e-ISSN : 2597-6052
MPPKI MEDIA PUBLIKASI PROMOSI KESEHATAN INDONESIA
Research Articles Open Access

# Reducing Postpartum Anxiety in IUD Users through Ylang-ylang Aromatherapy and Slow Deep Breathing: A Quasi-Experimental Study

**Luh Putu Widiastini[1]*, I Gusti Agung Manik Karuniadi[2], Luh Gede Susila Dewi[3]**
[1]Study Program of Midwifery, STIKES Bina Usada Bali, Bali, Indonesia
[2]Study Program of Midwifery, STIKES Bina Usada Bali, Bali, Indonesia
[3]RSD Mangusada, Bali, Indonesia

***Corresponding Author**: E-mail: enick.dilaga@gmail.com

**ARTICLE INFO**

**Manuscript Received:** 19 Feb, 2025
**Revised:** 08 Apr, 2025
**Accepted:** 21 Apr, 2025
**Date of Publication:** 05 May, 2025
**Volume:** 8
**Issue:** 5
**DOI:** 10.56338/mppki.v8i5.7232

**KEYWORDS**

Ylang-ylang Aromatherapy;
IUD;
Anxiety;
Post-placental;
Slow Deep Breathing

**ABSTRACT**

**Introduction:** The number of IUD contraceptive users has declined, influenced by factors such as anxiety. Individuals with anxiety experience psychological distress, necessitating complementary therapy. Alternative treatments include ylang-ylang aromatherapy and Slow Deep Breathing. This study aimed to determine the effectiveness of ylang-ylang aromatherapy and Slow Deep Breathing in reducing anxiety among post-placental IUD users at Mangusada Hospital.
**Methods:** A quasi-experimental nonequivalent control group design was used, involving 70 postpartum IUD users divided into experimental (n=35) and control (n=35) groups. Anxiety was measured using the NRS-A questionnaire before and after a 15-minute intervention. Ethical approval was obtained (070/6854/RSDM/2024). Data were analyzed using descriptive statistics, Kolmogorov-Smirnov for normality, Wilcoxon Signed-Rank, and Mann–Whitney U tests, with a 95% confidence level.
**Results:** There was no significant difference in pre-test anxiety between the groups (mean: 5.69 ± 0.900, p = 1.000). Post-test results showed a greater reduction in the treatment group (mean: 3.03 ± 0.664) than in the control group (mean: 3.83 ± 0.785). The Mann-Whitney U test confirmed a significant difference in anxiety levels post-intervention (Z = -3.998, p = 0.000). The effect size (r = 0.676) indicates a large impact of the intervention.
**Conclusion:** Ylang-ylang aromatherapy and slow deep breathing are effective complementary interventions for reducing anxiety in post-placental IUD users.

**Publisher:** Fakultas Kesehatan Masyarakat Universitas Muhammadiyah Palu

## INTRODUCTION

In Bali, there were 601,733 couples of childbearing age and 321,029 active family planning participants. In Badung Regency, there are 73,836 couples of childbearing age and 36,000 registered family planning participants (1). Family planning services aim to lower the birth rate, promote active family planning participation, raise participants' understanding and sense of responsibility, and manage growth to achieve a modest, affluent family (2). Expanding access to postpartum family planning services is part of the government's initiatives. The intrauterine device (IUD) is the most effective postpartum contraceptive method available. The use of intrauterine devices can help reduce unwanted pregnancies (3). The IUD is a long-acting method of contraception used to postpone, space out, and halt fertility (4,5).

Based on the Profil Kesehatan Ibu dan Anak 2024, only approximately 9.68% of women in Indonesia use the IUD as a contraceptive method (6). In Bali Province, 27.43% of childbearing-age (PUS) couples used IUD contraception to postpone or avoid pregnancy between 2020 and 2022 (7). Active Family Planning Participants Based on the IUD Contraceptive Method in Bali Increased from 98,492 in 2022 to 101,300 in 2023 (8). However, the coverage of postpartum IUD users at Mangusada Hospital remains low. Based on data from January to June 2023, there were 523 deliveries and 250 postpartum IUD users in the hospital.

The IUD has several advantages as a postpartum contraceptive: it is convenient, easy to insert, highly effective, and does not affect breastmilk production. Additionally, it reduces the risk of bleeding during insertion, and fertility can quickly return after removal of the device. However, several factors contribute to the low adoption of IUDs, including attitudes, lack of awareness, relatively high costs, limited access to services, the role of healthcare professionals, spousal support as key family decision-makers, and psychological concerns such as insertion anxiety, potential side effects, and past trauma from previous insertions (9). The Cognitive Behavioral Model explains that this anxiety can stem from cognitive distortions, such as catastrophic thinking or unrealistic negative beliefs, which then trigger avoidance behaviors towards IUD use (10). In a study conducted in India on women aged 26-35 years who gave birth normally and chose to use the CuT 380 IUD at the interval, many experienced side effects after IUD insertion, such as feeling weak (53%), low back pain (34%), excessive bleeding (64%), and bad-smelling vaginal discharge (71%). In addition, psychologically, most respondents felt afraid that they could still get pregnant (63%), more anxious (54%), irritable (50%), and lost sexual interest (62%) (11). A 2023 study conducted at Mangusada Hospital identified factors associated with post-placental IUD use, including knowledge, partner support, information from health workers, and anxiety (12).

Anxiety disorders, like other mental health conditions, result from a complex interaction of social, psychological, and biological factors(10). In addition, neurotransmitter receptor instability and a lack of monoamine neurotransmitters (dopamine, norepinephrine, and serotonin) are associated with anxiety (13). Anxiety sufferers are concerned about the possible negative effects of the drugs they take, as well as the psychological impact of having to take them continuously. Consequently, the demand for safe and effective anti-anxiety drugs is increasing, particularly in alternative medicine. One alternative treatment for anxiety is ylang-ylang aromatherapy. Ylang ylang essential oil (YYO), also known as ylang odorata essential oil, is often used in aromatherapy to promote relaxation and mood regulation (14). Relaxation treatments are often used in daily life to treat various problems, including muscle tension, pain, hypertension, respiratory diseases, stress, and anxiety. Slow deep breathing is a deliberate relaxation technique used to regulate deep and slow breathing (15). This study combined ylang-ylang aromatherapy and slow deep breathing, which have not been widely used to address postpartum anxiety, especially among IUD users. This dual approach addresses both the physiological and psychological aspects of anxiety, offering a simple, non-pharmacological solution. Based on this context, researchers are interested in knowing the effect of ylang-ylang aroma therapy and deep and slow breath therapy on anxiety in patients using postpartum intrauterine devices (IUD) at Mangusada Hospital

## METHOD

### Research Type

This study employed quantitative research methods with a quasi-experimental design, specifically a nonequivalent group control design (16), comparing experimental groups whose samples were observed first before being given ylang-ylang aromatherapy and slow deep breathing and then comparing them with the control group.

**Population and Sample/Informants**

The study population comprised all postpartum IUD family planning participants at RSD Mangusada. The sampling technique used was non-probability sampling, stratified purposive sampling, with the following inclusion criteria: aged 20–45 years, well-informed, able to communicate, and newly accepted IUD family planning after childbirth at RSUD Mangusada. The exclusion criteria were mothers who declined to participate and those who experienced postpartum complications. A total of 70 postpartum IUD users were selected and divided into two groups: 35 in the treatment group, who received ylang-ylang aromatherapy and slow, deep breathing, and 35 in the control group.

**Research Location**

This study was conducted at Mangusada Hospital for three months, from July to September 2024.

**Instrumentation or Tools**

Primary data were collected by asking respondents to complete written questionnaires on anxiety (the Numerical Rating Scale for Anxiety, or NRS-A) before and after receiving slow deep breathing and ylang-ylang aromatherapy as a treatment. Validity and reliability assessments were not conducted because the NRS-A is a standardized anxiety measurement tool (17).

**Data Analysis**

The initial analysis in this study involved a descriptive analysis to assess each variable by determining the minimum, maximum, mean, median, and standard deviation values, allowing for a scientific summary and interpretation of the data (18). The respondents' characteristics included age, education, occupation, parity, anxiety score, and pre- and post-treatment data in the treatment and control groups.

Before analysis, a data normality test was conducted using the Kolmogorov-Smirnov test because the sample size was ≥ 50. The analysis results showed a p-value of <0.05, indicating that the data were not normally distributed; therefore, nonparametric tests were used for further analysis.

Comparative Analysis: The paired data analysis was conducted using the Wilcoxon Signed-Rank Test due to the non-normal distribution of data. The Mann–Whitney U test was used to compare two samples or groups (18) because the data were not normally distributed, hypothesis testing was conducted by comparing the probability value from the test results with the significance level. In this study, a 95% confidence level was used, equivalent to $\alpha = 0.05$. The alternative hypothesis, which states that ylang-ylang aromatherapy and slow deep breathing effectively reduce anxiety in post-placental intrauterine device (IUD) users at RSD Mangusada, is accepted if the probability value is less than the significance level ($p < 0.05$). The alternative hypothesis is rejected and the null hypothesis is accepted if the probability value ($p > 0.05$) exceeds the significance level. This suggests that ylang-ylang aromatherapy and slow deep breathing are ineffective in reducing anxiety among post-placental intrauterine device (IUD) users at the RSD Mangusada. Data analysis was conducted using SPSS software for Windows, version 22.

**Ethical Approval**

This study was approved by the Health Research Ethics Committee of Mangusada Hospital, Badung Regency, under ethics permit number 070/6854/RSDM/2024.

## RESULTS
### Descriptive Analysis

**Table 1.** Characteristics of respondents, including age, parity, education, occupation, pretest and posttest results, and anxiety of control and treatment groups.

| | | Age of the Treatment Group | Age of the Control Group | Parity of Treatment Group | Parity of Control Group | Education of the treatment group | Education of the control group | Treatment group employment | Control group employment |
|---|---|---|---|---|---|---|---|---|---|
| N | Valid | 35 | 35 | 35 | 35 | 35 | 35 | 35 | 35 |
| | Missing | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| | Mean | 27.71 | 28.40 | 1.97 | 2.20 | 1.11 | 1.11 | 1.20 | 1.20 |
| | Median | 28.00 | 27.00 | 2.00 | 2.00 | 1.00 | 1.00 | 1.00 | 1.00 |
| | Std. Deviation | 6.318 | 5.781 | .822 | 0.901 | 0.404 | 0.404 | 0.473 | 0.473 |
| | Minimum | 14 | 20 | 1 | 1 | 1 | 1 | 1 | 1 |
| | Maximum | 45 | 43 | 3 | 4 | 3 | 3 | 3 | 3 |

From the table above, it is obtained that the characteristics of respondents based on age, obtained the mean age in the treatment group 27.71 ± 6.318, the mean age in the control group 28.40 ± 5.781, the mean parity in the treatment group 1.97 ± 0.822, the mean parity in the control group 2. 20±0.901, mean last education in the treatment group 1.11±.404, mean last education in the control group 1.11±.404, mean employment in the treatment group 1.20±0.473, mean employment in the control group 1.20±0.473.

**Table 2.** Descriptive analysis of anxiety levels in treatment and control groups before and after treatment

| | Pre Test anxiety group Treatment | Pre Test anxiety group Control | Post Test anxiety group Treatment | Post Test anxiety group Control |
|---|---|---|---|---|
| N Valid | 35 | 35 | 35 | 35 |
| Missing | 0 | 0 | 0 | 0 |
| Mean | 5.69 | 5.69 | 3.03 | 3.83 |
| Std. Deviation | 0.900 | 0.900 | 0.664 | 0.785 |
| 95% CI | 5.38-5.99 | 5.38-5.99 | 2.80-3.26 | 3.56-4.10 |
| Mild Anxiety | - | | 27 (77.1%) | 13 (37.1%) |
| Moderate Anxiety | 32 (91.4%) | 32 (91.4%) | 8 (22.9%) | 22 (62.9%) |
| Severe Anxiety | 3 (8.6%) | 3 (8.6%) | - | - |
| Asymp. Sig. (2-tailed) | 1.000 | | - | |

Based on the descriptive analysis above, from 35 respondents, the average pretest anxiety level of the treatment group was 5.69 ± 0.900, with moderate anxiety criteria of 32 (91.4%) and severe anxiety of 3 (8.6%). The average pretest anxiety level of the control group was 5.69 ± 0.900 with moderate anxiety criteria of 32 (91.4%) and severe anxiety 3 (8.6%), 95% CI 5.38-5.99, and a p-value of 1.000 which means there is no difference in the anxiety level of respondents who use IUD before being given treatment in the treatment and control groups, the average posttest anxiety level in the treatment group was 3.03 ± 0.664, 95% CI 2.80-3.26, with moderate anxiety criteria of 8 (22.9%), mild anxiety of 27 (77.1%), the average posttest anxiety level in the control group was 3.83 ± 0.785, 95% CI 3.56-4.10, with moderate anxiety criteria of 22 (62.9%), and mild anxiety of 13 (37.1%).

### Normality Test of Pretest and Posttest Data on Anxiety levels in Treatment and Control Groups

**Table 3.** Normality Test using Kolmogorov-Smirnov

| | Group | Kolmogorov-Smirnov[a] | | |
|---|---|---|---|---|
| | | Statistic | df | Sig. |
| Pretest | Treatment | 0.351 | 35 | 0.000 |
| | Control | 0.351 | 35 | 0.000 |
| Posttest | Treatment | 0.289 | 35 | 0.000 |
| | Control | 0.242 | 35 | 0.000 |

a. Lilliefors Significance Correction

Based on the table above, the results of the data normality test using the Kolmogorov-Smirnov test show that the p-value is 0.000, that is, all data are not normally distributed; therefore, further analysis uses the non-parametric test.

### Comparative Analysis

**Table 4.** Wilcoxon Signed Ranks Test in the Treatment and Control groups

| | Pretest -Post test Treatment group | Pretest -Post test Control group |
|---|---|---|
| Z | -5.132[a] | -5.021[a] |
| Asymp. Sig. (2-tailed) | 0.000 | 0.000 |

a. Based on positive ranks.
b. Wilcoxon Signed Ranks Test

The above-mentioned table indicates that the treatment and control groups' Wilcoxon Signed Ranks Test findings have a p-value of 0.000, indicating that anxiety affects both groups both before and after treatment.

**Table 5.** Mann Whitney U Test in Treatment and Control groups

| | Posttest of Treatment and Control group |
|---|---|
| Z | -3.998 |
| Asymp. Sig. (2-tailed) | 0.000 |

Based on the table above, it is obtained that the results of The Mann-Whitney U test confirmed a significant difference in anxiety levels post-intervention ($Z = -3.998$, $p = 0.000$). The effect size ($r = 0.676$) indicates a large impact of the intervention. Ylang-ylang Aroma Therapy and Slow Deep Breathing are therefore useful in lowering anxiety levels in patients who have just had a permanent intrauterine device (IUD) implanted at Mangusada Hospital.

## DISCUSSION

The intrauterine device (IUD) is the most effective postpartum contraceptive method due to its high efficacy, long-term reversible effects, and minimal side effects. However, its low adoption is influenced by various factors, including partner support, knowledge, the role of healthcare providers, and psychological factors such as insertion anxiety, potential side effects, and past trauma from previous insertions (12). Based on the descriptive analysis of age-related characteristics, the mean age of participants in the treatment group was 27.71 ± 6.318 years, while the mean age in the control group was 28.40 ± 5.781 years. The mean parity of the treatment group was 1.97 ± 0.822, whereas of that the control group was 2.20 ± 0.901. The treatment group's mean last education was 1.11 ± 0.404, while the control group's mean last education was 1.11 ± 0.404. The mean employment of the treatment group was 1.20 ± 0.473, and that of the control group was 1.20 ± 0.473. This is consistent with the study by (20), The study

titled Analysis of Factors Associated with Anxiety Level in Postpartum Mothers at Citra Insani Maternity Home found that most respondents had low education (70%) compared to those with higher education (30%). The majority experienced moderate anxiety (60%), with 52.5% aged 20–28 years and 47.5% aged 29–35. In terms of parity, 80% were multiparous and 20% were primiparous. Regarding employment status, 37.5% of the mothers were employed, and 62.5% were not. The findings indicated no significant correlation between postpartum anxiety levels and age, parity, education level, or occupation.

Anxiety disorders are common among postpartum women. The causes of postpartum anxiety remain unclear. Anxiety during the IUD insertion process is a psychological barrier that prevents women from using IUDs as a method of contraception (21). Anxiety is a common, unpleasant emotional state marked by worry and has specific behavioral, cognitive, and physical symptoms (22). Descriptive analysis showed that both the treatment and control groups (n=35 each) had the same mean pre-test anxiety score of 5.69 ± 0.900, with 91.4% experiencing moderate anxiety and 8.6% severe anxiety. The p-value of 1.00 indicates no significant difference between the groups at the baseline. Post-intervention, the treatment group showed a greater reduction in anxiety, with a mean score of 3.03 ± 0.664 (77.1% mild, 22.9% moderate), compared to the control group's mean score of 3.83 ± 0.785 (37.1% mild, 62.9% moderate). These findings suggest that the intervention was effective in reducing anxiety levels and may be beneficial in clinical settings, particularly for managing anxiety related to IUD use.

Anxiety management can be addressed through complementary methods such as ylang-ylang aromatherapy. Ylang-ylang essential oil, derived from the blossoms of the tropical tree *Cananga odorata* (Lam.) Hook. f. & Thomson (family Annonaceae), is commonly known as ylang-ylang. Traditional medicine uses this oil for various purposes, such as treating neurological diseases and anxiety. The QoL of patients with neuropathic pain is significantly affected by the high frequency of comorbidities, including anxiety, depression, and other mood disorders. Inhaling ylang ylang (Ylang-ylang) essential oil has been shown to alleviate pain and anxiety in several clinical tests (23). Previous studies have shown that ylang-ylang aromatherapy reduces anxiety by regulating the serotonin levels. After inhalation, the concentration of 5-hydroxytryptamine (5-HT) increases, which enhances social and cognitive functions while alleviating anxiety. The modulation of serotonin and dopamine metabolism is associated with ylang-ylang aromatherapy (24). A high linalool content can function as an antidepressant. In addition, kenanga oil contains active compounds that can trap free radicals, such as hydroxyl, peroxyl, and alkyl radicals (23). The study results indicated that essential oil extracted from the ylang-ylang flower (*Cananga odorata*) can effectively reduce stress and anxiety levels triggered by specific conditions. (26).

In addition, slow deep breathing techniques can be used to reduce anxiety. For thousands of years, the practice of slow breathing has been applied in ancient spiritual traditions such as yoga and Tai Chi, which serve to rebalance emotions and reduce long-term stress, promote relaxation, reduce pain perception, and overcome acute panic attacks(27). Reports indicate that slow breathing reduces physiological stress, as evidenced by changes in the autonomic nervous system, including increased parasympathetic activity and decreased sympathetic tone (15,28). Deep and slow breathing stimulates the autonomic nervous system to release endorphins, which further activates the parasympathetic nervous system and reduces sympathetic nerve activity. This process leads to a decreased heart rate and dilation of blood vessels (15)

This study aimed to assess the effects of ylang-ylang aromatherapy and slow deep breathing on anxiety related to post-placental intrauterine device (IUD) use at RSD Mangusada. The Mann–Whitney U test comparing the treatment and control groups yielded a P-value of 0.000, demonstrating the effectiveness of these interventions in reducing anxiety levels among the IUD users. This finding is consistent with the research conducted by (29), which reported a decrease in anxiety scores by 9.1 before and after the intervention. The statistical test also showed a P-value of 0.000, confirming that slow deep breathing techniques significantly reduced the maternal anxiety during IUD insertion. Ylang-ylang aromatherapy and slow deep breathing effectively reduce anxiety through complementary mechanisms.

Aromatherapy targets the brain's limbic system and regulates mood-related neurotransmitters, while active compounds help lower stress hormone levels. Deep breathing activates the parasympathetic nervous system, slows the heart rate, and promotes calmness. Combined, they create a synergistic effect enhancing relaxation both emotionally and physically—making them highly effective for clinical use (30,31)

## CONCLUSION

The implementation of post-placental intrauterine devices (IUDs) at Mangusada Hospital was associated with a significant reduction in anxiety levels, as demonstrated by the Mann–Whitney U test comparing the treatment and control groups. The results further substantiate the effectiveness of slow deep breathing techniques and ylang-ylang aromatherapy as non-pharmacological interventions for anxiety reduction, supported by a p-value of 0.000, Z = -3.998, and the effect size (r = 0.676)

Nonetheless, the study is subject to certain limitations, including potential sampling bias, the absence of blinding, and the lack of prior validation of the research instrument within a comparable Indonesian population, which may have introduced response bias owing to varying participant characteristics.

Future research is encouraged to adopt randomized controlled trial designs with larger and more heterogeneous samples, as well as to investigate the long-term psychological impacts of these interventions. This study contributes meaningfully to the existing body of knowledge by demonstrating the clinical utility of integrative, non-pharmacological strategies for managing procedural anxiety. The findings have practical implications for developing comprehensive maternal care models and formulating policies to enhance holistic health service delivery.

## AUTHOR'S CONTRIBUTION STATEMENT

Luh Putu Widiastini contributed to the study conception and design, data collection, analysis and interpretation, and drafting and finalizing the manuscript.

I Gusti Agung Manik Karuniadi contributed to the methodological framework, statistical analysis, and critical revision of the manuscript.

Luh Gede Susila Dewi contributed to the literature review, data interpretation

## CONFLICTS OF INTEREST

The authors declare no conflicts of interest regarding the publication of this manuscript.

## DECLARATION OF GENERATIVE AI AND AI-ASSISTED TECHNOLOGIES IN THE WRITING PROCESS

In the process of preparing this manuscript, the author used artificial intelligence (AI) tools, namely ChatGPT and DeepL, to support language refinement, increase sentence clarity, and improve the overall structure of the manuscript. The use of this technology is selective and remains under the full control of the author, without reducing the originality of ideas, analysis, or interpretations conveyed in the manuscript. This disclosure is provided as part of the authors' commitment to academic integrity, adherence to ethical publication standards, and promotion of transparency in the practice of responsible scientific authorship.

## SOURCE OF FUNDING STATEMENTS

This research was supported by a collaborative grant between RSD Mangusada and STIKES Bina Usada Bali (contract numbers 068/7549/RSDM/2023 and 043/BUB-PKS/VIII/2023). Clearly state that the funding agency had no involvement in the study design, execution, analysis, interpretation, or manuscript preparation.

## ACKNOWLEDGMENTS

The license to perform this research was granted by LPPM STIKES Bina Usada Bali, for which the researcher is grateful to the institution. Acknowledgements Additionally, the researcher expresses gratitude to RSD Mangusada for supporting and facilitating this study.

## BIBLIOGRAPHY

1. BKKBN Prov Bali. Jumlah Pasangan Usia Subur dan Peserta KB Aktif Per Kabupaten_Kota _ Satu Data Indonesia Provinsi Bali [Internet]. Satu Data Indonesia Provinsi Bali. 2022 [cited 2023 Jul 15]. Available from: https://balisatudata.baliprov.go.id/laporan/jumlah-pasangan-usia-subur-dan-peserta-kb-aktif-per-kabupatenkota?year=2021

2. Sari M. Pelayanan KB [Internet]. BKKBN. 2017 [cited 2023 Jul 15]. Available from: https://kampungkb.bkkbn.go.id/kampung/1381/intervensi/45128/pelayanan-kb
3. Grandi G, Del MC, Alice S, Fabio T. Postpartum contraception : A matter of guidelines. Gynecol Obs. 2023;(January):1–10. Available from: https://doi.org/ 10.1002/ijgo.14928
4. Affandi B, Adriaansz G, Gunardi ER, Koesno H. Buku Panduan Praktis Pelayanan Kontrasepsi. Ketiga. Jakarta: Bina Pusaka Sarwono Prawirohardjo; 2014.
5. Matahari R, Utami FP, Sugiharti S. Buku Ajar Keluarga Berencana dan Kontrasepsi. Yogyakarta: Pustaka Ilmu Group Yogyakarta; 2018.
6. Badan Pusat Statistik. Profil Kesehatan Ibu dan anak 2024. Volume 10,. Jakarta: Badan Pusat Statistik; 2024.
7. Badan Pusat Statistik. Profil Kesehatan Ibu dan Anak 2022. Jakarta; 2022.
8. Badan Pusat Statistik. Banyaknya Peserta KB Aktif Menurut Metode Kontrasepsi dan Kabupaten/Kota di Provinsi Bali, 2019-2023 [Internet]. Badan Pusat Statistik. 2023. Available from: https://bali.bps.go.id/statictable/2018/06/28/118/jumlah-peserta-kb-aktif-menurut-metode-kontrasepsi-dan-kabupaten-kota-di-provinsi-bali-2019.html
9. Sembiring JB, Suwardi S, Saragih HJ. Faktor-Faktor yang Berhubungan dengan Kesediaan Menjadi Akseptor KB Pasca Persalinan di RSUD Deli Serdang Lubuk Pakam Tahun 2019. J Ilm Univ Batanghari Jambi. 2020;20(2):571–9. Available from: https://doi.org/ 10.33087/jiubj.v20i2.907
10. World Health Organization (WHO). Anxiety Disorder [Internet]. Vol. 15, World Health Organization. World Health Organization; 2023. p. 1–8. Available from: https://www.who.int/news-room/fact-sheets/detail/anxiety-disorders
11. Sonam K, Sharma D, Yadav P. Physical and Psychological Problems Experienced by The Intra-Uterine Contraceptive Devices User :A Descriptive Study. Obstet Gynaecol Forum [Internet]. 2024;34(3s). Available from: https://www.researchgate.net/publication/383941832
12. Widiastini LP, Karuniadi IGAM, Dewi LGS. Factors Associated with Post Placental Intrauterine Device ( IUD ) Use. J Ilmu dan Teknol Kesehat. 2024;11(2). Available from: https://doi.org/10.32668/jitek.v11i2.1421
13. Liu Y, Zhao J, Guo W. Emotional Roles of Mono-Aminergic Neurotransmitters in Major Depressive Disorder and Anxiety Disorders. Front Psychol. 2018;9(November):1–8. Available from: https://doi.org/10.3389/fpsyg.2018.02201
14. Zhang N, Zhang L, Feng L, Yao L. Cananga odorata essential oil reverses the anxiety induced by 1- ( 3-chlorophenyl ) piperazine through regulating the MAPK pathway and serotonin system in mice. J Ethnopharmacol [Internet]. 2018;219(March):23–30. Available from: https://doi.org/10.1016/j.jep.2018.03.013
15. Magnon V, Dutheil F, Vallet GT. Benefits from one session of deep and slow breathing on vagal tone and anxiety in young and older adults. Sci Rep [Internet]. 2021;19267(11):1–10. Available from: https://doi.org/10.1038/s41598-021-98736-9
16. Sugiyono. Metode Penelitian Kuantitatif, Kualitatif, dan R & D. 26th ed. Bandung: Alfabeta; 2017.
17. Prokopowicz A, Stanczykiewicz B, Uchmanowicz I. Validation of the Numerical Anxiety Rating Scale in postpartum females : a prospective observational study. Ginekol Pol. 2022;93(9):686–94. Available from: https://doi.org/10.5603/GP.a2021.0197
18. Hazra A, Gogtay N. Biostatistics Series Module 1_ Basics of Biostatistics. Indian J Dermatol [Internet]. 2016;61(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4763618/
19. Sundjaja JH, Shrestha R, Krishan K. McNemar And Mann-Whitney U Tests [Internet]. Treasure Island (FL): StatPearls Publishing; 2024 Jan-; 2023. Available from: https://www.ncbi.nlm.nih.gov/books/NBK560699/
20. Febriani Y, Rasipin, Runjati. Analysis Of Factors Related To Anxiety Level In Postpartum Mothers at Citra Insani Maternity Home, Semarang. Str J Ilm Kesehat. 2020;9(2):670–7. Available from: https://doi.org/10.30994/sjik.v9i2.357
21. Nguyen L, Lamarche L, Lennox R, Ramdyal A, Patel T, Black M, et al. Strategies to Mitigate Anxiety and Pain in Intrauterine Device Insertion: A Systematic Review. J Obstet Gynaecol Canada [Internet]. 2019;(June). Available from: https://doi.org/10.1016/j.jogc.2019.09.014

22. Nuss P. Anxiety disorders and GABA neurotransmission : a disturbance of modulation. Neuropsychiatr Dis Treat. 2015;11:165–75. Available from: https://doi.org/10.2147/NDT.S58841
23. Borgonetti V, L´opez V, Galeotti N. Ylang-ylang (Cananga odorata (Lam.) Hook. f. & Thomson) essential oil reduced neuropathic-pain and associated anxiety symptoms in mice. J Ethnopharmacol J. 2022;294(May). Available from: https://doi.org/10.1016/j.jep.2022.115362
24. Zhang N, Wang S, Yao L. Inhalation of Cananga odorata essential oil relieves anxiety behaviors in autism-like rats via regulation of serotonin and dopamine metabolism. J Integr Med [Internet]. 2023;21(2):205–14. Available from: https://www.sciencedirect.com/science/article/abs/pii/S2095496423000067
25. Desnita E, Yesika R. Pemanfaatan Minyak Kenanga ( Cananga Odorata ) untuk Pencegahan Depresi Lansia pada Masa Covid-19 di Panti Jompo Sumatera Barat. Heal Med J. 2023;V(2):80–5. Available from:https://doi.org/10.33854/heme.v5i2
26. Sundara AK, Larasati B, Meli DS, Wibowo DM, Utami FN, Maulina S, et al. Review Article : Aromaterapi Sebagai Terapi Stres dan Gangguan Kecemasan. J Buana Farma. 2022;2(2):78–84. Available from: https://doi.org/10.36805/jbf.v2i2.396
27. Ashhad S, Kam K, Negro CA Del, Feldman JL. Breathing Rhythm and Pattern and Their Influence on Emotion. Annu Rev ofNeuroscience. 2022;45:223-247(July):223–47. Available from:https://doi.org/10.1146/annurev-neuro-090121- 014424
28. Birdee G, Nelson K, Wallston K, Nian H, Diedrich A, Paranjape S, et al. Slow breathing for reducing stress : The effect of extending exhale. Complement Ther Med [Internet]. 2023;73(March):102937. Available from: https://doi.org/10.1016/j.ctim.2023.102937
29. Aslamiah K, Martini S, Novita N, Studi P, Terapan S, Poltekkes K, et al. The Effect of Slow Deep Breathing Technique on Anxiety During. J Matern Child Heal Sci. 2023;3(June):6–11. Available from: https://doi.org/10.36086/maternalandchild.v3i1.1683
30. Zhang N, Wang S, Yao L. Inhalation of Cananga odorata essential oil relieves anxiety behaviors in autism-like rats via regulation of serotonin and dopamine metabolism. J Integr Med [Internet]. 2023;21(2). Available from: https://www.sciencedirect.com/science/article/abs/pii/S2095496423000067
31. Shao R, Man ISC, Lee TMC. The Effect of Slow - Paced Breathing on Cardiovascular and Emotion Functions : A Meta - Analysis and Systematic Review. Mindfulness (N Y) [Internet]. 2024;15(1):1–18. Available from: https://doi.org/10.1007/s12671-023-02294-2