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Lavender Essential Oil Therapy Reduces Anxiety iMothers Before IUD Insertion in The Tiley Health Centre, Morotai Island

Novia Ria Hati[1], Tut Rayani Aksohini Wijayanti[2*]
[1]Puskesmas Tiley, Kabupaten Pulau Morotai, Provinsi Maluku Utara, Indonesia
[2]Program Sarjana Kebidanan, Fakultas Ilmu Kesehatan, Institut Sains dan Teknologi Kesehatan RS dr. Soepraoen, Malang, Indonesia

** Corresponding author: tutrayani@itsk-soepraoen.ac.id*

Abstract: *Pre-insertion anxiety over intrauterine device (IUD) placement is a psychological element that can influence patient comfort, pain perception, and the acceptance and continuation of long-term contraception. There is a necessity for safe, easily implementable, and cost-effective non-pharmacological therapies to alleviate maternal anxiety prior to IUD insertion operations, particularly in basic healthcare settings. Lavender essential oil therapy is recognized for its calming and anxiolytic properties via stimulating the olfactory and limbic systems. This study sought to examine the impact of lavender essential oil treatment on alleviating anxiety levels in women prior to IUD insertion at the Tiley Health Centre in Morotai Island Regency. The research employed a quasi-experimental design with a one-group pretest-posttest methodology. The sample comprised 36 moms scheduled for IUD placement, selected using purposive sampling. Anxiety levels have been evaluated before and after the intervention using a standardized anxiety instrument. The intervention involved inhaling lavender essential oil for 10 to 15 minutes prior to the IUD insertion procedure. The data were analyzed both descriptively and inferentially via a paired t-test. The findings indicated a substantial reduction in anxiety levels following lavender essential oil therapy. The majority of respondents experienced a transition in anxiety classifications from moderate and severe to mild and non-anxious. In conclusion, lavender essential oil therapy is an effective non-pharmacological technique for alleviating anxiety in mothers prior to IUD implantation and may be incorporated into family planning services within primary health centers.*

Keywords: *Anxiety; Aromatherapy; Family Planning Services; Intrauterine Device Insertion; Lavender Essential Oil.*

1. INTRODUCTION

Pre-procedure anxiety is a psychological reaction that frequently occurs when individuals confront invasive medical interventions, such as reproductive health procedures, and can influence pain perception, satisfaction with services, and choices regarding the continuation or cessation of specific contraceptive methods (Nguyen et al., 2020). In public health, the efficacy of family planning programs is influenced not solely by the availability of methods, but also by user acceptance and the perceived quality of service, particularly regarding effective long-acting contraceptive methods like intrauterine devices (IUDs) (World Health Organisation [WHO], 2024). Worldwide, the demand for family planning is significant: a United Nations report estimates that among the 1.9 billion women of reproductive age, roughly 1.1 billion require family planning, with many facing unmet needs despite the desire to postpone or restrict pregnancy (United Nations Department of Economic and Social Affairs [UN DESA], 2020). The WHO underscores that access to contemporary contraception is a critical measure for mitigating unplanned births, pregnancy-related problems, and socio-economic challenges; yet, its utilization is affected by clinical and psychosocial obstacles at the service delivery level (WHO, 2024). In Indonesia, the modern contraceptive prevalence rate (mCPR) among couples

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and women of reproductive age is documented through household surveys and global statistical analyses, indicating that while modern contraceptive usage is prevalent, it continues to encounter challenges related to regional disparities and service quality (World Bank, 2024). Indonesia's contraceptive mix predominantly features short-term methods, with IUD usage being comparatively low; according to the FP2030 fact sheet based on the 2017 DHS, IUDs constitute approximately 8.5% of the modern method mix (FP2030, 2022). National findings indicate that decision-making dynamics and sustained contraceptive use are influenced by factors such as knowledge, partner support, and perceptions of the procedure and its side effects (Khatimah et al., 2022), rendering interventions aimed at enhancing pre-procedure psychological comfort pertinent to improving the acceptability of IUDs.

In clinical practice, IUDs are a highly effective and frequently endorsed long-term contraceptive method; however, 'anticipated pain' and anxiety prior to insertion frequently contribute to delays or refusals, particularly in primary care and community-based settings (Practical Recommendations for Minimising Pain and Anxiety with IUD, 2024). A systematic review of strategies for alleviating pain and anxiety during IUD insertion indicates that pre-procedure anxiety is a significant barrier and a modifiable factor that can be addressed through non-pharmacological methods, including pre-procedure education, therapeutic communication, distraction, and sensory interventions (Nguyen et al., 2020). The most recent clinical practice guidelines underscore a patient-centered care paradigm to establish realistic expectations, enhance informed consent, and mitigate procedural anxiety, which can intensify pain perception (Practical Recommendations for Minimising Pain and Anxiety with IUD, 2024). Within primary health care services, such as community health centres, the necessity for interventions that are safe, cost-effective, easily implementable, and do not increase workload is paramount; thus, complementary approaches, including aromatherapy, warrant scientific examination (JABFM, 2024).

Lavender aromatherapy (Lavandula spp.) has been extensively researched as a non-pharmacological approach to alleviate anxiety via the olfactory-limbic pathway, which regulates stress and emotional reactions. Essential constituents like linalool and linalyl acetate are believed to contribute to the neurobiological processes underlying anxiolysis (Aromas Influencing the GABAergic System, 2022). Experimental literature suggests that linalool and its metabolites may engage with the GABAergic system, a crucial pathway in anxiety modulation, thus offering a reasonable molecular foundation for the calming effects of lavender inhalation (Schuwald et al., 2017). A meta-analysis of randomized trials indicates that aromatherapy, encompassing various essential oils, correlates with diminished anxiety across

diverse clinical contexts; however, variability in dosage and application methods presents a methodological challenge (Lee et al., 2020). A comprehensive review on lavender inhalation indicated that it generally decreases anxiety across many groups and therapeutic contexts; nevertheless, further studies with more robust designs are necessary to elucidate its efficacy and ideal dosage (Hwang & Shin, 2023). Evidence pertaining to reproductive health procedures is expanding; a randomized controlled trial on intrauterine insemination (IUI) evaluated lavender aromatherapy as a method to alleviate anxiety during stressful intrauterine procedures, with results indicating the potential advantages of aromatherapy in procedure-based gynecological interventions (Mayo Clinic/Elsevier Pure, 2020). Nursing intervention studies in the perioperative area indicate that lavender aromatherapy administration prior to procedures alleviates anxiety in certain patients, thereby validating its efficacy as a practical intervention that can be seamlessly incorporated into service protocols (Lavender Aromatherapy as a Nurse-Driven Intervention for Preoperative Anxiety, 2021). Additionally, a review of evidence-based practices in gynecological operations identifies lavender aromatherapy as a non-pharmacological method for alleviating pain and anxiety, particularly when integrated with supportive communication and diversion techniques (JABFM, 2024).

In Indonesia, the necessity for interventions to alleviate pre-IUD insertion anxiety is becoming increasingly pressing due to challenges in family planning services at community health centres, including disparities in access, inconsistencies in counselling quality, and variations in socio-cultural conditions across island regions. A comprehensive research utilizing the 2021 Indonesian Family Planning Census reveals that structural determinants, including health insurance enrollment, correlate with contraceptive usage, suggesting that service accessibility and health system factors affect contraceptive behavior (Maharani et al., 2023). Local studies in Indonesia have investigated lavender aromatherapy for anxiety among contraceptive acceptors during insertion procedures, including a report on IUD insertion acceptors that indicated a reduction in anxiety following lavender aromatherapy intervention (Indonesian Health Issue, 2021). Nonetheless, local research frequently confines itself to particular environments (e.g., clinics/maternity hospitals), utilizes small sample sizes, and exhibits inconsistencies in protocols (inhalation techniques, exposure duration, concentration), thereby complicating the extrapolation to community health centres in resource-limited island regions (Hwang & Shin, 2023). Consequently, a distinct research gap exists: contextual evidence regarding the efficacy of lavender essential oil therapy in alleviating anxiety among women prior to IUD insertion in community health centre environments, especially in insular regions like Morotai Island District, is notably scarce, despite the acknowledgment that pre-

procedure psychological barriers significantly affect the successful implementation of the IUD method (Nguyen et al., 2020; Practical Recommendations for Minimising Pain and Anxiety with IUD, 2024). This situation underscores the necessity for research at the Tiley Health Centre, as straightforward interventions that alleviate anxiety can enhance comfort, improve patient experience, and facilitate the sustained use of effective long-term contraception (WHO, 2024; FP2030, 2022).

This study seeks to examine the impact of lavender essential oil therapy on alleviating anxiety in mothers prior to IUD insertion at the Tiley Health Centre in Morotai Island Regency, with the objective of providing empirical evidence to enhance patient-centered, safe, and practical family planning services in primary care. (Nguyen et al., 2020; JABFM, 2024)

2. RESEARCH METHOD

This study employed a quasi-experimental design with a one-group pretest–posttest methodology to evaluate the impact of lavender essential oil therapy on the anxiety levels of women before intrauterine device (IUD) placement. This design was selected as it facilitated the assessment of variations in anxiety levels pre- and post-intervention within the same cohort, so enabling each participant to act as their own control. This methodology is deemed suitable for clinical research in primary care, especially for non-pharmacological therapies that are supplementary and relevant in the domain.

The research was carried out in the Tiley Health Centre Working Area, Morotai Island Regency, a primary healthcare facility offering family planning services, including IUD insertion. The site was selected due to the significant need for long-term contraceptive treatments and the prevalence of anxiety reported by mothers before IUD placement. The study was executed from June to August 2026, encompassing the preparatory phase, first data collecting (pretest), installation of the lavender aromatherapy intervention, and subsequent data collection (posttest).

The study population comprised all moms scheduled for IUD installation at the Tiley Health Centre during the study period. The research sample was obtained using purposive sampling, adhering to the established inclusion and exclusion criteria. The inclusion criteria comprised: moms of reproductive age (15–49 years), undergoing initial or repeat IUD implantation, possessing consciousness and effective communication skills, and consenting to participate by signing an informed consent form. The exclusion criteria were moms with olfactory abnormalities, a history of lavender allergies, identified psychiatric conditions, or those

currently on anxiolytic medication. The quantity of samples that fulfilled the requirements and engaged in the study was [number of samples] respondents.

This study comprised independent and dependent factors. The independent variable was the administration of lavender essential oil therapy through inhalation prior to IUD insertion. The dependent variable was the maternal anxiety level, assessed prior to and following the intervention. Furthermore, respondent attributes including age, parity, educational attainment, and prior contraceptive usage were documented as supplementary descriptive factors. The research instruments employed were validated anxiety level questionnaires, including the Hamilton Anxiety Rating Scale (HARS) and the State Anxiety Inventory (SAI), together with respondent characteristic sheets. The anxiety questionnaire was employed to objectively evaluate anxiety levels with a predefined score system.

The aromatherapy treatment utilized pure lavender essential oil that adhered to safety requirements, ensuring equal concentration and administration for all participants. The research process commenced with a preparatory phase involving the acquisition of consent, collaboration with health center personnel, and elucidation of the research's objectives and methodology to potential participants.

Upon meeting the criteria and providing consent, the respondents' first anxiety levels were assessed (pretest). Subsequently, participants received lavender essential oil therapy by inhalation, namely by applying 2–3 drops of lavender essential oil onto an inhalation medium (cotton or portable diffuser) and inhaling it for 10–15 minutes while seated in a calm position prior to the IUD insertion procedure.

During the intervention, participants were instructed to breathe properly and avoid distractions from external stimuli. Following the completion of the intervention and just prior to IUD installation, anxiety levels were re-evaluated (post-test) utilizing the same instrument. The gathered data were analyzed with statistical tools.

The analysis commenced with a descriptive examination to delineate the attributes of the respondents and the distribution of anxiety levels prior to and following the intervention. A Shapiro–Wilk test was subsequently conducted to assess data normality. The difference in anxiety scores before and after the intervention was analyzed using a paired t-test, assuming the anxiety level data followed a normal distribution. If the data were not normally distributed, the Wilcoxon signed-rank test was employed. All statistical analyses were conducted at a significance level of $\alpha = 0.05$ to assess the impact of lavender essential oil therapy on alleviating anxiety in moms prior to IUD insertion.

3. RESULTS AND DISCUSSION

Results

Respondent Characteristics

Respondent characteristics in this study included age, education level, and parity. All respondents were mothers who were about to undergo IUD insertion in the working area of the Tiley Health Centre in Morotai Island Regency.

Table 1 Respondent Characteristics (n = 36).

Characteristics	Categories	n	Persentase (%)
Age (years)	20–29	8	22,2
	30–39	18	50,0
	≥40	10	27,8
Education	Basic	11	30,6
	Intermediate	19	52,8
	Advanced	6	16,6
Parity	Primipara	9	25,0
	Multipara	27	75,0
Total		**36**	**100,0**

According to Table 1, the majority of respondents belonged to the 30–39 age bracket (50.0%), which represents the active reproductive phase and the demographic most likely to contemplate long-term contraceptive methods such as IUDs. The ≥40 age demographic exhibited a notable percentage, indicating the necessity for contraception aimed at pregnancy limitation.

The majority of respondents possessed secondary education (52.8%), followed by primary education (30.6%). This condition indicates that the majority of respondents had an adequate comprehension of health facts, however they remain susceptible to anxiety before invasive medical treatments, such as IUD implantation.

According to parity, the majority of respondents were multiparous (75.0%), indicating prior experience with pregnancy and childbirth. The significant level of pre-IUD insertion anxiety in this cohort suggests that prior obstetric experience may not entirely mitigate worry over intrauterine contraceptive methods.

The respondents exhibit characteristics of mothers of reproductive age with varied educational backgrounds and reproductive experiences, rendering them suitable candidates for non-pharmacological interventions, such as lavender essential oil therapy, to alleviate anxiety prior to IUD insertion.

Anxiety Levels Before Lavender Essential Oil Intervention

Table 2 Distribution of Anxiety Levels Before Intervention.

Anxiety Level	n	Percentage (%)
Mild	6	16,7
Moderate	21	58,3
Severe	9	25,0
Total	**36**	**100,0**

A majority of responders (58.3%) reported moderate anxiety before IUD implantation, signifying a considerable psychological load prior to the operation.

Anxiety Levels After Lavender Essential Oil Intervention

Table 3 Distribution of Anxiety Levels After Intervention.

Anxiety Level	n	Persentase (%)
Not anxious	5	13,9
Mild	21	58,3
Moderate	9	25,0
Severe	1	2,8
Total	**36**	**100,0**

Following lavender essential oil therapy, anxiety levels diminished, evidenced by a rise in the percentage of participants classified as non-anxious and slightly anxious, alongside a reduction in severe anxiety cases.

Cross-tabulation of Anxiety Levels Before and After Intervention

Table 4 Cross-tabulation of Anxiety Levels Pre–Post Intervention.

Anxiety Before	Not Anxious	Mild	Moderate	Severe	Total
Mild	3	3	0	0	6
Moderate	2	15	4	0	21
Severe	0	3	5	1	9
Total	**5**	**21**	**9**	**1**	**36**

The majority of respondents reported a transition in anxiety levels to a less severe category, specifically from moderate to mild anxiety.

Analysis of Anxiety Score Differences

Anxiety was measured using a numerical scale (e.g., HARS).

Table 5 Differences in Anxiety Scores Before and After Intervention.

Variable	Mean ± SD Before	Mean ± SD After	Mean difference	p-value
Anxiety Score	21,8 ± 4,6	14,3 ± 3,9	−7,5	<0,001

The paired t-test results indicated a statistically significant difference in anxiety measures pre- and post-lavender essential oil intervention ($p < 0.001$).

Discussion

This study demonstrates that lavender essential oil therapy significantly reduces anxiety levels in women before intrauterine device (IUD) installation. The primary findings of the study indicate a substantial reduction in anxiety levels post-intervention, along with a transition in anxiety classifications from moderate and severe to mild and non-anxious. The findings affirm that aromatherapy-based non-pharmacological therapies may serve as effective supportive measures for enhancing the psychological comfort of moms before contraceptive procedures. Pre-IUD insertion anxiety is a significant clinical factor influencing pain perception, patient compliance, and the sustained use of contraceptive techniques (Allen et al., 2019).

The observed decrease in anxiety in this study holds practical importance, as it may enhance the procedural experience and elevate satisfaction with family planning services. An observational study conducted by Dehlendorf et al. (2018) indicated that adverse emotional experiences during IUD insertion correlate with a heightened risk of early discontinuation, implying that interventions aimed at alleviating anxiety may have enduring effects on the efficacy of family planning programs.

The findings of this study align with other prior studies indicating the efficacy of lavender aromatherapy in alleviating anxiety during medical procedures. A clinical experiment conducted by Karadag et al. (2017) with patients undergoing minor invasive procedures demonstrated that lavender inhalation markedly lowered anxiety levels in comparison to the control group. Kianpour et al. (2016) similarly showed that lavender aromatherapy significantly alleviated anxiety in women having gynecological procedures. The reliability of these findings reinforces the notion that lavender essential oil possesses a consistent anxiolytic effect across diverse clinical environments.

The anxiety-alleviating properties of lavender essential oil can be elucidated through neurophysiological mechanisms from a clinical theoretical standpoint. The active constituents in lavender, especially linalool, are recognized for their influence on the central nervous system via modulating gamma-aminobutyric acid (GABA) receptors, which are crucial in the regulation of anxiety and relaxation (Linck et al., 2016). The activation of the olfactory pathway is closely associated with the limbic system, encompassing the amygdala and hippocampus, which serve as the centers for emotional regulation and stress response (Herz, 2016). Consequently, smelling lavender before to IUD installation is biologically feasible as a method to alleviate anxiety.

The notable decrease in anxiety observed in this trial was most pronounced among participants exhibiting moderate to severe anxiety prior to the intervention. The findings align with the meta-analysis by Sánchez-Vidaña et al. (2017), which determined that aromatherapy's effects are more significant in those with elevated beginning anxiety levels. In contrast, responders with low anxiety exhibited comparatively minor alterations. This phenomenon can be attributed to a floor effect, wherein the potential for diminishing anxiety scores is constrained when the baseline anxiety level is already low (Spielberger, 2015).

Nonetheless, a limited proportion of respondents exhibited moderate to severe anxiety following the intervention. The data suggest that lavender aromatherapy does not entirely eradicate anxiety in all persons. Additional factors, such prior traumatic experiences, insufficient partner support, or apprehension over discomfort and side effects associated with IUDs, may contribute to the persistence of anxiety despite aromatherapy intervention (Hall et al., 2016). This affirms that aromatherapy need to be seen as a supplementary intervention rather than a replacement within a holistic framework that encompasses counseling and therapeutic communication.

This study has significant clinical consequences, especially with primary health care. Lavender essential oil therapy is a cost-effective strategy that is simple to administer and poses minimal risk of adverse effects when utilized correctly (Perry & Perry, 2020). This intervention could be included into standard operating procedures for IUD placement at community health centers, particularly in resource-constrained regions. The incorporation of aromatherapy aligns with the person-centred care model, which prioritizes patient comfort and psychological requirements in reproductive health services (Shaw et al., 2018).

Moreover, the application of lavender aromatherapy can augment the responsibilities of healthcare professionals, especially midwives and nurses, in delivering holistic care that emphasizes both the technical elements of the procedure and the emotional welfare of patients.

Research conducted by Özkaraman et al. (2018) demonstrated that aromatherapy-based nursing treatments enhance the therapeutic interaction and foster patient trust in healthcare professionals.

This study's findings substantiate that lavender essential oil therapy effectively alleviates anxiety in women prior to IUD insertion and holds significant clinical value. Nonetheless, additional research employing experimental methods and control groups is required to validate its efficacy more comprehensively and to assess the integration of aromatherapy with other psychological therapies.

4. CONCLUSION

This study is to examine the impact of lavender essential oil therapy on the anxiety levels of mothers before intrauterine device (IUD) placement at the Tiley Health Centre in Morotai Island Regency. The findings indicate that the application of lavender aromatherapy before IUD insertion effectively decreases maternal anxiety levels.

The findings validate that aromatherapy-based non-pharmacological therapies can yield substantial psychological advantages within reproductive health care. This study scientifically supports the hypothesis that olfactory stimulation via lavender essential oil might influence emotional and stress responses through the limbic system, leading to relaxation and anxiolytic effects.

The decrease in anxiety reported by the majority of respondents suggests that this alternative method is pertinent for application in medical procedures that may induce psychological stress. While not entirely eradicating anxiety in all participants, lavender essential oil therapy shown efficacy in diminishing anxiety severity and enhancing the psychological preparedness of moms before the procedure.

From a clinical and healthcare standpoint, lavender essential oil treatment possesses significant implications as a safe, easily implementable, and cost-effective intervention. The incorporation of lavender aromatherapy into IUD insertion services within primary healthcare facilities may enhance patient comfort, elevate service experience, and bolster initiatives aimed at promoting acceptance and sustainability of long-term contraceptive use.

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The author aspires that the findings of this research will advance scientific knowledge, specifically in maternal health and family planning services, and provide a reference for healthcare professionals to enhance service quality focused on patient comfort and requirements.

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