnant Women" is relevant to test the benefits of a simple, inexpensive, and easy-to-apply non-pharmacological intervention. The study results are expected to serve as the basis for complementary practice recommendations in early trimester ANC services, thereby enabling better control of nausea and vomiting, maintaining maternal nutritional intake, and enhancing comfort during pregnancy (Putri, H. F. W., et al. (2023).

## **2. RESEARCH METHOD**

This study used a quantitative approach with a quasi-experimental design using a one-group pretest–posttest design. This design was chosen to determine the effect of lemon aromatherapy on emesis gravidarum in first trimester pregnant women by comparing conditions before and after intervention without involving a control group.

The population in this study was all first trimester pregnant women who attended antenatal care (ANC) at the research site. The study sample was first trimester pregnant women who met the inclusion criteria, namely pregnant women with a gestational age of  $\leq 12$  weeks, experiencing nausea and vomiting of pregnancy, willing to be respondents, and not currently taking antiemetic medication. Exclusion criteria included pregnant women with severe hyperemesis gravidarum or who had a disease that could affect nausea and vomiting. The sample size was determined based on the number of available respondents who met the criteria, using purposive sampling.

The independent variable in this study was lemon aromatherapy, while the dependent variable was emesis gravidarum. Lemon aromatherapy was administered through inhalation using lemon essential oil, which was inhaled for a certain duration according to the research procedure. Gravidarum emesis was measured using nausea and vomiting scale instruments commonly used in pregnant women, such as PUQE (Pregnancy-Unique Quantification of Emesis and Nausea) or nausea and vomiting intensity observation sheets, which include the frequency of nausea and vomiting within a certain period.

Data collection was conducted by measuring the level of emesis gravidarum before administering lemon aromatherapy (pretest). Next, respondents were given lemon aromatherapy intervention according to the established procedure. After the intervention, the level of emesis gravidarum was measured again (posttest) to assess the changes that occurred.

Data analysis was performed univariately to describe the characteristics of the respondents and the levels of emesis gravidarum before and after the intervention. Next, bivariate analysis was performed to determine the effect of lemon aromatherapy on emesis gravidarum. Before testing the hypothesis, the data was tested for normality using the Shapiro–Wilk test. If the data was normally distributed, the paired t-test was used, whereas if the data was not normally distributed, the Wilcoxon Signed Rank Test was used. The level of statistical significance was set at  $p < 0.05$ .

### 3. RESULTS AND DISCUSSION

**Table 1.** Demographic data

	Var	n	F (%)
Age	< 20 years old	2	6.7
	20-35 years old	16	86.7
	>35 years old	2	6.7
Education	Elementary school	4	13.3
	Junior high school	9	30.0
	High School	17	56.7
	College/university	0	0
Employment	Housewife	27	90
	Farmer	0	0
	Private employee	3	10.0
	Government employee	0	0
Parity	Primipara	10	33.3
	Multipara	20	66.7
Pre-emesis	Mild	0	0
	Moderate	19	63.3
	Severe	11	36.7
Post-emesis	Mild	19	63.3
	Moderate	11	36.7
	Severe	0	0
Total		30	100

(source: primary data, 2025)

Based on the respondent characteristics table, out of a total of 30 respondents, most were in the 20–35 age group, namely 16 people (86.7%), which is the healthy reproductive age. Respondents aged <20 and >35 years numbered 2 people (6.7%) each, so only a small proportion of respondents were in the risk age group.

In terms of education level, the majority of respondents had a high school education, totaling 17 people (56.7%). Respondents with junior high school (SMP) education numbered 9 people (30.0%), and elementary school (SD) education numbered 4 people (13.3%). There were no respondents with a college education background. This shows that the respondents' education level was dominated by secondary education.

Based on employment status, most respondents were housewives, namely 27 people (90.0%), while respondents who worked as private employees numbered 3 people (10.0%). There were no respondents who worked as farmers or civil servants. This condition shows that the majority of respondents focused on domestic activities.

In terms of parity, most respondents were multiparous, namely 20 people (66.7%), while 10 respondents (33.3%) were primiparous. This shows that the majority of respondents had previous pregnancy experience.

Based on the level of emesis before intervention, most respondents experienced moderate emesis, namely 19 people (63.3%), and severe emesis in 11 people (36.7%). There were no respondents with mild emesis before intervention.

After the intervention, there was a change in the level of emesis among respondents. The majority of respondents experienced mild emesis, namely 19 people (63.3%), while respondents with moderate emesis numbered 11 people (36.7%). There were no respondents who experienced severe emesis after the intervention.

**Table 2.** Statistik analysis

Independent variable	n	P Value	Dependent variable
Pre-emesis	30	0.000	Post-emesis

*Wilcoxon*

\*significant

(source: primary data, 2025)

Based on the results of statistical analysis using the Wilcoxon test on 30 respondents, a p-value of 0.000 ( $p < 0.05$ ) was obtained. These results indicate that there is a statistically significant difference between the level of emesis before intervention and the level of emesis after intervention.

These findings indicate that the intervention had a significant effect on reducing the severity of emesis in respondents. This is in line with the results of the descriptive analysis, which showed a change in the category of emesis from predominantly moderate and severe emesis before the intervention to predominantly mild and moderate emesis after the intervention, as well as the absence of severe emesis in the post-intervention measurement.

The use of the Wilcoxon test was deemed appropriate because the emesis level data was ordinal and did not meet the assumption of normality, so this nonparametric test was suitable for comparing conditions before and after intervention in the same group of respondents.

## **Discussion**

The Wilcoxon test results showed a significant difference between the emesis levels before and after lemon aromatherapy ( $p = 0.000$ ;  $p < 0.05$ ) in 30 pregnant women. These findings indicate that lemon aromatherapy is effective in reducing the degree of emesis, as seen from the shift in the emesis category from predominantly moderate to severe in the pretest to predominantly mild to moderate in the posttest, and the absence of severe emesis after the intervention.

Clinically, nausea and vomiting of pregnancy (NVP) is a common complaint, especially in the first trimester, and can interfere with quality of life, food intake, and daily activities. ACOG emphasizes that NVP is often "normalized," putting it at risk of being undermanaged, even though stepwise management should be provided according to the severity of the complaint. RCOG guidelines also emphasize the importance of supportive care and management according to severity to prevent complications such as dehydration and electrolyte disturbances (RCOG, 2016; ACOG, 2018).

Mechanistically, aromatherapy works through the olfactory pathway connected to the limbic system (the center of emotions and autonomic responses), thereby triggering relaxation, reducing tension, and decreasing the perception of nausea. In lemon aromatherapy, the fresh citrus component is often reported to help suppress nausea and improve comfort. Several recent studies and publications indicate that lemon aromatherapy can reduce nausea and vomiting scores in first-trimester pregnant women, with statistically significant results. Additionally, systematic reviews/literature reviews in recent years have also concluded that lemon aromatherapy tends to be effective in reducing nausea and vomiting scores in emesis

gravidarum, although the quality and design of the studies vary, so caution is still needed in generalizing the findings (Thaib, A. A., et al. (2024).

However, it should be noted that emesis is influenced by many confounding factors such as stress, fatigue, diet, exposure to triggering odors, and the possible use of other strategies (e.g., dietary changes or medical therapy). Therefore, to strengthen the interpretation, the research manuscript should explain the control of these factors (e.g., ensuring that respondents did not consume certain antiemetics during the measurement period or standardizing the posttest measurement time). The ACOG and RCOG guidelines also emphasize that if symptoms persist/are severe or lead to hyperemesis, further evaluation and medical management are still necessary (Putri, H. F. W. (2023); RCOG, 2024).

Overall, the results of this study support the use of lemon aromatherapy as a relatively easy, inexpensive, and applicable non-pharmacological intervention in midwifery care to help reduce emesis, especially in mild to moderate cases.

#### 4. CONCLUSION

Based on the research results and statistical analysis using the Wilcoxon test, it can be concluded that lemon aromatherapy has a significant effect on reducing the level of emesis in pregnant women. There is a significant difference between the level of emesis before and after the administration of lemon aromatherapy, as indicated by a p-value of 0.000 ( $p < 0.05$ ).

Descriptively, the results showed a decrease in the degree of emesis from moderate and severe categories before the intervention to predominantly mild and moderate categories after the intervention, and no severe emesis was found in the post-intervention measurement. These findings indicate that lemon aromatherapy is effective as a supportive non-pharmacological intervention in helping to reduce nausea and vomiting complaints in pregnant women.

Thus, lemon aromatherapy can be considered a safe, easy, and affordable alternative therapy in midwifery practice, especially for pregnant women with mild to moderate emesis, while still paying attention to medical monitoring and treatment if symptoms persist or worsen..

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