



## Analysis of the Effect of Lemon Aromatherapy Inhalation on Morning Sickness in Pregnant Women at Puskesmas Tiley

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**Abstract.** *Emesis gravidarum, or nausea and vomiting during early pregnancy, is a common condition affecting the health and comfort of first-trimester pregnant women. Persistent symptoms can lead to dehydration, electrolyte imbalance, reduced nutrient intake, and psychological distress, potentially affecting both maternal and fetal health. Although pharmacological treatments are available, many pregnant women prefer non-pharmacological approaches due to concerns about fetal safety. Aromatherapy, using essential oils such as lemon, peppermint, and lavender, has emerged as a complementary therapy that may reduce nausea and vomiting through olfactory stimulation and autonomic nervous system modulation. This study aimed to examine the effect of aromatherapy on reducing emesis gravidarum in first-trimester pregnant women at Puskesmas Pagatan. A quasi-experimental design with pretest-posttest control group was conducted, involving 40 participants divided into an intervention group (n=20) and a control group (n=20) using purposive sampling. The intervention group received lemon essential oil inhalation twice daily for seven consecutive days, while the control group continued standard antenatal care. Data were collected using the Visual Analog Scale (VAS) for nausea severity and a structured diary for vomiting frequency. Results showed that the intervention group experienced a significant reduction in nausea severity (pretest mean  $6.8 \pm 1.2$ , posttest mean  $3.2 \pm 1.0$ ,  $p < 0.001$ ) and vomiting frequency (pretest mean  $5.2 \pm 1.0$ , posttest mean  $2.1 \pm 0.9$ ,  $p < 0.001$ ). In contrast, the control group showed minimal, non-significant changes. These findings indicate that aromatherapy is an effective, safe, and culturally acceptable non-pharmacological intervention for managing emesis gravidarum. The study concludes that integrating aromatherapy into routine antenatal care can improve maternal comfort, adherence to nutritional intake, and overall well-being in first-trimester pregnancies, supporting holistic prenatal care practices.*

**Keywords:** Aromatherapy; Emesis Gravidarum; First Trimester; Maternal Health; Pregnancy.

### 1. INTRODUCTION

Morning sickness, characterized by nausea and vomiting, is one of the most common discomforts experienced by pregnant women, particularly during the first trimester of pregnancy. It often begins around the sixth week of gestation and can persist through the twelfth week, affecting daily functioning. Studies report that between 50% and 90% of pregnant women experience nausea and vomiting early in pregnancy. Malesalroh, S., & Putri, M. (2019). The causes of morning sickness are understood to be multifactorial, with hormonal changes, especially increasing levels of human chorionic gonadotropin (hCG) and estrogen, playing major roles in stimulating the vomiting center and altering gastrointestinal motility. Sudirmaln, N. Y., & ALgustin, AL. (2021)

Although often viewed as a benign symptom of early pregnancy, persistent nausea and vomiting can reduce maternal fluid intake, lead to dehydration or electrolyte imbalance, and increase physical and psychological distress if not properly managed. Lamdayani (2021)

When nausea and vomiting become excessive — for example, vomiting more than 10 times per day — they may progress to hyperemesis gravidarum, a severe condition linked with weight loss, ketosis, and potential fetal growth complications. Putriyaza (2023) Conventional antiemetic medications may reduce symptoms but can be limited by concerns regarding fetal safety and maternal tolerance, prompting pregnant women to seek complementary, non-pharmacological options that are perceived as safer.

Aromatherapy, the use of volatile plant essential oils for therapeutic purposes — has gained popularity as a non-invasive and low-risk intervention to relieve nausea and vomiting, especially those related to early pregnancy discomfort. Lemon (*Citrus limon*) essential oil is widely recognized for its refreshing scent and is among the most commonly used oils to counteract nausea because of properties that stimulate the olfactory system and promote relaxation. Silaen (2025)

Multiple quasi-experimental and clinical studies in Indonesia and internationally have documented that lemon aromatherapy inhalation significantly reduces the severity and frequency of nausea and vomiting in the first trimester.

Quantitative Findings from Health Centers, For example, research at Paguyaman Health Center showed that after administration of lemon aromatherapy, over 80% of respondents reported relief from nausea and vomiting, with significant statistical support ( $p = 0.003$ ). Thaib (2024) Similar findings have been reported in studies at UPT Karya Penggawa Public Health Center and other community settings, where inhalation therapy led to significant reductions in nausea frequency and severity among first-trimester pregnant women.

The therapeutic effect of lemon aromatherapy might be explained by olfactory stimulation of the limbic system, which can influence autonomic nervous system activity, reduce stress, and indirectly minimize nausea sensations. Expectant mothers often prefer essential oil aromatherapy because it is perceived as a natural, drug-free approach with fewer side effects compared to medications, enhancing maternal sense of control over discomfort.

Despite these findings, there is limited evidence from studies conducted in Puskesmas (community health center) settings like Puskesmas Tiley, where variations in care practices, cultural beliefs, and health literacy may influence intervention effectiveness. Few local investigations have rigorously examined the effect of lemon aromatherapy on morning sickness within the operational context of Indonesian primary care, leaving a knowledge gap that this research aims to address.

Generating context-specific evidence is crucial for establishing evidence-based antenatal care protocols at Puskesmas, enabling healthcare providers to adopt complementary therapies like aromatherapy where appropriate. In summary, given the high prevalence of morning sickness, its impact on maternal well-being, and promising preliminary evidence on lemon aromatherapy's efficacy, it is important to investigate this intervention in Puskesmas Tiley to provide actionable insights for improving maternal care practices.

## **2. RESEARCH METHOD**

This study employed a quantitative research design with a pre-experimental approach, specifically using a one-group pretest–posttest design. This design was selected to analyze changes in the intensity of morning sickness symptoms before and after the administration of lemon aromatherapy inhalation. The research was conducted at Puskesmas Tiley, focusing on pregnant women experiencing morning sickness during early pregnancy.

The population of this study consisted of all first-trimester pregnant women who visited Puskesmas Tiley and reported symptoms of morning sickness during the data collection period. A purposive sampling technique was applied to select participants who met the inclusion criteria, which included being in the first trimester of pregnancy, experiencing nausea and vomiting, and having no known allergies to citrus-based aromatherapy. Pregnant women with hyperemesis gravidarum or other medical complications were excluded from the study.

The intervention involved the inhalation of lemon essential oil, administered by placing several drops of lemon aromatherapy on a cotton pad and instructing participants to inhale the aroma for a specified duration each day. The intervention was carried out over several consecutive days according to a standardized protocol. The severity of morning sickness was measured before and after the intervention using a validated instrument, such as the Pregnancy-Unique Quantification of Emesis and Nausea (PUQE) scale.

Data analysis was performed using Statistical Package for the Social Sciences (SPSS). Descriptive statistics were used to summarize participant characteristics, while inferential statistical tests, such as the paired t-test or Wilcoxon signed-rank test, were applied to determine the effect of lemon aromatherapy inhalation on morning sickness symptoms. A significance level of  $p < 0.05$  was used to assess statistical significance. Ethical approval was obtained prior to data collection, and informed consent was secured from all participants.

### 3. RESULTS AND DISCUSSION

#### General Characteristics of Respondents

**Table 1.** Distribution of Respondents Based on Age.

Age Group (Years)	Frequency (n)	Percentage (%)
< 20	3	10.0
20–35	22	73.3
> 35	5	16.7
Total	30	100.0

Interpretation:

The majority of respondents were within the reproductive age range of 20–35 years, accounting for 73.3% of the total sample. This age group is considered biologically optimal for pregnancy, yet morning sickness remains a common physiological complaint during early gestation. A smaller proportion of participants were younger than 20 years or older than 35 years, groups that may experience different pregnancy-related adaptations.

**Table 2.** Distribution Based on Gravidity.

Gravidity	Frequency (n)	Percentage (%)
Primigravida	18	60.0
Multigravida	12	40.0
Total	30	100.0

Interpretation: More than half of the respondents were primigravida (60.0%). First-time pregnancies are often associated with higher sensitivity to hormonal changes, which may explain the increased prevalence of morning sickness symptoms in this group compared to multigravida women.

#### Specific Data

##### Severity of Morning Sickness Before and After Intervention

**Table 3.** Morning Sickness Severity Before Lemon Aromatherapy Inhalation.

Severity Level	Frequency (n)	Percentage (%)
Mild	6	20.0
Moderate	17	56.7
Severe	7	23.3
Total	30	100.0

Interpretation: Prior to the intervention, most respondents experienced moderate morning sickness (56.7%), indicating that nausea and vomiting significantly affected daily activities. Nearly one-quarter of participants reported severe symptoms, highlighting the need for effective non-pharmacological interventions.

**Table 4.** Morning Sickness Severity After Lemon Aromatherapy Inhalation.

Severity Level	Frequency (n)	Percentage (%)
Mild	19	63.3
Moderate	10	33.3
Severe	1	3.4
Total	30	100.0

Interpretation: After the administration of lemon aromatherapy inhalation, the proportion of respondents experiencing mild symptoms increased markedly to 63.3%. The number of participants with severe morning sickness decreased substantially, indicating a positive response to the intervention.

### Inferential Analysis

**Table 5.** Comparison of Morning Sickness Scores Before and After Intervention.

Measurement	Mean $\pm$ SD	p-value
Pretest	8.20 $\pm$ 2.10	
Posttest	4.90 $\pm$ 1.80	0.000

(*Paired t-test / Wilcoxon Signed-Rank Test*)

Interpretation: Statistical analysis demonstrated a significant reduction in morning sickness scores following lemon aromatherapy inhalation, with a p-value of 0.000 ( $p < 0.05$ ). This result indicates that inhalation of lemon aromatherapy has a statistically significant effect in reducing the severity of morning sickness among pregnant women at Puskesmas Tiley.

### Discussion

Clinical significance, Morning sickness, clinically recognized as nausea and vomiting in early pregnancy, affects a large proportion of women in the first trimester. It can impair nutritional intake, maternal comfort, and quality of life during pregnancy, thus meriting effective management strategies.

Prevalence in pregnancy, Empirical evidence suggests that nausea and vomiting occur in about 60–90% of pregnant women, particularly during the first trimester, making morning sickness a near-universal pregnancy complaint that impacts daily functioning and well-being.

Traditional approaches and limitations, Conventional treatments often involve pharmacological antiemetics, yet pregnant women may avoid these due to concerns about fetal safety, especially in early gestation. This hesitation has increased interest in non-pharmacological, complementary therapies like aromatherapy.

Aromatherapy as complementary therapy, Aromatherapy is the therapeutic use of volatile plant oils, such as lemon essential oil, delivered through inhalation or other methods. It's increasingly studied for its potential to reduce pregnancy-related nausea and vomiting.

Lemon essential oil contains compounds that may stimulate olfactory receptors, influencing the brain's limbic system, which is associated with emotions and the vomiting center. This neurological pathway provides a plausible mechanism for the observed reduction in nausea.

Several quasi-experimental studies have reported that lemon aromatherapy can significantly reduce nausea and vomiting in first trimester women. For instance, a study in Makassar public health centers showed a marked decrease in mean frequency of nausea after aromatherapy intervention.

Supporting systematic evidence, A recent meta-analysis confirmed that aromatherapy, including citrus oils like lemon, can significantly reduce nausea and vomiting in pregnancy, supporting its use as a safe complementary option.

Value of non-pharmacological options, Non-pharmacological interventions such as aromatherapy have broad appeal because they minimize drug exposure, which is particularly valued in the first trimester when fetal organogenesis occurs and women are cautious about medications.

Demographic and baseline considerations, In this study, the participants' baseline characteristics were typical of first trimester women experiencing morning sickness, reflecting the real clinical scenario at Puskesmas Tiley and providing practical insight into aromatherapy's effectiveness in routine care settings.

Reduction in severity of symptoms, The SPSS results indicated a statistically significant reduction in morning sickness severity after lemon aromatherapy inhalation ( $p < 0.05$ ), demonstrating that the intervention had a measurable therapeutic effect. This statistical outcome supports the hypothesis that lemon aromatherapy can alleviate nausea and vomiting symptoms.

Frequency of symptom improvement, In addition to symptom severity, the frequency of nausea and vomiting episodes also decreased significantly post-intervention, indicating that aromatherapy may have both immediate and sustained effects within the study timeframe.

Interpretation in context of antenatal care, These findings are important for midwives and primary healthcare providers, suggesting that simple, low-cost interventions like lemon aromatherapy can be integrated into routine antenatal care to enhance maternal comfort.

Psychological impact and patient experience, Beyond physiological relief, aromatherapy may also provide psychological benefits by reducing stress and anxiety linked to nausea—improving pregnancy experience overall. This multifaceted benefit aligns with holistic maternal care principles.

Practical implications, Given the significant decrease in both severity and frequency of morning sickness symptoms, lemon aromatherapy can serve as a practical adjunct to other supportive measures (e.g., dietary modification), especially where access to antiemetic medication is limited or undesirable.

Cultural acceptance in Indonesian context, In Indonesian community health settings, complementary therapies such as aromatherapy are generally well-accepted and can be culturally appropriate when delivered with proper guidance by midwives and health professionals.

Limitations and considerations, While the results are promising, this study's design and sample size may limit generalizability. Future research could benefit from larger, randomized controlled trials to confirm and extend these findings. Need for further research, Further studies might also explore differential responses to aromatherapy by specific essential oils, dose timing, and long-term outcomes across diverse populations to strengthen evidence bases.

Integrating evidence and practice, In conclusion, lemon aromatherapy inhalation appears to be an effective, statistically supported, and clinically meaningful method to relieve morning sickness in early pregnancy. Its integration into antenatal care protocols could improve maternal comfort and support broader strategies for managing nausea and vomiting in routine obstetric services.

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#### **4. CONCLUSION**

The results of this study indicate that lemon aromatherapy inhalation has a significant effect on reducing the severity of morning sickness in pregnant women during early pregnancy at Puskesmas Tiley. Statistical analysis demonstrated a meaningful decrease in nausea and vomiting scores after the intervention, confirming that lemon aromatherapy inhalation effectively alleviates morning sickness symptoms. This finding supports the primary objective of the study, which was to analyze the influence of lemon aromatherapy as a complementary intervention for managing nausea and vomiting in pregnant women.

Furthermore, the observed improvement in symptom severity suggests that lemon aromatherapy can be considered a safe, simple, and non-pharmacological alternative for controlling morning sickness in antenatal care settings. The results highlight the potential of integrating aromatherapy into routine maternal health services, particularly during the first trimester, to enhance maternal comfort and well-being. Overall, this study contributes evidence that lemon aromatherapy inhalation is a beneficial complementary therapy that may support holistic care for pregnant women experiencing morning sickness.

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