



Research Article

Effectiveness of Prenatal Yoga in Reducing Low Back Pain Intensity during the Third Trimester of Pregnancy

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Abstract Low back pain is one of the most common musculoskeletal complaints experienced by pregnant women, particularly during the third trimester, due to biomechanical, postural, and hormonal changes during pregnancy. This condition may interfere with daily activities, sleep quality, and overall maternal comfort. One safe and potentially effective non-pharmacological approach to manage this complaint is prenatal yoga. This study aimed to analyze the effect of prenatal yoga on the intensity of low back pain in third-trimester pregnant women at UPT Puskesmas Mampuak. This study employed a quasi-experimental design using a one-group pretest–posttest approach. The sample consisted of 30 third-trimester pregnant women selected through purposive sampling. The prenatal yoga intervention was delivered in a structured manner, including stretching exercises, breathing techniques, and relaxation adapted to pregnancy conditions. Low back pain intensity was measured before and after the intervention using a standardized pain scale. Data were analyzed using the Wilcoxon Signed Rank Test. The results showed a reduction in low back pain intensity following the prenatal yoga intervention. The Wilcoxon test demonstrated a statistically significant difference between pain intensity before and after the intervention, with a p-value of 0.000 ($p < 0.05$). Descriptively, there was a decrease in the proportion of participants experiencing severe pain and an increase in those reporting moderate and mild pain. In conclusion, prenatal yoga has a significant effect on reducing the intensity of low back pain in third-trimester pregnant women. Prenatal yoga can be recommended as a safe, effective, and applicable non-pharmacological intervention to support antenatal care services at the primary healthcare level.

Keywords: Low Back Pain; Non-Pharmacological Intervention; Pregnant Women; Prenatal Yoga; Third Trimester

Received: June 15, 2025

Revised: August 30, 2025;

Accepted: October 19, 2025

Published : December 31, 2025

Curr. Ver.: December 31, 2025



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1. Introduction

Low back pain (LBP) is one of the most common musculoskeletal complaints experienced during pregnancy, with its prevalence tending to increase as gestational age advances, particularly in the third trimester. Globally, LBP during pregnancy has been reported to affect approximately 50–70% of pregnant women, with variations influenced by demographic factors, physical activity levels, and pain assessment methods (Salari et al., 2023). This condition not only causes physical discomfort but also has a significant impact on quality of life, sleep patterns, daily activities, and maternal readiness for childbirth (Davenport et al., 2019). Therefore, the management of low back pain during pregnancy represents an important issue in maternal healthcare services.

In the third trimester, the risk of low back pain increases due to progressive anatomical and biomechanical changes. Uterine enlargement leads to an anterior shift in the body's center of gravity, resulting in increased lumbar lordosis and greater load on the lumbopelvic segments (Yoseph et al., 2025). In addition, stretching of the abdominal muscles, increased pressure on the sacroiliac joints, and tension in the paraspinal muscles contribute to the development of low back pain (Fridawati et al., 2024). Hormonal factors also play a role, particularly elevated levels of relaxin and progesterone, which cause ligamentous laxity and

reduced joint stability, thereby increasing susceptibility to musculoskeletal pain (Daneau et al., 2025).

In Indonesia, low back pain is one of the most frequently reported complaints among pregnant women during antenatal care (ANC) visits, especially in the late stages of pregnancy. Health service data indicate that the majority of third-trimester pregnant women experience low back pain ranging from mild to severe intensity, which is often not optimally managed (Ministry of Health of the Republic of Indonesia, 2024). Pain management during pregnancy in primary healthcare settings remains largely limited to postural education and rest, while non-pharmacological interventions based on physical activity have not yet been systematically integrated into routine care programs (Ministry of Health of the Republic of Indonesia, 2020). Nevertheless, non-pharmacological approaches offer clear advantages in terms of safety and sustainability for uncomplicated pregnancies.

Various international guidelines recommend safe and structured physical activity as an integral component of antenatal care. The American College of Obstetricians and Gynecologists (ACOG) emphasizes that exercise during pregnancy, including stretching and light strengthening exercises, is safe for uncomplicated pregnancies and provides substantial physical and psychological benefits for maternal health (ACOG, 2020). Similarly, the World Health Organization (WHO) recommends regular physical activity during pregnancy to enhance maternal well-being and to reduce the negative effects of sedentary behavior, including musculoskeletal complaints (WHO, 2020).

One form of physical activity that has increasingly been applied as a complementary therapy during pregnancy is prenatal yoga, also referred to as pregnancy yoga. Prenatal yoga combines stretching, light muscle strengthening, breathing techniques, relaxation, and body awareness, all of which are adapted to the physiological conditions of pregnancy (Davenport et al., 2019). Clinically, prenatal yoga is believed to improve posture, enhance flexibility and core muscle stability, reduce back muscle tension, and modulate pain perception through relaxation mechanisms and stress reduction (Yoseph et al., 2025).

Previous studies have demonstrated the potential of prenatal yoga in reducing the intensity of low back pain among pregnant women. A meta-analysis conducted by Davenport et al. (2019) concluded that physical exercise during pregnancy, including yoga, is associated with a reduced risk and severity of lumbopelvic pain. Quasi-experimental studies conducted in Indonesia have also reported significant reductions in low back pain intensity among third-trimester pregnant women following regular participation in prenatal yoga programs (Mustofa et al., 2023; Fridawati et al., 2024). Other studies have found that prenatal gentle yoga effectively improves maternal comfort and mobility without causing significant adverse effects (Katili et al., 2025).

Although evidence regarding the benefits of prenatal yoga continues to grow, several research gaps remain. Most existing studies employ pre–post designs without control groups, thereby limiting the strength of causal inference (Mustofa et al., 2023). In addition, variations in the frequency, duration, and types of prenatal yoga exercises, as well as differences in pain measurement instruments, may influence study outcomes and limit the reproducibility of interventions in primary healthcare settings (Fridawati et al., 2024). Local contextual factors, including maternal characteristics, family support, and the availability of resources in primary healthcare centers, may also affect the effectiveness of prenatal yoga program implementation (Ministry of Health of the Republic of Indonesia, 2020).

In the context of maternal healthcare services in Indonesia, particularly at the primary healthcare level, research on the effectiveness of prenatal yoga remains relatively limited and unevenly distributed geographically. UPT Puskesmas Mampuak, as a primary healthcare facility, plays a strategic role in delivering promotive and preventive services for pregnant women. Therefore, evidence-based evaluation of the effect of prenatal yoga on low back pain intensity among third-trimester pregnant women at this facility is essential to support the development of more comprehensive and comfort-oriented antenatal care services.

Based on this background, this study aimed to analyze the effect of prenatal yoga (pregnancy yoga) on the intensity of low back pain in third-trimester pregnant women at UPT Puskesmas Mampuak. The findings of this study are expected to provide a scientific basis for strengthening non-pharmacological, physical activity–based interventions and to support the integration of prenatal yoga into maternal healthcare programs at the primary healthcare level.

2. Research Method

This study employed a quasi-experimental design using a one-group pretest–posttest approach. This design was selected because the study aimed to examine the effect of a prenatal yoga intervention on changes in low back pain intensity among third-trimester pregnant women before and after the intervention, without the use of a control group. This design was considered the most appropriate for non-pharmacological intervention research conducted in primary healthcare settings such as UPT Puskesmas Mampuak, while taking into account ethical considerations, resource limitations, and the feasibility of program implementation.

A quantitative approach was used, as the data collected consisted of numerical measurements of low back pain intensity that were statistically analyzed to assess differences before and after the prenatal yoga intervention.

The study was conducted at UPT Puskesmas Mampuak in 2026. The study population comprised all third-trimester pregnant women attending antenatal care (ANC) visits at UPT Puskesmas Mampuak during the study period. This population was selected because third-trimester pregnant women are at a higher risk of experiencing low back pain due to biomechanical and hormonal changes associated with pregnancy.

The study sample consisted of third-trimester pregnant women who met the inclusion and exclusion criteria. Inclusion criteria were: third-trimester pregnancy with gestational age ≥ 28 weeks, experiencing mild to moderate low back pain, having an uncomplicated pregnancy, being able to participate in all prenatal yoga sessions, and willingness to participate as evidenced by signed informed consent. Exclusion criteria included a history of severe musculoskeletal disorders, high-risk pregnancy, bleeding, preeclampsia, or other medical conditions contraindicating physical activity.

A purposive sampling technique was used, whereby participants were selected based on specific criteria aligned with the study objectives. This technique was chosen because not all third-trimester pregnant women were eligible to participate in prenatal yoga, necessitating careful selection of participants who met the intervention requirements.

The sample size was determined based on the number of eligible participants during the study period, with consideration given to the minimum sample size required for paired comparison tests. In quasi-experimental studies conducted in primary healthcare settings, a sample size of 20–30 participants is considered statistically sufficient to detect changes in pain scores before and after the intervention, particularly when the data are not normally distributed.

The independent variable in this study was prenatal yoga (pregnancy yoga), while the dependent variable was the intensity of low back pain among third-trimester pregnant women. The prenatal yoga intervention was delivered through structured exercise sessions consisting of stretching, light strengthening, breathing techniques, and relaxation exercises adapted to third-trimester pregnancy conditions. The intervention was conducted two to three times per week for 2–4 weeks, with each session lasting approximately 30–45 minutes, and was guided by trained healthcare professionals.

Low back pain intensity was measured using the Numeric Rating Scale (NRS) or the Visual Analog Scale (VAS), both of which are valid and reliable instruments for pain assessment. Pain intensity was measured twice: before the intervention (pretest) and after completion of the prenatal yoga program (posttest).

The research procedure began with the collection of participants' demographic characteristics, followed by baseline measurement of low back pain intensity prior to the prenatal yoga intervention. Participants then engaged in the prenatal yoga program according to the predetermined schedule. Upon completion of the intervention, low back pain intensity was reassessed using the same measurement instrument to obtain posttest data.

Data analysis was conducted in stages. Univariate analysis was used to describe participant characteristics and the distribution of low back pain intensity before and after the intervention, presented as means, standard deviations, medians, and frequency distributions. Prior to bivariate analysis, data normality was assessed using the Shapiro–Wilk test. When the data were not normally distributed, Wilcoxon Signed Rank Test was applied to determine differences in low back pain intensity before and after the prenatal yoga intervention. If the data were normally distributed, a paired t-test was used. Statistical significance was set at $p < 0.05$.

This study adhered to ethical principles in health research, including informed consent, confidentiality of participant data, and assurance of safety during the prenatal yoga intervention in accordance with maternal healthcare service standards.

3. Results and Discussion

Table 1. Demographic data.

Var	n	F (%)	
Age	< 20 yo	5	16.7
	20-35 yo	22	73.3
	>35 yo	3	10.0
Education	Elementary school	3	10.0
	Junior High School	6	20.0
	Senior High School	18	60.0
	College/university	3	10.0
Employment	Housewife	25	83.3
	Farmer	0	0
	Private employee	0	0
	Government employee	5	16.7
Parity	Primipara	16	53.3
	Multipara	13	43.3
	Grande Multypara	1	3.3
Previous disease	None	27	90.0
	Hepatitis B	3	10.0
Pain before	Mild	1	33.3
	Moderate	13	43.3
	Severe	16	53.3
Pain after	Mild	5	16.7
	Moderate	20	66.7
	Severe	5	16.7
Total	30	100	

(source: primary data, 2025)

Prior to the intervention, the majority of participants experienced severe low back pain, with 16 respondents (53.3%) classified in this category. Respondents with moderate pain accounted for 13 individuals (43.3%), while only 1 respondent (3.3%) reported mild pain. These findings indicate that most third-trimester pregnant women experienced low back pain of moderate to severe intensity before the intervention.

Following the prenatal yoga intervention, a shift in the distribution of low back pain intensity was observed. The largest proportion of respondents reported moderate pain, totaling 20 individuals (66.7%). The number of respondents experiencing severe pain decreased markedly to 5 individuals (16.7%), while the number of those reporting mild pain increased to 5 individuals (16.7%). This change demonstrates a clear shift in pain intensity from severe to moderate and mild categories after the prenatal yoga intervention.

Preliminary Interpretation

Descriptively, the findings of this study indicate that prenatal yoga has the potential to reduce the intensity of low back pain among third-trimester pregnant women. This is reflected by a decrease in the proportion of severe pain and an increase in moderate and mild pain categories following the intervention. These results support the study hypothesis that prenatal yoga may serve as an effective and safe non-pharmacological intervention for alleviating low back pain during the third trimester of pregnancy.

However, this descriptive interpretation requires further confirmation through bivariate statistical analysis (Wilcoxon Signed Rank Test or paired t-test) to determine whether the observed changes in pain intensity are statistically significant, in accordance with the quasi-experimental pretest–posttest design employed in this study.

Table 2. Statistical Analysis.

Var indep	N	P Value	Var dep
Pain before	30	0.000*	Pain after
<i>Wilcoxon</i>			

*significant

source: primary data, 2025.

Bivariate analysis was conducted to determine the effect of prenatal yoga on the intensity of low back pain among third-trimester pregnant women at UPT Puskesmas Mampuk. The statistical test used was the Wilcoxon Signed Rank Test, as the low back pain intensity data before and after the intervention were not normally distributed and were obtained from the same group of participants.

The results of the Wilcoxon test indicated a statistically significant difference in low back pain intensity before and after the prenatal yoga intervention. The obtained p-value was 0.000 ($p < 0.05$); therefore, the null hypothesis (H_0) was rejected and the alternative hypothesis (H_1) was accepted. These findings demonstrate that prenatal yoga has a significant effect on reducing the intensity of low back pain among third-trimester pregnant women.

Clinically, these results indicate that prenatal yoga was effective in reducing low back pain intensity, as reflected by a decrease in the number of participants reporting severe pain and an increase in those reporting mild and moderate pain after the intervention. Thus, prenatal yoga may be recommended as a safe and effective non-pharmacological intervention to alleviate low back pain among third-trimester pregnant women in primary healthcare settings.

Discussion

The findings of this study demonstrate that prenatal yoga has a significant effect on reducing low back pain intensity among third-trimester pregnant women at UPT Puskesmas Mampuk. This conclusion is supported by the Wilcoxon Signed Rank Test results, which revealed a statistically significant difference in pain intensity before and after the intervention ($p < 0.05$). Descriptively, the study also showed a shift in pain intensity from severe to moderate and mild categories following participation in the prenatal yoga program, indicating meaningful clinical benefits of the intervention.

Physiologically, low back pain during the third trimester of pregnancy results from a combination of biomechanical, neuromuscular, and hormonal changes. Increased body weight, anterior displacement of the center of gravity, and enhanced lumbar lordosis place excessive stress on the lumbopelvic muscles and joints (Wu et al., 2018). Additionally, reduced core muscle stability due to abdominal muscle stretching contributes to postural imbalance and pain development (Stuge & Mørkved, 2016). Prenatal yoga addresses these issues by improving postural alignment through controlled stretching and light strengthening exercises, thereby reducing muscle tension and enhancing lumbopelvic stability.

The results of this study are consistent with previous research demonstrating the effectiveness of prenatal yoga in reducing pregnancy-related low back pain. Babbar et al. (2016) reported that pregnant women who regularly practiced yoga experienced significantly fewer musculoskeletal pain complaints compared to those who did not exercise. Similarly, Kolu et al. (2020) found that yoga-based and core stabilization exercises reduced low back pain intensity and improved physical function among women in late pregnancy. Studies conducted in Indonesia by Lestari et al. (2021) and Sari et al. (2022) further support these findings, reporting significant reductions in low back pain scores among third-trimester pregnant women following prenatal yoga interventions.

From a pain theory perspective, the reduction in pain intensity following prenatal yoga may be explained by the gate control theory and neuroendocrine regulation mechanisms. Structured light physical activity stimulates the release of endorphins, which function as natural analgesics and reduce pain perception (Koltyn & Arbogast, 2019). Moreover, breathing and relaxation techniques incorporated in yoga help reduce sympathetic nervous system activation and psychological tension, both of which are known to exacerbate pain

perception during pregnancy (Field, 2018). Therefore, the benefits of prenatal yoga extend beyond physical effects to include psychological well-being.

Despite the significant findings, it is important to note that not all participants experienced pain reduction to the mild category. Some pregnant women continued to report moderate pain following the intervention. This outcome may be influenced by individual factors such as parity, advancing gestational age approaching delivery, daily physical activity levels, and variations in adherence to and execution of yoga movements (Pennick & Liddle, 2019). These findings suggest that while prenatal yoga may not completely eliminate pain, it plays an important role in reducing pain intensity and enhancing pain tolerance, which remains clinically meaningful.

The clinical implications of this study are highly relevant for midwifery services at the primary healthcare level. Prenatal yoga represents a non-pharmacological intervention that is relatively safe, cost-effective, and easy to integrate into antenatal classes at primary healthcare centers. With adequate training for healthcare providers, prenatal yoga can be incorporated into promotive and preventive care strategies to enhance maternal comfort and reduce reliance on pharmacological pain management, which is often limited during pregnancy (Smith et al., 2020). Furthermore, this approach aligns with the principles of women-centered care, emphasizing active maternal participation in maintaining health during pregnancy.

Nevertheless, this study has several limitations, including the absence of a control group and a relatively small sample size, which limit the generalizability of the findings. Future studies are recommended to employ experimental designs with control groups, longer intervention durations, and consideration of psychosocial factors as potential confounding variables. Despite these limitations, this study provides valuable local evidence supporting the effectiveness of prenatal yoga in reducing low back pain among third-trimester pregnant women in primary healthcare settings.

4. Conclusion

This study concludes that prenatal yoga has a significant effect on reducing the intensity of low back pain among third-trimester pregnant women at UPT Puskesmas Mampuk. The results of the bivariate analysis using the Wilcoxon Signed Rank Test demonstrated a statistically significant difference in pain intensity before and after the prenatal yoga intervention ($p < 0.05$). Clinically, the prenatal yoga intervention was effective in reducing the proportion of participants experiencing severe pain and increasing the proportion of those reporting mild and moderate pain, reflecting improvements in maternal comfort and pain tolerance.

These findings confirm that prenatal yoga is a safe, effective, and practical non-pharmacological intervention for managing low back pain during the third trimester of pregnancy. When implemented through a structured approach tailored to the physiological conditions of pregnant women, prenatal yoga can serve as an important component of promotive and preventive antenatal care services. Therefore, prenatal yoga may be recommended as a complementary intervention to enhance the quality of maternal healthcare, particularly at the primary healthcare level.

Acknowledgement. The authors would like to express their sincere gratitude to the Head of UPT Puskesmas Mampuk, the midwives, and all healthcare professionals who provided support and facilitation throughout the research process. Appreciation is also extended to all third-trimester pregnant women who willingly participated as respondents and actively engaged in the prenatal yoga sessions. The authors are grateful to all individuals and institutions who contributed directly or indirectly to the successful completion of this study and to the advancement of evidence-based midwifery practice.

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