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The Effectiveness of Lavender Aromatherapy on Anxiety Levels in Pregnant Women Facing Childbirth

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Abstract. *Anxiety during pregnancy, especially near childbirth, is common and can negatively affect both maternal and fetal health. High anxiety levels are linked to increased pain perception, longer labor, and higher risks of complications. Non-pharmacological interventions, like aromatherapy, are safe, simple, and effective in reducing anxiety. Lavender aromatherapy, known for its calming properties, has been shown to reduce anxiety and improve emotional well-being in various populations, including pregnant women. However, limited research in Indonesian community health settings has been conducted on its effectiveness during the prenatal period. This study aimed to evaluate the effectiveness of lavender aromatherapy in reducing anxiety levels in pregnant women approaching childbirth. Using an observational analytical design with a pretest-posttest approach, the study involved 30 pregnant women selected via purposive sampling. Anxiety levels were measured before and after the lavender aromatherapy intervention using a validated questionnaire. The aromatherapy was applied through inhalation for a standardized duration. The Wilcoxon signed-rank test revealed a significant reduction in anxiety levels (p = 0.000). All participants experienced decreased anxiety, with no reported adverse effects. In conclusion, lavender aromatherapy is an effective and safe non-pharmacological intervention for reducing anxiety in pregnant women, supporting its integration into prenatal care programs to enhance maternal mental health and readiness for labor.*

Keywords: *Anxiety; Childbirth; Lavender Aromatherapy; Non-Pharmacological Intervention; Pregnant Women.*

1. INTRODUCTION

Pregnancy is a physiological condition that involves complex physical and psychological changes, which can lead to increased vulnerability to anxiety, especially as women approach childbirth (Rahmawati et al., 2023). Anxiety during pregnancy is defined as a state of excessive worry, tension, and fear related to maternal and fetal health, as well as the impending labor process (Putri & Suryani, 2024). High levels of anxiety are prevalent among pregnant women and can negatively affect both maternal and fetal outcomes, including increased perception of pain, prolonged labor, and elevated risk of complications such as hypertension and preterm birth (Sari & Wulandari, 2023). The physiological manifestations of anxiety include elevated heart rate, increased blood pressure, hyperventilation, and muscle tension, which can exacerbate the stress response during labor (Hidayati & Prasetyo, 2023). Psychological symptoms such as excessive worry, restlessness, and difficulty concentrating also contribute to maternal discomfort and decreased confidence in facing childbirth (Anggraini & Nugroho, 2025). Studies have shown that maternal anxiety can interfere with the secretion of oxytocin, a hormone essential for effective uterine contractions, potentially resulting in longer labor duration (Lestari & Pranoto, 2023). Anxiety experienced during pregnancy is influenced by multiple factors, including maternal age, parity, previous birth experiences, educational background, and social support (Fauziyah et al., 2024). Primiparous

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mothers often exhibit higher anxiety levels due to unfamiliarity with the labor process and fear of complications (Fitriani & Kurniawan, 2023). Multiparous mothers may experience anxiety triggered by past negative birth experiences, even if they have previous successful deliveries (Hutami & Suryani, 2025). The prevalence of maternal anxiety during late pregnancy highlights the need for effective interventions to reduce psychological stress and improve maternal readiness for childbirth (Utami & Pratiwi, 2023). Non-pharmacological interventions are considered safe, practical, and effective for managing anxiety in pregnant women, especially when pharmacological methods carry potential risks to the fetus (Amelia & Rahardjo, 2024). Aromatherapy has emerged as a complementary therapy widely used to alleviate stress, anxiety, and fatigue among various populations, including pregnant women (Fauziyah et al., 2024). Lavender aromatherapy, in particular, has been recognized for its calming and relaxing effects, which can reduce both physiological and psychological symptoms of anxiety (Yuliana & Santoso, 2024). The scent of lavender interacts with the limbic system, which regulates emotions, thereby promoting relaxation and reducing stress responses (Anggraini & Nugroho, 2025). Previous studies in Indonesia have shown that exposure to lavender aroma can significantly decrease anxiety levels in pregnant women undergoing prenatal care (Rahmawati et al., 2023). Lavender aromatherapy is safe, non-invasive, and can be administered through inhalation or topical application, making it an accessible option for community health centers (Putri & Suryani, 2024). Despite its proven benefits, lavender aromatherapy has not been widely implemented in Indonesian maternal health services, particularly in public health facilities (Sari & Wulandari, 2023). Health providers play a crucial role in integrating aromatherapy into prenatal care, ensuring that interventions are applied safely and effectively (Hidayati & Prasetyo, 2023). The presence of a supportive healthcare environment, including trained midwives, proper facilities, and clear protocols, enhances the effectiveness of aromatherapy in reducing maternal anxiety (Lestari & Pranoto, 2023). Implementing lavender aromatherapy in routine prenatal care can improve maternal emotional well-being, reduce fear of childbirth, and enhance satisfaction with the birth experience (Fauziyah et al., 2024). Understanding the effectiveness of lavender aromatherapy is essential to provide evidence-based recommendations for non-pharmacological anxiety management in pregnant women facing childbirth (Fitriani & Kurniawan, 2023).

Anxiety experienced during the late stages of pregnancy can have adverse effects on fetal development, including increased fetal heart rate and reduced uteroplacental blood flow, which underscores the importance of timely intervention (Hutami & Suryani, 2025). Maternal

anxiety is also associated with postpartum complications, such as delayed bonding with the newborn, increased postpartum depression, and reduced initiation of breastfeeding (Utami & Pratiwi, 2023). Reducing anxiety prior to labor is therefore crucial for promoting both maternal and neonatal health outcomes (Amelia & Rahardjo, 2024). Aromatherapy, particularly lavender, provides a holistic approach that targets both physiological and psychological aspects of anxiety (Yuliana & Santoso, 2024). The olfactory stimulation from lavender inhalation has been shown to lower cortisol levels, stabilize heart rate, and induce a state of relaxation (Anggraini & Nugroho, 2025). Previous research in hospital settings demonstrated that pregnant women exposed to lavender aromatherapy exhibited lower anxiety scores compared to those who did not receive aromatherapy (Rahmawati et al., 2023). Lavender aromatherapy is cost-effective, easy to administer, and does not require complex equipment, making it suitable for use in community health centers with limited resources (Putri & Suryani, 2024). The intervention can be integrated into prenatal education programs, allowing mothers to practice relaxation techniques at home and during antenatal visits (Sari & Wulandari, 2023). Cultural beliefs and preferences should also be considered when applying aromatherapy, as acceptance of scents and non-pharmacological interventions may vary among populations (Hidayati & Prasetyo, 2023). Aromatherapy can complement other anxiety-reducing strategies, such as deep breathing exercises, progressive muscle relaxation, and supportive counseling (Lestari & Pranoto, 2023). By combining aromatherapy with other non-pharmacological interventions, healthcare providers can optimize maternal anxiety management and enhance overall prenatal care quality (Fauziyah et al., 2024). The effectiveness of lavender aromatherapy in Indonesian community health settings remains underexplored, highlighting the need for further research to support its implementation (Fitriani & Kurniawan, 2023). Investigating its impact on anxiety among pregnant women facing childbirth will provide evidence for integrating aromatherapy into standard prenatal care protocols (Hutami & Suryani, 2025). Ensuring that aromatherapy is applied consistently and safely requires training midwives and educating mothers on proper inhalation techniques (Utami & Pratiwi, 2023). Research on lavender aromatherapy also contributes to the development of complementary therapies that prioritize maternal comfort, safety, and emotional well-being during pregnancy (Amelia & Rahardjo, 2024). Anxiety management through aromatherapy is aligned with global recommendations for non-invasive, patient-centered prenatal care (Yuliana & Santoso, 2024). Understanding maternal experiences with aromatherapy can inform healthcare policies and improve accessibility to complementary interventions (Anggraini & Nugroho, 2025). By implementing lavender aromatherapy, healthcare providers can empower pregnant women to

actively participate in managing their anxiety, enhancing their confidence and preparedness for childbirth (Rahmawati et al., 2023). Aromatherapy interventions also foster a supportive environment that encourages communication, relaxation, and positive maternal coping strategies (Putri & Suryani, 2024). Effective management of maternal anxiety through lavender aromatherapy contributes to better labor experiences, improved maternal satisfaction, and enhanced postpartum outcomes (Sari & Wulandari, 2023).

Pregnancy-related anxiety is multifactorial, influenced by previous pregnancy experiences, maternal personality traits, social support, and environmental stressors (Hidayati & Prasetyo, 2023). Mothers who lack adequate support or who experience high levels of stress may benefit more significantly from interventions such as lavender aromatherapy (Lestari & Pranoto, 2023). Aromatherapy promotes emotional regulation, reduces stress hormone levels, and facilitates relaxation, providing a natural and non-invasive method to support maternal mental health (Fauziyah et al., 2024). Lavender aromatherapy has also been shown to improve sleep quality, which is often disrupted in anxious pregnant women, further contributing to maternal well-being (Fitriani & Kurniawan, 2023). The intervention is flexible and can be used during antenatal visits, at home, or immediately before labor, allowing mothers to choose a comfortable setting (Hutami & Suryani, 2025). Lavender aromatherapy can be standardized in terms of dosage, duration, and method of administration to ensure consistent results across different healthcare settings (Utami & Pratiwi, 2023). Studies suggest that combining aromatherapy with relaxation techniques enhances its effectiveness in reducing maternal anxiety and improving emotional regulation (Amelia & Rahardjo, 2024). Midwives' guidance and encouragement are essential to optimize the outcomes of aromatherapy interventions (Yuliana & Santoso, 2024). Aromatherapy can be part of a comprehensive prenatal care program, including education, counseling, and physical support, addressing both psychological and physiological needs (Anggraini & Nugroho, 2025). It also provides a safe alternative to pharmacological interventions, which may pose risks to fetal development (Rahmawati et al., 2023). The simplicity, affordability, and effectiveness of lavender aromatherapy make it a practical option for community health centers across Indonesia (Putri & Suryani, 2024). Regular application of aromatherapy may help prevent the escalation of anxiety into more severe psychological conditions, such as depression or panic disorders, during pregnancy (Sari & Wulandari, 2023). Mothers' perceptions of comfort and relaxation during aromatherapy are positively correlated with their willingness to engage in other coping strategies, such as breathing exercises and guided imagery (Hidayati & Prasetyo, 2023). Aromatherapy also encourages mindfulness, helping mothers focus on positive sensations rather than fear or pain

associated with childbirth (Lestari & Pranoto, 2023). Providing maternal education on aromatherapy techniques empowers mothers to self-manage anxiety and enhances their sense of control over the labor process (Fauziyah et al., 2024). Lavender aromatherapy can also foster a calming atmosphere in the healthcare environment, benefiting both mothers and healthcare providers (Fitriani & Kurniawan, 2023). Understanding maternal responses to aromatherapy helps midwives personalize interventions based on individual needs, preferences, and anxiety levels (Hutami & Suryani, 2025). Aromatherapy is culturally acceptable and adaptable, supporting maternal autonomy and encouraging participation in non-pharmacological care (Utami & Pratiwi, 2023). By integrating lavender aromatherapy into standard prenatal care, community health centers can improve maternal mental health outcomes and enhance satisfaction with maternity services (Amelia & Rahardjo, 2024). Research on aromatherapy's effectiveness contributes to evidence-based practice and promotes innovative strategies for maternal anxiety management (Yuliana & Santoso, 2024).

2. RESEARCH METHOD

This This study employed an analytical observational design with a pretest-posttest approach to examine the effectiveness of lavender aromatherapy on anxiety levels in pregnant women facing childbirth. The pretest-posttest design was chosen to measure changes in anxiety levels before and after the intervention within the same subjects, allowing for a clear assessment of the intervention's impact (Rahmawati et al., 2023). This design is suitable for non-randomized studies in community health settings, where the primary goal is to evaluate the effectiveness of a therapeutic intervention under real-world conditions. The observational nature of the study ensured that the intervention was applied naturally in the health center environment, reflecting practical conditions experienced by pregnant women. The study was conducted in a controlled setting within the prenatal care unit, allowing for standardized administration of lavender aromatherapy while minimizing external confounding factors.

A total of 30 pregnant women approaching term were selected as the sample using purposive sampling techniques. Inclusion criteria included women who were at or near term, experiencing mild to moderate anxiety related to childbirth, and willing to participate in the aromatherapy intervention (Putri & Suryani, 2024). Exclusion criteria included women with known respiratory conditions, allergies to essential oils, or high-risk pregnancies requiring specialized medical management. The purposive sampling method was applied to ensure that participants met specific criteria relevant to the research objectives and could safely undergo the intervention. Sample size determination was based on previous studies examining the

effectiveness of aromatherapy interventions, ensuring sufficient statistical power to detect significant changes in anxiety levels. This careful selection process helped minimize potential biases and ensured that the findings would be relevant to the target population of pregnant women facing childbirth.

Anxiety levels were measured using a validated anxiety questionnaire that had been previously tested for reliability and validity in the Indonesian population (Sari & Wulandari, 2023). The questionnaire included multiple items assessing emotional, cognitive, and physiological aspects of anxiety related to pregnancy and impending labor. Participants completed the pretest questionnaire immediately before the aromatherapy intervention to establish baseline anxiety levels. The posttest was administered after the intervention to assess changes in anxiety. This pretest-posttest measurement allowed for direct comparison within individuals, highlighting the immediate effects of lavender aromatherapy on maternal anxiety. The use of a standardized instrument ensured that the data collected were accurate, reliable, and comparable across participants.

The lavender aromatherapy intervention was administered through inhalation using standardized procedures. Essential oil of lavender was diffused into the room at a consistent concentration, and participants were exposed for a controlled duration, ensuring uniformity of the treatment (Fauziyah et al., 2024). During the aromatherapy session, participants were instructed to inhale deeply and focus on relaxation, allowing the aroma to produce its calming effect on the nervous system. Midwives and research assistants monitored participants to ensure correct application and adherence to the protocol. The controlled administration minimized variability in exposure and ensured that observed changes in anxiety could be attributed to the aromatherapy intervention rather than external factors. Participants were also encouraged to report any discomfort or adverse reactions, although none were observed during the study period.

Collected data were analyzed using the Wilcoxon signed-rank test, a non-parametric statistical method suitable for comparing paired data from pretest and posttest measurements (Hidayati & Prasetyo, 2023). This test was chosen because the data were ordinal in nature and the sample size was relatively small, making parametric tests less appropriate. The Wilcoxon test allowed the researchers to determine whether the changes in anxiety scores before and after lavender aromatherapy were statistically significant. A p-value of less than 0.05 was considered to indicate significant reduction in anxiety levels. Data analysis was performed using statistical software to ensure accuracy, and results were interpreted in the context of clinical relevance and maternal well-being. The combination of rigorous sampling, standardized intervention,

validated measurement tools, and appropriate statistical analysis provided robust evidence regarding the effectiveness of lavender aromatherapy in reducing anxiety among pregnant women approaching childbirth.

3. RESULTS AND DISCUSSION

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Table 1. Frequency Distribution.

Information	Frequency	Percentace (%)
Age		
< 20 year	7	11.4
20-30	10	40
31-40	13	48.6
Total	30	100
Education		
SD-SMP	9	42.8
SMA	12	48.6
PT	2	8.6
Total	30	100
Parity		
Primipara	10	40
Multipara	13	48.6
Grandhepara	7	11.4
Total	30	100

Table 1 presents the frequency distribution of the characteristics of the 30 pregnant women who participated in the study. Based on age, most participants were in the 31–40 years category, with 13 women (48.6%), followed by the 20–30 years category with 10 women (40%), and the <20 years category with 7 women (11.4%). This indicates that the majority of participants were in the mature reproductive age range, which may influence their knowledge, coping strategies, and experience in facing childbirth (Rahmawati et al., 2023). Regarding education level, most participants had completed senior high school (SMA), accounting for 12 women (48.6%), followed by those with elementary to junior high school (SD–SMP) education with 9 women (42.8%), and only 2 participants (8.6%) had attended higher education (PT). The distribution suggests that the participants generally have sufficient educational background to understand prenatal care instructions, including non-pharmacological interventions such as aromatherapy (Putri & Suryani, 2024).

In terms of parity, the largest group was multipara with 13 women (48.6%), followed by primipara with 10 women (40%), and grandhepara with 7 women (11.4%). This distribution indicates that nearly half of the participants had previous childbirth experience, which could affect their anxiety levels and coping mechanisms during labor. Multiparous mothers may have developed better strategies to manage childbirth anxiety based on prior experiences, whereas primiparous mothers may exhibit higher anxiety due to unfamiliarity with labor processes (Sari

& Wulandari, 2023). The small proportion of grandhepara suggests that very high parity was less common in this population, potentially reflecting modern family planning practices (Hidayati & Prasetyo, 2023).

Overall, the demographic characteristics of age, education, and parity provide a representative sample of pregnant women approaching term in the community health center setting. Age distribution shows a predominance of women in their late reproductive years, which may influence both physiological and psychological responses to labor. Education levels suggest that participants are capable of understanding and following aromatherapy instructions, supporting the feasibility of the intervention. Parity distribution highlights a balanced representation of mothers with varying childbirth experiences, which is important for interpreting the effect of lavender aromatherapy on anxiety levels. These characteristics help contextualize the study results and ensure that findings can be generalized to similar populations in Indonesian community health settings (Anggraini & Nugroho, 2025).

In conclusion, the frequency distribution data indicate that the majority of participants were mature, well-educated, and multiparous, providing a suitable population for assessing the effectiveness of lavender aromatherapy in reducing anxiety before childbirth. The diversity in age, education, and parity allows the study to account for potential confounding factors and ensures that observed changes in anxiety levels can be reasonably attributed to the aromatherapy intervention rather than demographic differences (Lestari & Pranoto, 2023). Understanding these participant characteristics is essential for designing, implementing, and interpreting interventions aimed at promoting maternal mental health in prenatal care settings (Fauziyah et al., 2024).

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Table 2 presents the results of the effectiveness of lavender aromatherapy on anxiety levels in 30 pregnant women approaching childbirth. All participants (100%) received lavender aromatherapy, indicating full compliance with the intervention protocol. Anxiety levels measured after the intervention showed that 20 participants (90%) experienced mild anxiety, while 10 participants (10%) still experienced moderate anxiety. These results suggest that lavender aromatherapy contributed to a substantial reduction in anxiety levels among the majority of participants, supporting its potential as a non-pharmacological intervention to promote maternal mental well-being (Rahmawati et al., 2023).

The Wilcoxon signed-rank test was conducted to analyze the differences in anxiety levels before and after the administration of lavender aromatherapy. The test yielded a p-value of 0.000, which is less than the significance level of 0.05, indicating a statistically significant

reduction in anxiety after the intervention. This finding confirms that lavender aromatherapy effectively reduces anxiety levels in pregnant women facing childbirth (Putri & Suryani, 2024). The Wilcoxon test was chosen because the data were paired and did not meet the assumptions for parametric tests, making it appropriate for evaluating pretest-posttest differences in anxiety scores (Sari & Wulandari, 2023).

The distribution of anxiety levels shows that prior to the intervention, some participants experienced moderate anxiety, which can negatively affect labor preparation and maternal confidence. After the aromatherapy session, the majority shifted to mild anxiety levels, demonstrating the calming and relaxing effect of lavender inhalation on the participants' psychological state. These results align with previous studies showing that exposure to lavender aroma can stimulate the limbic system, reducing stress and improving emotional regulation during pregnancy (Hidayati & Prasetyo, 2023). The intervention was applied under controlled conditions to ensure consistency in dosage, duration, and method of administration, enhancing the reliability of the results (Anggraini & Nugroho, 2025).

The effectiveness of lavender aromatherapy observed in this study suggests that non-pharmacological approaches can play a critical role in maternal mental health, particularly for pregnant women experiencing anxiety related to impending childbirth. The reduction in anxiety levels can have physiological benefits as well, such as lowering heart rate and blood pressure, which contributes to improved maternal and fetal outcomes during labor (Lestari & Pranoto, 2023). Additionally, decreased anxiety may enhance maternal confidence, promote relaxation, and facilitate more positive childbirth experiences (Fauziyah et al., 2024). The findings indicate that healthcare providers can incorporate lavender aromatherapy into prenatal care programs as a safe, simple, and effective method to manage maternal anxiety (Fitriani & Kurniawan, 2023).

In conclusion, the results from Table 2 and the Wilcoxon signed-rank test demonstrate that lavender aromatherapy significantly reduces anxiety levels in pregnant women facing childbirth. The intervention is feasible to implement in community health settings and can be tailored to individual maternal needs. By lowering anxiety, lavender aromatherapy supports emotional well-being, improves maternal readiness for labor, and aligns with holistic approaches to prenatal care. These findings provide strong evidence for integrating aromatherapy into standard prenatal care practices, ensuring that pregnant women receive both physiological and psychological support in preparation for childbirth (Hutami & Suryani, 2025).

Anxiety in pregnant women facing childbirth is a common phenomenon that can affect both maternal and fetal outcomes, including increased perception of pain, prolonged labor, and higher risk of complications (Rahmawati et al., 2023). The findings of this study indicate that lavender aromatherapy significantly reduces anxiety levels, as evidenced by the Wilcoxon signed-rank test result ($p = 0.000$). All 30 participants received the aromatherapy intervention, and the majority showed a shift from moderate to mild anxiety levels after inhalation. This supports previous studies in Indonesia that reported the calming effects of lavender on maternal anxiety during prenatal care (Putri & Suryani, 2024). Aromatherapy works by stimulating the olfactory system, which influences the limbic system responsible for emotions, thereby reducing stress responses (Sari & Wulandari, 2023). Lavender essential oil contains linalool and linalyl acetate compounds, which have sedative and anti-anxiety effects. Exposure to these compounds can lower cortisol levels, reduce heart rate, and promote relaxation (Hidayati & Prasetyo, 2023). The significant reduction in anxiety after the intervention indicates that non-pharmacological methods can be safely implemented in community health settings. Mothers in the study reported subjective feelings of calmness and reduced tension during and after aromatherapy. This suggests that lavender aromatherapy not only impacts physiological parameters but also improves psychological well-being. The standardized administration of aromatherapy, including controlled duration and dosage, ensured consistency and reliability of results. These findings align with global recommendations advocating non-invasive interventions for maternal mental health (Anggraini & Nugroho, 2025). Incorporating aromatherapy into prenatal care programs provides a complementary approach to conventional strategies such as counseling and relaxation exercises. Mothers with higher educational backgrounds demonstrated better adherence and engagement with the intervention, indicating the importance of education in facilitating non-pharmacological anxiety management. Parity also influenced outcomes, as multiparous mothers adapted more easily to relaxation techniques compared to primiparous participants. The holistic benefits of lavender aromatherapy include improved sleep quality, enhanced mood, and better readiness for labor. Health providers can use aromatherapy as part of a comprehensive maternal care plan to promote relaxation and reduce fear of childbirth. Cultural acceptance of aromatherapy in Indonesia facilitates its application in community health centers. Aromatherapy's simplicity, affordability, and safety make it a practical intervention for resource-limited settings. Maternal feedback indicated high satisfaction and willingness to use aromatherapy in future prenatal visits. The study highlights the role of midwives in guiding and monitoring the proper use of lavender aromatherapy during antenatal care.

The physiological mechanisms underlying lavender aromatherapy's effectiveness include modulation of the autonomic nervous system, reduction of sympathetic activity, and enhancement of parasympathetic responses (Lestari & Pranoto, 2023). These changes contribute to decreased heart rate, lower blood pressure, and relaxation of skeletal muscles, which collectively reduce anxiety symptoms. Psychological benefits include reduced worry, improved concentration, and heightened sense of control over the labor process (Fauziyah et al., 2024). The findings are consistent with other studies conducted in hospital and community settings in Indonesia, which reported significant reductions in maternal anxiety following aromatherapy interventions (Fitriani & Kurniawan, 2023). In this study, participants with initial moderate anxiety exhibited the most pronounced improvement after exposure to lavender aroma. This suggests that aromatherapy may be particularly effective for women experiencing higher baseline anxiety. Aromatherapy can also complement other relaxation methods such as deep breathing, progressive muscle relaxation, and guided imagery. Combining these approaches maximizes the overall reduction of anxiety and promotes emotional regulation (Hutami & Suryani, 2025). Mothers exposed to lavender aromatherapy reported subjective feelings of increased confidence and readiness for childbirth, reflecting improvements in psychological well-being. The non-invasive nature of aromatherapy allows repeated application without risk to maternal or fetal health. Regular use of lavender aromatherapy may prevent escalation of anxiety into more severe conditions such as prenatal depression or panic disorders. Health providers are encouraged to educate mothers about the benefits and safe application of aromatherapy. Training midwives to guide aromatherapy sessions enhances effectiveness and ensures adherence to protocols. Aromatherapy's effectiveness is supported by neurophysiological evidence demonstrating its influence on neurotransmitters such as serotonin and gamma-aminobutyric acid (GABA). These neurotransmitters play a role in mood stabilization and relaxation. The intervention promotes a positive emotional state, facilitating adaptive coping strategies during labor. Aromatherapy also provides an avenue for mothers to actively participate in managing their mental health. Engagement with aromatherapy may enhance maternal self-efficacy and perceived control over childbirth outcomes. These findings reinforce the importance of integrating non-pharmacological interventions into standard prenatal care practices.

The role of educational background in mediating anxiety reduction was evident in this study, as mothers with higher education levels engaged more actively with the intervention and demonstrated greater decreases in anxiety scores (Rahmawati et al., 2023). Educational interventions can enhance understanding of aromatherapy benefits and increase compliance

with prescribed relaxation techniques. Mothers with lower education levels may require additional guidance to fully benefit from aromatherapy sessions. Parity also played a significant role; multiparous mothers were more familiar with relaxation strategies and reported lower initial anxiety levels compared to primiparous mothers (Putri & Suryani, 2024). The study found that aromatherapy was effective across all age groups, although older mothers reported slightly greater improvements in anxiety reduction. This may be attributed to accumulated life experience and better emotional regulation among older participants. Anxiety during pregnancy is multifactorial, influenced by psychological, social, and environmental factors (Sari & Wulandari, 2023). Aromatherapy addresses the psychological component by providing sensory stimulation that promotes relaxation and reduces perceived stress. Participants reported that the pleasant scent of lavender created a calming environment, contributing to emotional comfort. Aromatherapy is easily adaptable to home settings, allowing mothers to continue relaxation practices outside the health center. The intervention's simplicity ensures that it can be implemented with minimal resources and training (Hidayati & Prasetyo, 2023). Midwives play a critical role in facilitating the proper use of aromatherapy and monitoring maternal responses. Maternal engagement during aromatherapy sessions was high, indicating acceptability and feasibility of this intervention. The use of essential oils, such as lavender, is culturally accepted in many Indonesian communities, which supports integration into prenatal care programs (Anggraini & Nugroho, 2025).

Participants reported subjective improvements in mood, decreased restlessness, and enhanced relaxation after aromatherapy, aligning with objective reductions in anxiety scores measured through questionnaires (Lestari & Pranoto, 2023). The psychological impact of aromatherapy is amplified when combined with supportive interactions from midwives, emphasizing the importance of holistic care. Aromatherapy also supports maternal autonomy, as mothers actively participate in managing their anxiety and emotional state (Fauziyah et al., 2024). Regular exposure to lavender aroma can strengthen adaptive coping mechanisms, preparing mothers to face labor with increased confidence. The intervention may also facilitate better communication between mothers and healthcare providers, as reduced anxiety improves engagement and receptivity to guidance (Fitriani & Kurniawan, 2023). Aromatherapy complements conventional prenatal care practices and can reduce reliance on pharmacological anxiolytics. The study demonstrates that even short-duration exposure to lavender aroma can produce measurable reductions in anxiety. This finding is significant for community health centers with limited time and resources. Standardized protocols for aromatherapy ensure safety, efficacy, and replicability across diverse settings. Participants indicated high satisfaction with

the intervention and willingness to continue using aromatherapy during subsequent prenatal visits (Hutami & Suryani, 2025). Aromatherapy sessions created a supportive environment, enhancing maternal comfort and promoting positive perceptions of prenatal care services. These results highlight the potential of lavender aromatherapy as an evidence-based strategy to improve maternal mental health during late pregnancy. Health providers are encouraged to adopt aromatherapy alongside other non-pharmacological interventions to optimize maternal outcomes.

Lavender aromatherapy's physiological effects include modulation of autonomic nervous system activity, decreased sympathetic arousal, and increased parasympathetic tone, leading to reduced heart rate and blood pressure (Utami & Pratiwi, 2023). These changes facilitate relaxation and decrease physical symptoms associated with anxiety, such as muscle tension and restlessness. The intervention's effectiveness in reducing both psychological and physiological manifestations of anxiety underscores its value in holistic prenatal care. Aromatherapy can also enhance sleep quality in pregnant women, contributing to improved overall well-being. The integration of aromatherapy into antenatal care aligns with recommendations for patient-centered and non-invasive interventions. Mothers reported feelings of control, calmness, and emotional stability after the sessions, indicating enhanced self-efficacy (Amelia & Rahardjo, 2024). Aromatherapy can be combined with mindfulness practices to further reduce anxiety and promote emotional resilience. Consistent application may produce long-term benefits for maternal mental health during pregnancy. The study demonstrates that simple, low-cost interventions can have meaningful impacts on maternal anxiety. Midwives' guidance and monitoring are critical to ensure correct use and maximize benefits. These findings provide a foundation for scaling aromatherapy interventions in other community health settings in Indonesia. Incorporating aromatherapy into standard prenatal programs promotes holistic care, addresses psychological needs, and enhances maternal satisfaction with services.

Maternal age, parity, and education were identified as important factors influencing the degree of anxiety reduction achieved through lavender aromatherapy (Rahmawati et al., 2023). Older mothers and multiparous participants experienced greater reductions, likely due to prior labor experience and emotional regulation. Education facilitated understanding and adherence to intervention procedures. These findings suggest that interventions should be tailored to individual maternal characteristics to optimize outcomes. Aromatherapy provides a safe alternative to pharmacological anxiolytics, minimizing potential risks to the fetus. The study contributes to evidence supporting non-invasive, complementary interventions for maternal

mental health (Putri & Suryani, 2024). Lavender aromatherapy promotes emotional balance, reduces stress hormone levels, and supports adaptive coping strategies. Health providers can integrate aromatherapy into routine prenatal education programs to enhance maternal preparedness for labor. Regular monitoring and feedback ensure that interventions are effective and safe. Participants reported positive perceptions and willingness to recommend aromatherapy to peers. Aromatherapy fosters a supportive and calming prenatal care environment. The findings support broader implementation in Indonesian community health centers. Psychological benefits include increased confidence, reduced worry, and improved focus during labor. Physiological benefits include relaxation, decreased sympathetic activity, and lowered stress markers. Aromatherapy can be used in combination with breathing exercises and counseling. The intervention is culturally acceptable and widely feasible. Standardized application protocols ensure consistency and replicability. The study highlights the importance of addressing both physiological and psychological aspects of maternal care. Integrating aromatherapy into prenatal care can improve maternal satisfaction and emotional well-being.

Pregnancy-related anxiety can negatively affect labor outcomes, including longer duration, higher pain perception, and increased intervention rates (Sari & Wulandari, 2023). Lavender aromatherapy provides a practical, evidence-based approach to mitigating these effects. Participants experienced measurable reductions in anxiety and reported enhanced readiness for labor. Aromatherapy supports maternal mental health by promoting relaxation and emotional regulation. The intervention is safe, non-invasive, and well-tolerated. Findings align with previous Indonesian studies demonstrating the effectiveness of essential oils in reducing prenatal anxiety (Hidayati & Prasetyo, 2023). Mothers with moderate baseline anxiety benefited most, suggesting targeted use may yield significant results. Aromatherapy can be implemented in community health centers with minimal equipment and training. Health providers can monitor responses and adjust sessions according to maternal needs. The intervention complements other non-pharmacological strategies, including counseling, exercise, and mindfulness. Aromatherapy promotes maternal autonomy and active participation in prenatal care. Positive maternal experiences encourage continued engagement with relaxation techniques. Implementation of aromatherapy can improve overall quality of prenatal care. Reducing maternal anxiety contributes to better maternal-fetal outcomes and satisfaction with childbirth. Aromatherapy sessions can foster supportive interactions between midwives and mothers. Standardized guidelines ensure safety, efficacy, and reproducibility. Cultural acceptance enhances maternal willingness to participate. Psychological benefits include calmness, improved focus, and reduced worry. Physiological benefits include

relaxation, lower blood pressure, and reduced muscle tension. The study highlights aromatherapy as a valuable complementary intervention in prenatal care.

The findings of this study provide strong evidence for the inclusion of lavender aromatherapy in prenatal care programs in Indonesian community health settings (Anggraini & Nugroho, 2025). The intervention is feasible, safe, and effective for reducing maternal anxiety. It addresses both physiological and psychological dimensions of stress. Mothers reported subjective improvement in mood, relaxation, and confidence. Objective measurements confirmed significant reductions in anxiety scores. Aromatherapy can be integrated into routine prenatal visits, allowing consistent application and monitoring. The study supports the use of non-pharmacological interventions as complementary strategies in maternal care. Health providers should receive training to guide and monitor aromatherapy sessions effectively. Combining aromatherapy with education and relaxation techniques enhances maternal outcomes. Cultural and social acceptance facilitates widespread implementation. Regular application can prevent escalation of anxiety during late pregnancy. Aromatherapy supports holistic care by promoting emotional well-being, maternal autonomy, and satisfaction. The intervention is cost-effective, accessible, and adaptable to diverse healthcare settings. Psychological benefits include reduced stress, improved emotional regulation, and enhanced readiness for labor. Physiological benefits include relaxation, lowered heart rate, and reduced sympathetic activity. Participant feedback indicated high satisfaction and willingness to continue aromatherapy. Aromatherapy aligns with global recommendations for non-invasive prenatal care interventions. Integration into prenatal care promotes maternal mental health, supports coping strategies, and enhances birth preparedness. The study demonstrates that evidence-based, low-cost interventions can significantly improve maternal experiences. Lavender aromatherapy provides a valuable addition to standard prenatal care practices in Indonesia.

4. CONCLUSION

The findings of this study demonstrate that lavender aromatherapy is effective in reducing anxiety levels in pregnant women facing childbirth. The results of the Wilcoxon signed-rank test ($p = 0.000$) indicate a statistically significant decrease in anxiety scores after the administration of lavender aromatherapy. Most participants experienced a shift from moderate to mild anxiety, highlighting the intervention's immediate calming and relaxing effects. This confirms that aromatherapy can serve as a reliable non-pharmacological method for managing maternal anxiety during late pregnancy (Rahmawati et al., 2023).

Lavender aromatherapy exerts its effects through both physiological and psychological mechanisms. Physiologically, it reduces sympathetic nervous system activity, lowers heart rate and blood pressure, and promotes muscle relaxation. Psychologically, it enhances emotional regulation, reduces worry, and improves maternal confidence in facing labor (Putri & Suryani, 2024). The combination of these effects contributes to overall well-being, enabling mothers to approach childbirth with a calmer mindset and increased readiness.

The study also highlights the importance of maternal characteristics, such as age, education, and parity, in influencing the effectiveness of aromatherapy. Older and multiparous mothers showed greater reductions in anxiety, likely due to prior experience and improved coping mechanisms. Higher education levels were associated with better understanding and adherence to the intervention, facilitating optimal benefits (Sari & Wulandari, 2023). These findings suggest that lavender aromatherapy can be tailored to individual maternal needs to maximize its effectiveness.

Lavender aromatherapy is safe, easy to apply, culturally acceptable, and cost-effective, making it feasible for implementation in community health center settings. Midwives play a crucial role in guiding, monitoring, and ensuring proper application of the intervention. Integrating aromatherapy into routine prenatal care programs provides an accessible and non-invasive strategy to enhance maternal mental health, improve satisfaction with prenatal services, and support positive labor outcomes (Hidayati & Prasetyo, 2023).

In conclusion, lavender aromatherapy is a practical and effective complementary intervention for reducing anxiety in pregnant women approaching childbirth. Its integration into standard prenatal care can promote holistic maternal health by addressing both emotional and physiological aspects of anxiety. Health providers are encouraged to adopt aromatherapy as part of comprehensive prenatal care programs to support emotional well-being, enhance coping strategies, and prepare mothers for a positive birth experience (Anggraini & Nugroho, 2025). The evidence from this study contributes to the development of safe, non-pharmacological interventions for improving maternal mental health in Indonesian community health settings.

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