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RESEARCH ARTICLE

Effectiveness of lemon oil inhalation aromatherapy on nausea and vomiting among ANC mothers

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Abstract: ***Background***: Nausea and vomiting are among the most frequent issues experienced during pregnancy, affecting both the physical and psychological well-being of expectant mothers. With the growing interest in herbal remedies during pregnancy, this study explored the impact of lemon aromatherapy through inhalation on alleviating pregnancy-related nausea and vomiting. ***Objectives***: This study aimed to evaluate the effect of inhaling lemon aromatherapy on reducing nausea and vomiting experienced during pregnancy. ***Materials and methods***: This was a quasi-experimental research design in which 70 ANC mothers with nausea and vomiting (35 in each experimental & control group) who were eligible were randomly divided into experimental and control groups based on non-probability purposive sampling technique. Lemon oil aromatherapy was given to the experimental group, to inhale it for 5 minutes at morning for 5 days. The nausea and vomiting intensity were investigated 1st day before intervention and after intervention on 5th day with PUQE (Pregnancy Unique Quantification of Emesis) by interview method of data collection. ***Results***: There was a statistically significant difference between the two groups in the mean scores of nauseas and vomiting on the experimental and control groups on 5th day. In the experimental group, 33 pregnant women (94.29%) showed mild symptoms and 02 women (5.71%) experienced moderate symptoms of nausea and vomiting in the post-test. Conversely, in the control group, 11 pregnant women (31.43%) experienced mild symptoms, 23 women (65.71%) experienced moderate symptoms, and one woman (2.86%) experienced severe symptoms in the post-test. ***Conclusions***: Aromatherapy with lemon oil may help to alleviate pregnancy-related nausea and vomiting.

Keywords: Nausea, Vomiting, Aromatherapy, inhalation, lemon oil, ANC mothers.

INTRODUCTION

Pregnancy is the period during which a fetus develops inside a woman's uterus, usually lasting about 40 weeks from the day of the last menstrual cycle to childbirth.[1]

Pregnancy refers to the time while a fetus develops in a woman's womb, typically spanning about 40 weeks, or slightly over nine months, starting from the last menstrual period to delivery. It is divided into three stages, known as trimesters, each marked by unique physiological changes. Common complaints during pregnancy include morning sickness, constipation, skin changes and rashes, swollen extremities, dental and gum issues, varicose veins, and pain management challenges. Morning sickness is frequent in early pregnancy and generally mild, often not requiring treatment. However, severe nausea and persistent vomiting may lead to hyperemesis gravidarum, a condition that can compromise hydration, electrolyte balance, and nutritional status. This condition is diagnosed by ruling out other possibilities and is characterized by extended episodes of severe nausea, dehydration, ketosis, and significant weight loss.[1]

Nausea and vomiting during pregnancy are among the most frequently reported issues, significantly impacting both the physical and mental well-being of ANC mothers. Given the growing preference for herbal remedies during pregnancy, this study explored the impact of lemon inhalation aromatherapy on managing nausea and vomiting in expectant mothers.[2]

Morning sickness typically starts in the first month of pregnancy and usually lasts until the 14th to 16th week, covering the third or fourth month. However, some woman experience nausea and vomiting throughout the whole pregnancy. While morning sickness generally does not harm the baby, it can become concerning if severe vomiting leads to weight loss.[3]

Nausea and vomiting during pregnancy are among the most common concerns, affecting both the physical and mental well-being of pregnant women, with the growing inclination towards using herbal remedies during pregnancy, this study aims to examine the impact of lemon inhalation aromatherapy on managing these symptoms. Nausea and vomiting in pregnancy can be addressed through both pharmacological and non-

pharmacological approaches. Lemon aromatherapy contains active compounds like limonene and linalyl acetate, which exhibit analgesic properties that help promote a sense of calmness.[4]

Nausea and vomiting during pregnancy (NVP) are among the most frequent issues faced by pregnant women, with 50% to 80% experiencing varying degrees of severity. The onset of NVP differs among individuals, often beginning between the first and second missed menstrual cycle. It typically persists until the 14th to 16th week of pregnancy, with peak severity occurring between the 7th and 9th weeks. For half of the women, NVP subsides by the 14th week, and for 90% of women, it resolves by the 22nd week.[5]

Nausea and vomiting during pregnancy (NVP) not only have negative effects on women's physical health but also impact their psychosocial well-being. Symptoms such as fatigue, irritability, lack of energy, missed workdays, decreased enjoyment of life, and inadequate preparation for childbirth can contribute to significant stress. As the exact cause of NVP remains unclear, most treatments aim to alleviate the symptoms rather than address the underlying condition. Treatment options for NVP vary depending on symptom severity and can range from dietary and lifestyle modifications to hospitalization. A 2010 review by the Cochrane database found limited evidence supporting the effectiveness of medications like vitamin B6 and antiemetic for mild or moderate NVP. Similarly, evidence for non-pharmacological approaches, such as acupressure, is limited, and acupuncture was shown to provide no significant benefit. Ginger products might offer some relief, but evidence supporting their effectiveness is also scarce.[6]

In recent times, there has been a growing inclination among pregnant women to use herbal and non-medicinal remedies due to concerns about the potential side effects of conventional drugs during early pregnancy. Research indicates that 49.2% of pregnant women have used herbal remedies, with 39.3% turning to them for gastrointestinal issues—5.71% of which were related to nausea and vomiting in pregnancy (NVP). In Iran, midwives frequently utilize non-pharmacological treatments such as aromatherapy, phytotherapy, and massage, largely due to their widespread acceptance and the practitioners' hands-on experience with these methods.[6]

The effectiveness of ginger as a natural remedy and its medicinal properties have been widely recognized, particularly in alleviating morning sickness among pregnant women. Ginger tea, in particular, has been shown to ease nausea and vomiting during pregnancy by promoting digestion and reducing gastric irritation.[9]

Literature review:

Section-a: Review of literature related to ANC mothers with nausea and vomiting

The research study conducted by C Liu, G Zhao, D Qiao, L Wang, Y He, M Zhao; 10 January 2022: to aimed Emerging Progress in Nausea and Vomiting of Pregnancy and Hyperemesis Gravidarum: Challenges and Opportunities. With a comprehensive methodology to explore the pathogenesis and management of NVP and HG. Nausea and vomiting of pregnancy (NVP) are a common condition affecting up to 70% of pregnant women, with hyperemesis gravidarum (HG) being its severe form, reported in 0.3–10.8% of pregnancies. While NVP is generally mild, HG can lead to adverse maternal and foetal outcomes. The exact causes remain unclear, but hormonal, genetic, and psychosocial factors have been hypothesized. Recent advances in molecular biology have identified growth/differentiation factor 15 (GDF15) as a potential therapeutic target. The study reviewed historical and contemporary hypotheses about the pathogenesis of NVP and HG, including hormonal changes, Helicobacter pylori infection, gastrointestinal dysmotility, and genetic factors. It also examined various management strategies, such as pharmacological treatments, complementary therapies, and supportive care. The findings highlighted the multifactorial nature of NVP and HG, with genetic factors like GDF15 playing a significant role. Management approaches were found to alleviate symptoms and improve maternal quality of life, though challenges remain in addressing severe cases. Understanding the underlying mechanisms of NVP and HG is crucial for developing effective treatments. Future research should focus on precision medicine and targeted therapies to reduce adverse outcomes and enhance maternal well-being during pregnancy.[10]

Section-b: Literature related to Lemon oil composition

A study done by Tamara S. Al-Qudah, Umber Zahra, Rafia Rehman, Muhammad Irfan Majeed, Sadia Sadique, Shafaq Nisar, Tamadour Said Al-Qudah and Reham W. Tahtamouni; 2018. On Lemon as a source of functional and medicinal ingredient: A review; Research study conducted with a comprehensive literature review methodology to investigate the functional and therapeutic potential of lemons. Lemons are widely recognized for their nutritional value and medicinal properties. This review explores the functional and therapeutic potential of lemons, emphasizing their bioactive compounds and their applications in various health-related domains. The study aims to consolidate existing knowledge and highlight the potential of lemons as a natural remedy and functional food ingredient. The study involves a comprehensive review of existing literature on the chemical composition, bioactive compounds, and health benefits of lemons. Focused analyses include the role of flavonoids, vitamins, essential oils, and other phytonutrients found in lemons. The authors also discuss various extraction methods used to isolate these components. The findings demonstrate that lemons contain a rich array of bioactive compounds

with antioxidant, anti-inflammatory, antimicrobial, and anticancer properties. Key components such as vitamin C, flavonoids, and essential oils contribute to these effects. Lemons are also reported to support digestive health, boost immunity, and have potential therapeutic applications in managing chronic conditions. The review underscores the significance of lemons as a versatile ingredient with multiple health benefits. It highlights the need for further research to explore their therapeutic applications and optimal use in functional foods and medicine. Incorporating lemon-derived products into healthcare practices could contribute to preventive and integrative medicine strategies.[11]

Section-c: Literature related lemon oil inhalation aromatherapy on nausea and vomiting

Research done by R Sulistyowati; 2021On Literature Review: The Effect of Lemon Aromatherapy on Emesis Gravidarum with literature review methodology to evaluate the effects of lemon aromatherapy on emesis gravidarum symptoms. Emesis gravidarum, or nausea and vomiting during pregnancy, is a common condition that affects maternal well-being. Conventional treatments may have limitations, leading to interest in complementary therapies like lemon aromatherapy. This literature review aims to examine the effects of lemon aromatherapy in alleviating emesis gravidarum symptoms and improving maternal comfort. The study reviewed existing literature on lemon aromatherapy as an intervention for emesis gravidarum. Relevant articles and studies were selected based on criteria such as methodology, sample size, and outcomes related to the effectiveness of aromatherapy. The findings were synthesized to highlight key patterns and conclusions. The literature indicates that lemon aromatherapy effectively reduces nausea and vomiting in pregnant women. The aroma compounds in lemon, particularly limonene, are suggested to interact with olfactory receptors, promoting relaxation and reducing gastrointestinal discomfort. Participants reported improvements in their quality of life and reduced severity of symptoms after using lemon aromatherapy. Lemon aromatherapy shows promise as a safe and effective complementary treatment for emesis gravidarum. Its non-invasive nature and accessibility make it a practical option for pregnant women. Further research is recommended to establish standardized protocols and investigate its long-term benefits and safety.[12]

Section-d: Literature related to lemon oil inhalation aromatherapy with other conditions

A study done by Masoume Rambod, Nilofar Pasyar, Zahra Karimian & Arash Farbood; 24 June 2023 on the effect of lemon inhalation aromatherapy on pain, nausea, as well as vomiting and neurovascular fracture surgery; a randomized trial with a randomized controlled trial (RCT) methodology to evaluate the effects of lemon inhalation aromatherapy on postoperative pain, nausea, vomiting, and neurovascular outcomes in patients undergoing lower extremity fracture surgery. Managing postoperative pain, nausea, and vomiting is a critical aspect of care for patients undergoing lower extremity fracture surgery. Lemon inhalation aromatherapy has emerged as a non-invasive complementary therapy with potential benefits. This study investigates the effects of lemon aromatherapy on pain, nausea, vomiting, and neurovascular outcomes in such patients. This randomized trial included patients undergoing lower extremity fracture surgery, who were assigned to either the intervention group (lemon inhalation aromatherapy) or the control group (standard care). Data were collected on pain intensity, nausea, vomiting frequency, and neurovascular status at predefined intervals post-surgery. Validated tools and assessment scales were used for measurement. The intervention group demonstrated a significant reduction in pain, nausea, and vomiting compared to the control group. Lemon aromatherapy also showed no adverse effects on neurovascular parameters, indicating its safety and tolerability. Patients in the intervention group reported improved overall comfort and satisfaction during the recovery period. The findings suggest that lemon inhalation aromatherapy is an effective and safe complementary therapy for managing postoperative symptoms in patients undergoing lower extremity fracture surgery. Further studies are recommended to validate these results and explore broader clinical applications for aromatherapy in surgical care.[13.]

MATERIAL AND METHOD

The present study employed a quantitative research approach to assess the effect of lemon oil inhalation aromatherapy on nausea and vomiting among antenatal mothers. A quasi-experimental pre-test post-test control group design was adopted. The design included two groups: an experimental group that received the intervention and a control group that did not. Both groups underwent a pre-test on Day 1 and a post-test on Day 5, with the intervention being administered only to the experimental group during the study period.

In this study, the independent variable was lemon oil inhalation aromatherapy, while the dependent variable was the level of nausea and vomiting, measured using the Modified Pregnancy Unique Quantification of Emesis (PUQE) scale. The study was conducted in selected areas of the Sangli, Miraj, and Kupwad Corporation region of Maharashtra, India. The target population consisted of antenatal mothers experiencing nausea and vomiting. The 70 participants were selected through non-probability purposive sampling based on defined inclusion and exclusion criteria. The samples were evenly divided into two groups, with 35 antenatal mothers in the experimental group and 35 in the control group.

The inclusion criteria for sample selection were antenatal mothers who were primigravida, willing to give written consent, and experiencing nausea and vomiting. Mothers with respiratory issues, hyperemesis gravidarum, or known hypersensitivity to lemon or lemon-based products were excluded. The sample size was calculated

using a standard formula for power analysis: $n=z^2xpxq/e^2$ where, (z = 1.96) (confidence interval at 5% significance), (p = 0.70) (prevalence of nausea and vomiting), (q = 0.30), and (e = 0.11) (absolute error). This resulted in a minimum required sample size of approximately 66.66, rounded to 70 for the purpose of this study.

Data collection tools were developed after a thorough literature review and expert consultation. The tool was divided into two sections: Section I collected demographic data including age, education, occupation, parity, gestational age, gravida, and diet pattern. Section II assessed the level of nausea and vomiting using the Modified PUQE scale, which evaluates the duration and severity of symptoms. The tool underwent content validation by a panel of 26 experts in the fields of obstetric nursing, medicine, and related disciplines. Feedback from the experts was used to refine the tool. Reliability testing was done using the inter-rater method, yielding a coefficient (r = 0.86), indicating high reliability.

Ethical clearance was obtained from the Institutional Ethical Committee of Bharati Vidyapeeth (Deemed to be University) College of Nursing, Sangli. Written informed consent was secured from all participants after a clear explanation of the study's objectives, procedures, and rights. Participants were assured of confidentiality and the voluntary nature of their participation, with the right to withdraw at any point without any penalty. In case of any adverse reaction such as allergic response or respiratory difficulty, the intervention was to be discontinued immediately, and appropriate medical advice provided. Participants were also educated on early warning signs and advised to seek medical help if needed. Administrative permissions were obtained from the relevant health authorities of the selected study areas. The lemon oil inhalation aromatherapy was administered as follows: each participant in the experimental group was seated in a comfortable position and provided with 250 ml of hot water containing three drops of lemon oil. After allowing a few seconds for the aroma to diffuse, the participant inhaled the vapor for five minutes. This procedure was carried out once daily for five consecutive days. The control group did not receive any intervention during this period.

Data collection period was conducted over five days. Pre-test and post-test scores for both groups were recorded using the Modified PUQE scale. Descriptive statistics such as frequency and percentage were used to analyze demographic variables. Mean and standard deviation were calculated for pre- and post-intervention scores, and the unpaired t-test was used to assess the effectiveness of lemon oil inhalation aromatherapy between the two groups.

STATISTICAL ANALYSIS:

SECTION-I

Table No. 1: Frequency and Percentage distribution of demographic variables.

n= 35 + 35

Sr. No.	Demographic Variables		Experimental Group		Control Group	
			f	%	f	%
1.	Age (in yrs.)	20 – 30 yrs	35	100	35	100
2.	Education	Undergraduate	23	65.71	21	60
		Graduate	10	28.57	10	28.57
		Post graduate	2	5.72	4	11.43
3.	Occupation	Housewife	17	48.57	18	51.43
		Employees	18	51.43	17	48.57
4.	Gestation week	10 -15 weeks	19	54.28	18	51.43
		16 -20weeks	15	42.86	15	42.86
		21-30 weeks	1	2.86	2	5.71
5.	Diet	Vegetarian	8	22.86	5	14.29
		Both	27	77.14	30	85.71

Conclusion

The analysis of demographic variables indicates that both the experimental and control groups were homogeneous in their baseline characteristics. All participants were between 20–30 years of age, ensuring age uniformity. Educational status, occupational distribution, and gestational weeks were comparable across groups, with most participants being undergraduates and employed or homemakers. The majority of antenatal mothers in both groups were between 10–20 weeks of gestation. Dietary habits were also similar, with most following a mixed diet. This demographic uniformity confirms that both groups were comparable and free from major confounding differences, thereby strengthening the reliability and validity of subsequent comparisons and statistical analyses related to the intervention outcomes.

SECTION-II

Table No. 3: Assessment of nausea and vomiting before and after intervention among ANC mothers in experimental and control group.

Experimental group: n= 35
Control group: n=35

PUQE nausea & vomiting scale (before)	**Experimental group**		**Control group**	
	f	**%**	**f**	**%**
3 – 6 (Mild)	11	31.43	11	31.43
7 – 12 (Moderate)	23	65.71	24	68.57
13 – 15 (Severe)	1	2.86	0	0
PUQE nausea & vomiting scale (after)	**Experimental group**		**Control group**	
	f	**%**	**f**	**%**
3 – 6 (Mild)	33	94.29	11	31.43
7 – 12 (Moderate)	2	5.71	23	65.71
13 – 15 (Severe)	0	0	1	2.86

Conclusion-

Above table shows that before intervention, PUQE scale assessment revealed that most ANC mothers in both experimental and control groups experienced mild to moderate nausea and vomiting before intervention. Specifically, 31.43% had mild and over 65% had moderate symptoms. These findings underscore the commonality of such discomforts during pregnancy and highlight the potential of lemon oil inhalation aromatherapy as an effective intervention. Addressing these symptoms through non-invasive methods like aromatherapy can significantly enhance maternal comfort and improve the overall pregnancy experience for expectant mothers. And after intervention the PUQE nausea and vomiting scale assessment among ANC mothers after intervention revealed significant differences between the experimental and control groups. In the experimental group, 33 pregnant women (94.29%) showed mild symptoms, and 2 women (5.71%) experienced moderate symptoms of nausea and vomiting in the post-test. Conversely, in the control group, 11 pregnant women (31.43%) experienced mild symptoms, 23 women (65.71%) experienced moderate symptoms, and 1 woman (2.86%) experienced severe symptoms in the post-test.

SECTION-III

Table No. 5: Assessment of pre-test and post-test scores in experimental group and control group.

Experimental group: n= 35

Control group: n=35

Experimental group	**Mean**	**S.D.**	**Paired t-test**	**p -value**	**Significance**
Pre- test	8	2.6002	- 15. 7249	0.00001 < 0.05	**Significant**
Post- test	3	1.7503			
Control Group	**Mean**	**S.D.**	**Paired T-test**	**P -Value**	**Significance**
Pre- test	7	2.5228	1.8708	0.07 > 0.05	**No significant**
Post- test	8	2.7439			

Conclusion-

Above table shows that in experimental group the Paired t- test at 5% level of significance was applied to the observations and result was analyzed statistically. According to pre- test in experimental group, mean score of level of nausea and vomiting was 8, S.D. was 2.6002 and according to post- test in experimental group, mean score of level of nausea and vomiting was 3, S.D. was 1.7503 and paired t- value was – 15.7249 and p- value was 0.00001 < 0.05. in control group a paired t-test at a 5% level of significance was applied to analyses the observations. In the control group, the pre-test mean score for nausea and vomiting was 7, with a standard deviation (S.D.) of 2.5228. The post-test mean score was 8, with an S.D. of 2.7439. The paired t-value was calculated as 1.8708, and the p-value was 0.07, which is greater than 0.05. These results indicate that the test is statistically insignificant at the 5% level of significance. Consequently, the alternative hypothesis (H_1) was rejected. This suggests there is no significant difference between the pre-test and post-test mean scores for nausea and vomiting levels in the control group, where no lemon oil inhalation aromatherapy was administered to ANC mothers. Thus, the data implies that lemon oil aromatherapy had no observed impact on reducing nausea and vomiting in the given control group.

Table No. 5 Assessment of pre- test and post- test in control group.

n=35

Control Group	**Mean**	**S.D.**	**Paired T-test**	**P -Value**	**Significance**
Pre- test	**7**	**2.5228**	**1.8708**	**0.07 > 0.05**	**No significant**
Post- test	**8**	**2.7439**			

Conclusion-

Above table shows that a paired t-test at a 5% level of significance was applied to analyse the observations. In the control group, the pre-test mean score for nausea and vomiting was 7, with a standard deviation (S.D.) of 2.5228. The post-test mean score was 8, with an S.D. of 2.7439. The paired t-value was calculated as 1.8708, and the p-value was 0.07, which is greater than 0.05. These results indicate that the test is statistically insignificant at the 5% level of significance. Consequently, the alternative hypothesis (H_1) was rejected. This suggests there is no significant difference between the pre-test and post-test mean scores for nausea and vomiting levels in the control group, where no lemon oil inhalation aromatherapy was administered to ANC mothers. Thus, the data implies that lemon oil aromatherapy had no observed impact on reducing nausea and vomiting in the given control group.

Table No. 6: Analysis of post test score experimental and control group n= 35 + 35

Post- test	Mean	S.D.	Unpaired t-test	p -value	Significance
Experimental group	3	1.7503	8.4132	0.00001 < 0.05	**Significant**
Control group	8	2.7439			

Conclusion -

Above table shows that an Unpaired t- test at 5% level of significance was applied to the observations and result was analyzed statistically. According to post- test, after intervention of lemon oil inhalation aromatherapy in experimental group mean was 3, S.D. was 1.7503 and in control group mean was 8, S.D. was 2.7439 and unpaired t- value was 8.4132 and p-value was 0.00001 < 0.05.

DISCUSSION

The present study explored the effectiveness of lemon essential oil inhalation aromatherapy in alleviating nausea and vomiting among antenatal mothers, particularly those in the early stages of pregnancy. The findings of this research align strongly with existing evidence suggesting that lemon oil, derived from Citrus limon, possesses significant antiemetic and calming properties due to its primary active compound, limonene. The results revealed that before intervention, both experimental and control groups exhibited comparable levels of mild to moderate nausea and vomiting as measured by the PUQE scale, confirming baseline homogeneity. This consistency in demographic and clinical characteristics between groups ensured that any subsequent differences observed could be attributed primarily to the intervention rather than to external factors.

Following five days of lemon oil inhalation aromatherapy, a significant reduction in nausea and vomiting symptoms was observed in the experimental group. The majority of participants (94.29%) reported only mild symptoms of post-intervention, compared to the control group, where no meaningful change occurred. The paired t-test confirmed a highly significant reduction in the experimental group ($p = 0.00001$), while the unpaired t-test further validated the difference between the two groups ($p = 0.00001$). These statistical findings strongly indicate that lemon oil inhalation aromatherapy effectively alleviates nausea and vomiting among pregnant women.

The mechanism underlying these effects can be attributed to both physiological and psychological pathways. Limonene, the main constituent of lemon essential oil, has been shown to influence the olfactory and limbic systems, areas of the brain associated with emotion and autonomic control. When inhaled, the scent activates olfactory receptors that transmit signals to the limbic system, producing calming effects and reducing nausea-related neural activity. Additionally, lemon oil may modulate serotonin receptors in the central nervous system and gastrointestinal tract, both of which are involved in the nausea and vomiting reflex. The refreshing and uplifting aroma also helps reduce anxiety and promote relaxation, thereby mitigating nausea symptoms indirectly through stress reduction.

The current findings are consistent with those of Mudarris et al. (2019–2023), who reported that lemon oil aromatherapy significantly reduced emesis gravidarum symptoms when administered for 5 minutes daily over several days. Their review of ten studies found that lemon scent not only decreased nausea intensity but also improved maternal comfort and appetite. Similarly, the study by Purwandari et al. in Indonesia demonstrated that 80% of pregnant women experienced mild symptoms after lemon aromatherapy intervention, highlighting its efficacy in reducing both frequency and severity of nausea and vomiting.

These results underscore the growing recognition of aromatherapy as a complementary therapy in maternity care. Compared with pharmacological interventions, lemon essential oil aromatherapy is non-invasive, cost-effective, and devoid of harmful side effects, making it a practical and safe alternative for managing pregnancy-related nausea.

CONCLUSION

The present study aimed to evaluate the effectiveness of lemon oil inhalation aromatherapy on reducing nausea and vomiting among antenatal mothers. The analysis of demographic variables revealed that both the experimental and control groups were homogeneous in their baseline characteristics, ensuring comparability and minimizing confounding influences. Before the intervention, PUQE scale assessments indicated that most antenatal mothers in both groups experienced mild to moderate nausea and vomiting, a common discomfort during early pregnancy. Following the intervention, a marked improvement was observed in the experimental group that received lemon oil inhalation aromatherapy. Post-test results demonstrated that 94.29% of mothers in the experimental group experienced only mild symptoms, with a significant reduction in the severity of nausea and vomiting. In contrast, the control group showed no meaningful improvement, with most participants continuing to experience moderate symptoms.

Statistical analysis using the paired t-test confirmed a significant reduction in mean nausea and vomiting scores in the experimental group (pre-test mean = 8, post-test mean = 3, $p < 0.05$), indicating the effectiveness of the aromatherapy intervention. Conversely, the control group showed no statistically significant difference ($p > 0.05$) between pre- and post-test scores, confirming that the reduction in symptoms was attributable to the intervention rather than chance or external factors. Further, the unpaired t-test comparing post-test scores between groups revealed a highly significant difference ($t = 8.4132$, $p < 0.05$), reinforcing the conclusion that lemon oil inhalation aromatherapy was effective in alleviating nausea and vomiting among antenatal mothers. Therefore, it can be concluded that lemon oil inhalation aromatherapy is a simple, non-invasive, safe, and effective complementary therapy for reducing the severity of nausea and vomiting during pregnancy, thereby enhancing maternal comfort and well-being.

In summary, the discussion supports that lemon essential oil inhalation aromatherapy significantly reduces nausea and vomiting among antenatal mothers through its physiological modulation of olfactory and neurochemical pathways and its psychological calming effects. The findings, corroborated by related literature, demonstrate that this natural therapy can enhance maternal well-being, improve daily functioning, and contribute positively to the overall pregnancy experience

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