ASTEEC Conference Proceeding: Applied Science
4th International Conference on Obstetricians Participating in Training for Innovative Measures to Advance Leadership 2026 (OPTIMAL 2026)
"Sustainable and Evidence-Based Interventions for Women, Children, and Family Health"
February 1, 2026 (Online)

Effectiveness of Prenatal Yoga Combined with Jasmine Aromatherapy on Anxiety and Sleep Quality among Third-Trimester Pregnant Women at Independent Midwife Practices in Rejang Lebong Regency, Indonesia

Lydia Febrina[1,*], Indah Fitri Andini[2]
[1,2]*Poltekkes Kemenkes Bengkulu, Bengkulu, Indonesia*
[*] Corresponding author: lydia.fe15@gmail.com

Abstract. Third-trimester pregnancy is commonly associated with anxiety and impaired sleep quality resulting from hormonal, physical, and psychological changes. This study examined the effectiveness of combined prenatal yoga and jasmine aromatherapy on anxiety and sleep quality among third-trimester pregnant women. A true-experimental study with a pretest-posttest control group design was conducted at independent midwife practices in the working area of the Rejang Lebong District Health Office, Bengkulu Province, Indonesia, from May to December 2025. Forty third-trimester pregnant women were purposively selected and randomly allocated into an intervention group (n=20), receiving combined prenatal yoga and jasmine aromatherapy twice weekly for four weeks, and a control group (n=20), receiving standard antenatal care. Anxiety was measured with the State-Trait Anxiety Inventory (STAI) and sleep quality with the Pittsburgh Sleep Quality Index (PSQI). After the intervention, the intervention group showed a significantly greater reduction in anxiety (mean difference 20.2 points) and greater improvement in sleep quality (mean difference 2.7 points) than the control group ($p<0.001$ for both), with very large effect sizes (Cohen's $d = 5.05$ and 2.07, respectively). Combined prenatal yoga and jasmine aromatherapy effectively reduced anxiety and improved sleep quality and is recommended as a complementary, non-pharmacological intervention in antenatal care.

Keywords: prenatal yoga, jasmine aromatherapy, anxiety, sleep quality, third trimester

1. INTRODUCTION

The third trimester of pregnancy is a critical period frequently accompanied by increased physiological and psychological complaints resulting from significant hormonal, physical, and emotional changes. Sleep disturbance affects approximately 66–97% of pregnant women in the late trimester [1], which may compromise quality of life, emotional balance, and the birthing process. Anxiety among pregnant women is also known to increase the risk of complications such as preterm birth, preeclampsia, and impaired neonatal adaptation [2].

Various non-pharmacological interventions have been developed to address sleep disturbance and anxiety during pregnancy, one of which is relaxation-based physical activity such as prenatal yoga. Prenatal yoga has been shown to improve flexibility, circulation, and reduce excessive sympathetic nervous system activity [3]. Several studies report that yoga practice during pregnancy can improve sleep quality, reduce cortisol levels, and lower anxiety before delivery [4], [5], while also enhancing emotional well-being and childbirth readiness [6].

In addition to physical and breathing exercises, complementary therapies such as aromatherapy are also frequently used to reduce stress and improve sleep quality in pregnant women. Aromatherapy acts through the olfactory and limbic systems, which regulate emotion and the body's stress response [7]. Among essential oils, jasmine (Jasminum sambac) is known for its relaxant, antidepressant, and anxiolytic effects. International studies show that jasmine oil inhalation can significantly reduce anxiety and cortisol levels in patients undergoing invasive medical procedures [8], with mild sedative and mood-enhancing effects. Studies in Indonesia similarly support the benefit of jasmine aromatherapy: it has been shown to be more effective than rose aromatherapy in reducing anxiety in postpartum mothers [9], and combined jasmine–kasturi aromatherapy significantly reduces postpartum anxiety [10]. However, no prior study has specifically evaluated jasmine aromatherapy combined with prenatal yoga among third-trimester pregnant women.

The safety of aromatherapy use during pregnancy must be carefully considered. According to reviews by the National Association for Holistic Aromatherapy (NAHA) and the British National Health Service (NHS), inhaled

jasmine essential oil at low doses is considered safe in the late trimester when not applied directly to the skin [11], [12]. When properly supervised, prenatal yoga combined with jasmine aromatherapy has the potential to become an effective, safe, and easily implemented non-pharmacological method at Independent Midwife Practices (PMB).

Based on this background, the present study aimed to determine the effectiveness of combined prenatal yoga and jasmine aromatherapy on anxiety and sleep quality among third-trimester pregnant women at Independent Midwife Practices in the working area of the Rejang Lebong District Health Office.

2. METHODS

This study used a true-experimental design with a pretest-posttest control group design, involving an intervention group receiving combined prenatal yoga and jasmine aromatherapy and a control group receiving standard antenatal care. Both groups were assessed before (pretest) and after (posttest) the intervention period on two dependent variables: anxiety and sleep quality. The overall study design flow is presented in Figure 1.

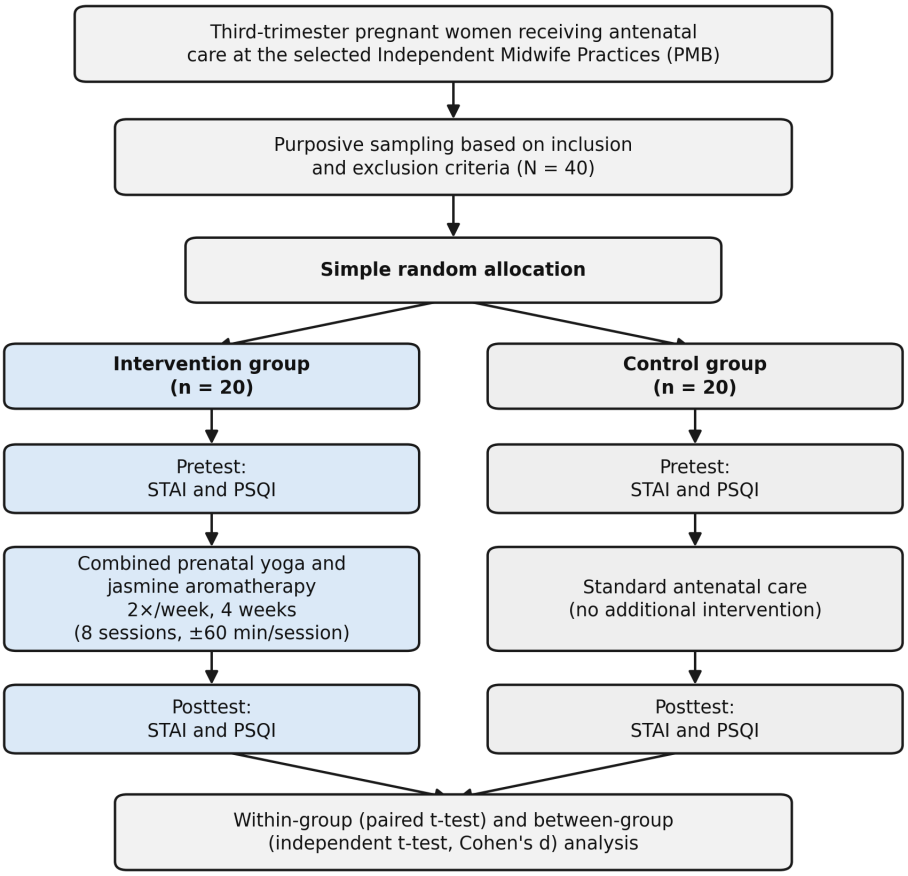


Figure 1. Study design flow diagram showing participant allocation, intervention protocol, and outcome assessment.

The study was conducted at two Independent Midwife Practices (PMB) in the working area of the Rejang Lebong District Health Office, Bengkulu Province, Indonesia, from May to December 2025.

The population comprised all third-trimester pregnant women receiving antenatal care at the selected PMBs. Forty respondents were selected using purposive sampling based on inclusion criteria (gestational age 28–40 weeks, no pregnancy complications, no psychiatric or severe respiratory disorders, and willingness to complete all sessions) and exclusion criteria (allergy to jasmine, current pharmacological treatment for anxiety or insomnia, or withdrawal before completion). Respondents were then randomly allocated into an intervention group (n=20) and a control group (n=20); baseline homogeneity between groups was confirmed using Levene's test ($p>0.05$ for both outcome variables).

The intervention group received combined prenatal yoga and jasmine (Jasminum sambac) aromatherapy twice weekly for four weeks (eight sessions), with each session lasting approximately 60 minutes and comprising a warm-up, trimester-appropriate asanas, pranayama, and a relaxation segment with jasmine oil inhalation (concentration ≤1%) via diffuser for 10–15 minutes. Sessions were supervised by a certified prenatal yoga instructor and monitored by the research midwife. The control group received standard antenatal care without additional intervention.

Anxiety was measured using the State-Trait Anxiety Inventory (STAI), a 40-item instrument with scores ranging from 20–80, with higher scores indicating greater anxiety [13]. Sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI), a 19-item instrument with a total score range of 0–21; a score ≥5 indicates poor sleep quality [14]. Both instruments were administered at baseline and after the four-week intervention period.

Data normality was assessed using the Shapiro–Wilk test and homogeneity of variance using Levene's test. As both assumptions were met, paired t-tests were used to examine within-group pre-post differences, and independent t-tests were used to compare between-group differences. Effect size was calculated using Cohen's d, with values of 0.2, 0.5, and 0.8 interpreted as small, medium, and large, respectively [15]. All analyses were performed at a 95% significance level ($p<0.05$).

This study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Written informed consent was obtained from all respondents, respondent data were kept confidential using unique identifier codes, and the study procedures were reviewed under the institutional Health Research Ethics Committee.

3. RESULTS AND DISCUSSION

Table 1 presents the characteristics of respondents in both groups. Most respondents were aged 20–35 years (90.0% intervention; 100.0% control). In the intervention group, 60.0% of respondents were primigravida, 65.0% had completed senior high school, and 70.0% were employed; in the control group, the corresponding proportions were 55.0% multipara, 75.0% senior high school education, and 80.0% employed. Baseline demographic characteristics were comparable between groups, supporting the validity of the subsequent between-group comparison.

Table 1. Characteristics of Respondents

Variable	Category	Intervention n (%)	Control n (%)
Age	20–35 years	18 (90.0)	20 (100.0)
	>35 years	2 (10.0)	0 (0.0)
Parity	Primigravida	12 (60.0)	9 (45.0)
	Multipara	8 (40.0)	11 (55.0)
Education	Senior high school	13 (65.0)	15 (75.0)
	Higher education	7 (35.0)	5 (25.0)
Occupation	Employed	14 (70.0)	16 (80.0)
	Unemployed	6 (30.0)	4 (20.0)

Table 2 presents anxiety (STAI) and sleep quality (PSQI) scores before and after the intervention period. In the intervention group, the mean anxiety score decreased significantly from 100.1±8.4 to 76.7±7.2 after four weeks of combined prenatal yoga and jasmine aromatherapy (mean reduction 23.4±4.2 points; $p<0.001$). In the control group, the anxiety score also decreased slightly, from 100.0±7.9 to 96.8±7.5, but the change was not statistically significant ($p=0.072$). A similar pattern was observed for sleep quality: PSQI scores in the intervention group decreased from 7.6±2.1 to 4.4±1.5 ($p<0.001$), clinically shifting most respondents from poor to good sleep quality (PSQI ≤5), whereas the control group showed only a small, non-significant change (7.8±2.0 to 7.3±1.9; $p=0.241$).

Table 2. Anxiety (STAI) and Sleep Quality (PSQI) Scores Before and After Intervention

Variable	Group	n	Pre (Mean±SD)	Post (Mean±SD)	t	p-value
Anxiety (STAI)	Intervention	20	100.1±8.4	76.7±7.2	18.62	0.000
	Control	20	100.0±7.9	96.8±7.5	1.92	0.072
Sleep quality (PSQI)	Intervention	20	7.6±2.1	4.4±1.5	9.84	0.000
	Control	20	7.8±2.0	7.3±1.9	1.21	0.241

Note: paired t-test, within-group comparison.

Table 3 shows the between-group comparison of score changes. The reduction in anxiety score in the intervention group (23.4±4.2) was significantly greater than in the control group (3.2±3.8), with a mean difference of 20.2 points ($t=15.84$; $p<0.001$) and a very large effect size (Cohen's $d=5.05$). Likewise, the improvement in sleep quality in the intervention group (3.2±1.4) was significantly greater than in the control group (0.5±1.2), with a mean difference of 2.7 points ($t=7.12$; $p<0.001$) and a very large effect size (Cohen's $d=2.07$). These findings indicate that combined prenatal yoga and jasmine aromatherapy produced a clinically and statistically meaningful effect on both outcomes.

Table 3. Between-Group Comparison of Score Changes and Effect Size

Variable	Mean Δ Intervention±SD	Mean Δ Control±SD	Mean Diff.	t	p-value	Cohen's d
Anxiety (STAI)	23.4±4.2	3.2±3.8	20.2	15.84	0.000	5.05
Sleep quality (PSQI)	3.2±1.4	0.5±1.2	2.7	7.12	0.000	2.07

Note: independent t-test, between-group comparison; Cohen's $d \geq 0.8$ is interpreted as a large effect.

Most respondents were within the reproductively safe age range of 20–35 years, a period generally associated with lower risk of pregnancy complications and better physiological and psychological adaptability. The predominance of primigravida respondents (60.0%) in the intervention group is noteworthy, as first-time pregnancy is commonly associated with higher prenatal anxiety than subsequent pregnancies due to limited prior experience with labor and delivery [16]. Similarly, the majority of respondents were employed (70–80%), which may add psychological and physical burden during the third trimester [17]. These characteristics suggest that the study sample was, if anything, predisposed toward higher baseline anxiety and poorer sleep quality, underscoring the clinical relevance of an effective relaxation-based intervention for this group.

The significant reduction in anxiety observed in the intervention group is consistent with previous studies reporting that prenatal yoga lowers sympathetic nervous system activity and increases parasympathetic dominance, thereby reducing physiological and psychological stress responses. Hasibuan et al. [18] similarly found that prenatal yoga significantly reduced anxiety and improved sleep quality among pregnant women, while a randomized controlled trial by Duncan et al. [19] reported a significant decrease in State Anxiety Inventory scores after four weeks of prenatal yoga compared with a control group. Kundarti et al. [20] likewise reported that prenatal yoga reduced anxiety, cortisol levels, and improved sleep quality among pregnant women.

The additional benefit observed with jasmine aromatherapy is consistent with its proposed mechanism of action: olfactory stimulation from jasmine essential oil activates the limbic system, modulating neurotransmitters such as serotonin, dopamine, and gamma-aminobutyric acid (GABA), which regulate mood, emotion, and sleep, while reducing cortisol secretion. A recent systematic review and meta-analysis by Wang et al. [21] confirmed that aromatherapy significantly improves both anxiety and sleep quality in maternal populations. Findings from Sari et al. [22], who specifically examined the combination of prenatal yoga and aromatherapy on anxiety among third-trimester pregnant women in Indonesia, and Kusuma and Wahyuni [23], who reported reduced anxiety following seven consecutive days of jasmine aromatherapy among third-trimester pregnant women, further support the present findings. The combination of prenatal yoga and jasmine aromatherapy appears to provide a synergistic

relaxation effect: yoga reduces physical and autonomic tension, while aromatherapy reinforces relaxation through the olfactory-limbic pathway, together producing a stronger overall effect than either therapy administered alone.

These findings support the potential of combined prenatal yoga and jasmine aromatherapy as a safe, low-cost, and easily implemented non-pharmacological intervention that midwives can integrate into comprehensive antenatal care at Independent Midwife Practices, particularly given the limited pharmacological options available during pregnancy. Nevertheless, this study has several limitations, including its two-site setting, a moderate sample size (n=40), a relatively short four-week intervention period, and the absence of long-term follow-up or biological stress markers such as salivary cortisol. Larger-scale randomized controlled trials with extended follow-up and objective physiological measures are recommended to further strengthen this evidence.

4. CONCLUSIONS

Combined prenatal yoga and jasmine aromatherapy, administered twice weekly for four weeks, significantly reduced anxiety and improved sleep quality among third-trimester pregnant women compared with standard antenatal care alone, with very large effect sizes for both outcomes (Cohen's d=5.05 for anxiety and 2.07 for sleep quality). These findings support the integration of this non-pharmacological, safe, and low-cost intervention into comprehensive antenatal care at Independent Midwife Practices. Future research using larger samples, randomized controlled trial designs, and longer follow-up periods is recommended to further strengthen this evidence and to explore additional outcomes such as salivary cortisol levels.

ACKNOWLEDGMENTS

The authors would like to thank the Director of Poltekkes Kemenkes Bengkulu, the Center for Research and Community Service (PPM) of Poltekkes Kemenkes Bengkulu, and the midwives and staff of the Independent Midwife Practices in Rejang Lebong Regency for their support and cooperation throughout this study.

REFERENCES

1. Sedov ID, Cameron EE, Madigan S, Tomfohr-Madsen LM. Sleep quality during pregnancy: A meta-analysis. *Sleep Med Rev.* 2021;58:101436.
2. Field T. Prenatal anxiety effects, interventions and outcomes: A review. *Int J Environ Res Public Health.* 2020;17(9):E3359.
3. Babbar S, et al. Yoga during pregnancy: A systematic review and meta-analysis. *Complement Ther Clin Pract.* 2022;47:101556.
4. Beddoe AE, Lee KA. Mind–body interventions during pregnancy. *J Obstet Gynecol Neonatal Nurs.* 2020;49(3):227–35.
5. Rakhshani A, et al. Effects of yoga on anxiety and depression during pregnancy. *J Complement Integr Med.* 2020;17(2):1–9.
6. Newham JJ, et al. Effects of antenatal yoga on maternal anxiety and mood. *Complement Ther Clin Pract.* 2023;52:101746.
7. Hwang E, et al. Aromatherapy for stress reduction: A systematic review. *J Altern Complement Med.* 2021;27(3):179–92.
8. Nasiri A, et al. The effect of jasmine essential oil inhalation on anxiety and cortisol levels in surgical patients: A randomized trial. *Complement Ther Med.* 2021;58:102689.
9. Marpaung D, et al. The effectiveness of rose and jasmine aromatherapy on reducing anxiety levels in postpartum mothers. *J Ilm PANNMED.* 2022;17(3):112–9.
10. Fadlilah S, et al. The effectiveness of giving jasmine and kasturi aromatherapy on reducing anxiety in postpartum mothers. *Jurnal Ners.* 2024;19(2):145–53.
11. National Association for Holistic Aromatherapy (NAHA). Using aromatherapy safely during pregnancy. 2023.
12. British National Health Service (NHS). Aromatherapy and pregnancy. 2023.
13. Spielberger CD, Gorsuch RL, Lushene RE, Vagg PR, Jacobs GA. Manual for the State-Trait Anxiety Inventory. Palo Alto, CA: Consulting Psychologists Press; 1983.
14. Buysse DJ, et al. The Pittsburgh Sleep Quality Index: A new instrument for psychiatric practice and research. *Psychiatry Res.* 2020;293:113–22.

15. Polit DF, Beck CT. *Nursing Research: Generating and Assessing Evidence for Nursing Practice.* 11th ed. Philadelphia: Wolters Kluwer; 2021.
16. Li Y, Zhou Y, Zhang L, Chen X. Parity differences in prenatal anxiety and associated factors during the third trimester of pregnancy. *BMC Pregnancy Childbirth.* 2023;23(1):1–9.
17. Sari RP, Handayani L. Hubungan status pekerjaan dengan tingkat kecemasan ibu hamil trimester III. *Jurnal Kebidanan Indonesia.* 2022;13(2):85–92.
18. Hasibuan DA, et al. The effectiveness of prenatal yoga in reducing anxiety and improving sleep quality among pregnant women. *International Journal of Public Health Excellence.* 2024;4(1):353–9.
19. Duncan LG, et al. Prenatal yoga and maternal anxiety: Randomized controlled trial. *Mindfulness.* 2023;14(1):145–57.
20. Kundarti FI, Titisari IRA, Sepdianto TC, Karnasih I, Sugijati S. The effect of prenatal yoga on anxiety, cortisol and sleep quality. *International Journal of Pharmaceutical Research.* 2020;12(3).
21. Wang Z, Mao C, Zeng S, Chen L, Feng Z, Liu W. The effects of aromatherapy on anxiety and sleep quality in maternal women: A systematic review and meta-analysis. *Frontiers in Public Health.* 2025;13:1701126.
22. Sari IP, et al. Efektivitas kombinasi prenatal yoga dan aromaterapi terhadap kecemasan ibu hamil trimester III. *Jurnal Kesehatan Reproduksi Indonesia.* 2022;9(2):120–9.
23. Kusuma N, Wahyuni R. Efektivitas aromaterapi melati terhadap kecemasan ibu hamil trimester III. *Jurnal Kebidanan dan Keperawatan.* 2021;17(2):83–9.