



The Effect of Antenatal Yoga on Lower Back Pain in Third-Trimester Pregnant Women at Ertitawati Siregar's Independent Midwifery Practice in Olora Village, Gunungsitoli City

Desi Handayani Lubis¹, Sri Rezeki², Erin Padilla Siregar³, Pratiwi Lumbantobing⁴

¹Sekolah Tinggi Ilmu Kesehatan Flora, Medan, Indonesia

^{2,3}STIKes Mitra Husada Medan, Indonesia

⁴STIKes Senior Medan, Indonesia

Email correspondence: desihandayanilubis84@gmail.com

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Abstract

Pregnancy-related low back pain (LBP) is prevalent in late gestation and can negatively affect physical comfort and psychological well-being. Non-pharmacological interventions such as antenatal yoga are increasingly incorporated into routine care; however, pragmatic evidence from community-based settings remains limited. This study examined within-subject changes in LBP severity among third-trimester pregnant women participating in a structured antenatal-yoga program delivered at a community midwifery clinic. Researchers conducted a single-group pre-experimental pretest–posttest study at an independent midwifery clinic in Gunungsitoli, Indonesia. Forty pregnant women ≥ 28 weeks' gestation were recruited through purposive sampling. The intervention consisted of supervised prenatal-yoga sessions held three times per week over four weeks. Pain intensity was assessed before and after the program using the Numeric Rating Scale (NRS) and categorical severity bands (mild, moderate, severe). Pre–post differences were analysed using the Wilcoxon signed-rank test. Participation in antenatal yoga was associated with a clinically meaningful reduction in pain severity. Prior to the intervention, 62.5% of participants reported moderate pain and 37.5% reported mild pain; no cases of severe pain were observed. Following the intervention, 82.5% reported mild pain and 17.5% reported moderate pain. The change in NRS scores was statistically significant ($p < 0.001$). In this pragmatic third-trimester cohort, engagement in a structured antenatal yoga program was linked to reduced LBP severity and a shift toward milder pain categories. These findings support the feasibility of integrating antenatal yoga into routine prenatal care as a non-pharmacological option. Future controlled studies incorporating effect sizes, confidence intervals, functional outcomes, adherence and safety monitoring, and short-term follow-up are recommended to strengthen causal inference and inform optimal program design.

Keywords: Antenatal Yoga, Pregnancy, Third Trimester, Low Back Pain, Non-Pharmacological Intervention, Community Midwifery, Pretest–Post-test.

INTRODUCTION

Pregnancy is a complex biological process that begins at conception and continues until childbirth (Jovandaric et al., 2023; Meincke, 2022; Wahyuni et al., 2024). During this period, particularly in the third trimester, women undergo a range of physiological changes that can compromise physical comfort, most notably through the onset of lower back pain (Anggraeni et al., 2024; Ginting et al., 2023; Nuraeni et al., 2025). This condition is primarily attributed to the increasing fetal weight, which places additional pressure on the spine, alters maternal posture, and weakens supporting muscles. It is estimated that approximately 80% of pregnant women experience back pain at some point during pregnancy, with 70% directly linked to

musculoskeletal changes during gestation (Fiat et al., 2022; Salari et al., 2023; Wyatt et al., 2024).

Lower back pain during pregnancy not only diminishes the quality of life and daily functioning of expectant mothers but also contributes significantly to the risk of maternal morbidity. Typically often localized in the lumbosacral region, this pain is exacerbated by hormonal fluctuations, increased body weight, postural changes, and biomechanical stress associated with pregnancy. It can impair mobility, disrupt sleep quality, destabilize emotional well-being, and, in some cases, lead to psychological distress such as anxiety or depression. These effects may adversely impact both maternal and fetal outcomes (Chunmei et al., 2023; Khatri et al., 2022).

Global epidemiological data reveal a concerning prevalence of lower back pain during the third trimester of pregnancy, ranging from 15% to 45%, with some regions such as Australia reporting rates as high as 80% (McIntyre et al., 2022). Multiple studies confirm that 60% to 80% of pregnant women in Indonesia, experience varying degrees of back pain during pregnancy, underscoring the urgent need for comprehensive and context-sensitive maternal strategies (Wójcik et al., 2024).

The burden of pregnancy-related lower back pain is compounded by limited access to optimal antenatal care, particularly in developing countries. According to the WHO, only 64% of pregnant women globally receive adequate antenatal care services. This shortfall not only reduces opportunities for early detection and management of musculoskeletal discomforts but is also associated with persistently high maternal mortality ratios. In Indonesia, for instance, the maternal mortality ratio remains high at 214 per 100,000 live births, reflecting systemic gaps in maternal health service provision (Istiqumilaily et al., 2023; Kunigara et al., 2022).

Given the multidimensional nature of lower back pain during pregnancy—encompassing biomechanical, physiological, and psychosocial factors—pharmacological treatments alone are often insufficient and may be contraindicated due to potential risks to the fetus. Consequently, non-pharmacological interventions such as prenatal yoga, physiotherapy, aquatic therapy, acupuncture, and postural training have gained increasing importance. These approaches not only alleviate physical discomfort but also enhance maternal well-being, support functional mobility, and contribute positively to mental health.

In conclusion, addressing lower back pain during pregnancy requires an integrative and preventive approach that goes beyond mere symptom management. It calls for a transition toward holistic maternal care strategies that harmonize physical, psychological, and social dimensions—ultimately contributing to the reduction of maternal morbidity and the

improvement of overall maternal health outcomes, particularly in developing countries like Indonesia.

Several non-pharmacological approaches have been employed to alleviate back pain in pregnant women, including prenatal exercises, massage, warm compresses, acupuncture, and yoga. Among these methods, antenatal yoga has demonstrated particularly promising outcomes. A study by Corrigan et al., (2022) reported that following a yoga intervention, most pregnant participants experienced a reduction in pain severity from moderate to mild. Yoga enhances muscle flexibility and reduces spinal pressure, making it an effective modality for managing back pain. Additionally, previous research suggests that yoga promotes relaxation and alleviates anxiety, both of which can amplify pain perception.

Preliminary data from the Independent Midwifery Practice of Ertitawati Siregar in Olora Village, Gunungsitoli City, indicated that among 28 pregnant women recorded in February, 14 reported back pain, 6 experienced limb numbness, and 8 had difficulty sleeping. Interviews with 11 pregnant women revealed that back pain was most frequently reported by multiparous mothers, with intensity ranging from mild to moderate. These findings highlight the urgent need for effective interventions such as antenatal yoga to alleviate pregnancy-related discomfort. Accordingly, this study aims to examine the impact of antenatal yoga on back pain among third-trimester pregnant women at the Independent Midwifery Practice of Ertitawati Siregar, in Olora Village, Gunungsitoli City.

From a public health standpoint, integrating structured, evidence-based, non-pharmacological therapies into national antenatal care guidelines is essential. Such interventions should be affordable, culturally sensitive, and adaptable to existing community health service systems. Furthermore, equipping midwives and antenatal care providers with the skills to identify and manage musculoskeletal disorders during pregnancy could significantly enhance the quality of maternal care, particularly in rural and underserved populations.

In conclusion, addressing lower back pain during pregnancy requires an integrative and preventive approach that extends beyond symptom management. It calls for a shift toward holistic maternal care strategies that balance physical, psychological, and social dimensions—thereby contributing to the reduction of maternal morbidity and the improvement of overall maternal health outcomes, particularly in developing countries like Indonesia.

METHODS

This study employed a pre-experimental design using a one-shot case study approach, which involved observing a single group following an intervention without the inclusion of a

control group, to assess the effect of antenatal yoga on lower back pain among third-trimester pregnant women (Strayhorn, 2021). The research was conducted at the Independent Midwifery Practice (Bidan Praktek Mandiri) of Ertitawati Siregar in Oloro Village, Gunungsitoli City. Data collection and intervention activities were carried out over a six-month period, from 10 April to 10 October 2024.

The study population consisted of all pregnant women between 28 and 40 weeks of gestation who experienced back pain and attended the Independent Midwifery Practice of Ertitawati Siregar in Oloro Village, Gunungsitoli City. The sample, defined as a subset of the population considered representative of the whole (Notoatmodjo, 2012), was selected using a purposive sampling technique, whereby participants met inclusion and exclusion criteria aligned with the research objectives. The final sample comprised 40 pregnant women with the specified gestational age range (Sugiyono, 2019).

To minimize bias in sample characteristics, inclusion and exclusion criteria were established prior to sampling. Inclusion criteria were: (1) mothers in the third trimester of pregnancy; (2) mothers experiencing back pain accompanied by additional complaints such as numbness in the hands and feet or difficulty sleeping; (3) mothers reporting back pain of mild to moderate intensity; and (4) mothers with no history of preterm labor or low birth weight (LBW). The exclusion criteria included: (1) history of vaginal bleeding; (2) placenta previa; (3) premature rupture of membranes; (4) history of anemia or hypertension; and (5) poor obstetric history, including bleeding during pregnancy.

The study included both an independent and a dependent variable. The independent variable was antenatal yoga, defined as a balancing technique aimed at maintaining emotional, physical, mental, and social well-being, performed routinely two to three times per week during pregnancy at the Independent Midwifery Practice of Ertitawati Siregar in Oloro Village, Gunungsitoli City. Operationalization involved the use of leaflets and SAP media, with two measurement points—0 (before antenatal yoga) and 1(after antenatal yoga) recorded on a nominal scale. The dependent variable was lower back pain among third-trimester pregnant women, assessed using an observation sheet (questionnaire/checklist) and measured on an interval scale categorized as follows: 1–3 (mild pain), 4–6 (moderate pain), and 7–10 (severe pain).

The research instrument was a closed-ended observation sheet (questionnaire/checklist) designed to assess the effect of yoga on back pain among third-trimester pregnant women. The questionnaire included predefined response options, allowing respondents to select answers using a checklist format. The data collection procedure involved several steps: preparation of

supporting materials and theoretical frameworks; preliminary study; consultation with a supervisor; obtaining permission for data collection; establishing a shared understanding with a research assistant, if applicable; providing counselling prior to the intervention; selection of participants (pre-test); implementation of the antenatal yoga intervention; post-intervention data collection (post-test); retrieval of respondent data; and data processing through editing, coding, and scoring.

Data analysis was conducted in two stages. Univariate analysis was used to describe the characteristics of both the independent and dependent variables. Bivariate analysis involved cross-tabulation of the dependent variable (back pain) and the independent variable (antenatal yoga) to evaluate changes before and after the intervention among third-trimester pregnant women. To determine whether the differences were statistically significant, the Wilcoxon signed-rank test was applied.

RESULTS

A total of 40 third-trimester pregnant women were included in the analysis. The univariate distribution revealed a notable shift toward lower pain categories following the antenatal yoga intervention. As shown in Table 1 and illustrated in Figure 1, prior to the intervention, 25 respondents (62.5%) reported moderate pain and 15 respondents (37.5%) reported mild pain, with no cases of severe pain were recorded. Post-intervention, the number of respondents reporting moderate pain decreased to 7 respondents (17.5%), while those reporting mild pain increased to 33 (82.5%). No instances of severe pain was observed at post-test.

Table 1. Distribution of back pain frequency before and after antenatal yoga at the Independent Midwife Practice of Ertitawati Siregar, Oloro Village, Gunungsitoli City (n = 40)

Back Pain Category	Before		After	
	n	%	n	%
Mild pain	15	37,5	33	82,5
Moderate pain	25	62,5	7	17,5
Severe pain	0	0	0	0
Total	40	100	40	100

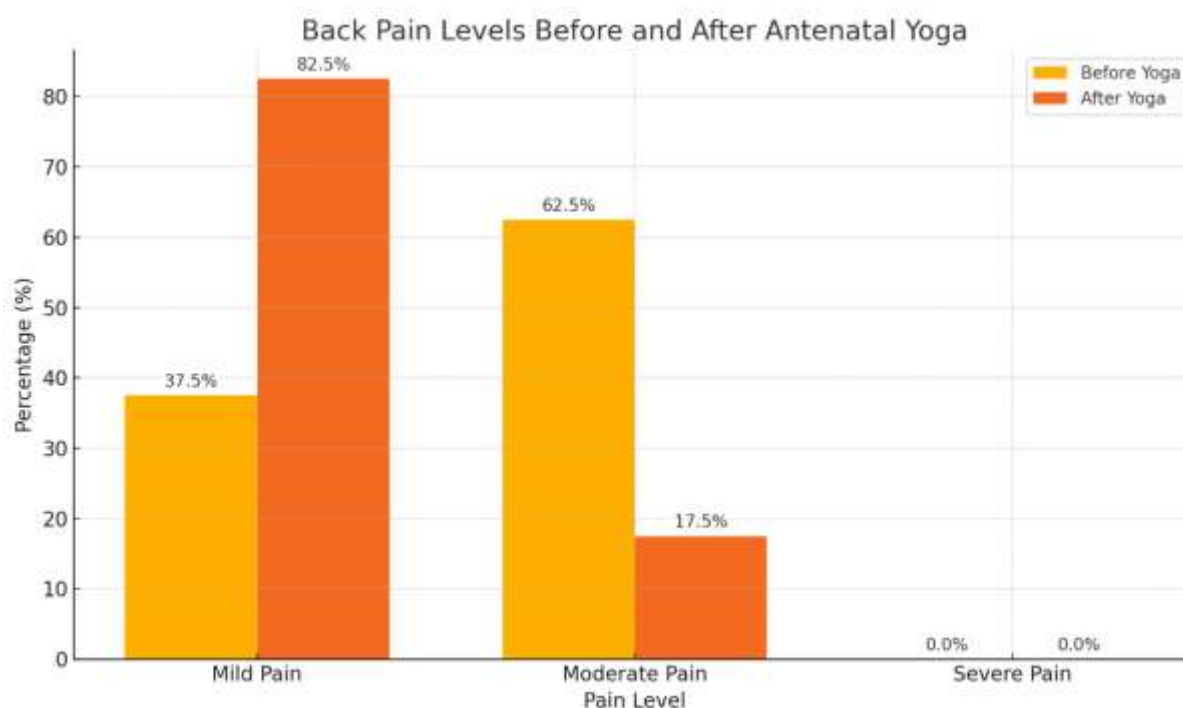


Figure 1. Statistics on Back Pain Levels Before and After Antenatal Yoga

Bivariate analysis using the Wilcoxon signed-rank test was conducted to assess differences in back pain before and after antenatal yoga. As shown in Table 2, the Asymp. Sig. (2-tailed) value is reported as < 0.001 (displayed as 0.000 in the output), which is below the α threshold of 0.05. Accordingly, the alternative hypothesis (H_a) is accepted, indicating that antenatal yoga has a significant effect on reducing back pain among third-trimester pregnant women at the Independent Midwifery Practice of Ertitawati Siregar in Oloro Village, Gunungsitoli City.

Table 2. Differences Before and After Antenatal Yoga in Back Pain Among Pregnant Women at The Independent Midwife Practice of Ertitawati Siregar, Oloro Village, Gunungsitoli City

Variabel	Mean Rank	Sum Rank	Asymp. Sig. (2-tailed)
Before	00	00	0.000
After	13.00	325.00	

DISCUSSION

Differences In Back Pain Scores Before and After Antenatal Yoga

This single-group pre-experimental study demonstrates that antenatal yoga is associated with a reduction in low back pain (LBP) among third-trimester pregnant women. The proportion of participants reporting moderate pain decreased from 62.5% to 17.5%, while those reporting mild pain increased to 82.5%. No cases of severe pain were observed before or after the intervention, and the Wilcoxon test signed-rank test indicated a statistically significant difference ($p < 0.001$).

As a direct comparator, a quasi-experimental pre–post control group trial conducted in Surakarta delivered 45-minute prenatal-yoga sessions over two weeks, measured using the Oswestry Disability Index (ODI). The study reported a mean pain reduction from 4.60 to 2.07 in the intervention group, while the control group showed no significant change ($p=0.059$), supporting the efficacy of structured prenatal yoga with a clearly defined pose set (Oktavia et al., 2023). Another quasi-experimental study ($n=60$) involving twice-weekly 60-minute sessions and measured using the Numeric Rating Scale (NRS), found that prenatal yoga reduced back pain more effectively than general pregnancy exercises ($p<0.05$), with moderate pain decreasing from 90% to 13.3% in the yoga group (Rofita et al., 2025). As a secondary comparator, meta-analytic evidence indicates that antenatal yoga significantly reduces labour pain (SMD -1.34 ; 95% CI -1.86 to -0.81) without adverse events, consistent with stress-regulating, mind–body mechanisms relevant to this context (Boopalan et al., 2023). From a pragmatic standpoint, a postpartum yoga feasibility trial reported full program completion by all participants with no adverse reactions. Although clinical outcomes showed no statistically significant change, there was a borderline improvement in quality of life ($p=0.06$) (Smith et al., 2025).

While these pre–post data suggest a clinically meaningful shift toward milder symptoms, the broader literature indicates only modest preventive effects of prenatal exercise for low back pain (LBP) and limited evidence for the prevention of pregnancy-related pelvic girdle pain (PPGP) (Ashrafi et al., 2025). To address this gap, integrating machine-learning approaches into routine antenatal care may enhance early identification and support targeted prevention and intervention strategies (Ashrafi et al., 2025). Mechanistically, third-trimester work shows that, under eyes-closed conditions, reduced total and anteroposterior (AP) sway are associated with higher LBP/PPGP disability scores, reinforcing the rationale for incorporating balance assessments into screening protocols (Bagwell et al., 2024). Additionally, five distinct trajectory classes for the progression of pelvic girdle pain have been identified, with weight gain below recommended levels linked to a lower probability of severe PGP trajectories (Byberg et al., 2024).

During pregnancy, a range of biomechanical and hormonal changes can alter spinal curvature, balance, and gait patterns. Increased movements of the centre of pressure (COP) and elevated stability indexes suggest that postural control is diminished during pregnancy (Conder et al., 2019). In third-trimester samples, under eyes-closed conditions, reduced total and anteroposterior sway has been linked to higher disability scores for low back pain (LBP) and pregnancy-related pelvic girdle pain (PPGP), highlighting impaired postural control in the

absence of visual input (Bagwell et al., 2024). Recent literature advocates for a broader understanding of PPGP, emphasizing its multifactorial nature – including contextual, neurobiological, and illness-perception factors (van Benten et al., 2024).

Given the observed shift in pain severity from moderate to mild and the statistically significant pre-post difference, structured antenatal yoga classes should be integrated into primary level antenatal care (ANC) services. A feasible implementation model includes 2 sessions per week, approximately 60 minutes, over a duration of 4–6 weeks. Sessions should emphasize pelvic tilt and postural training, cat–cow stretches, child's pose, hip flexor stretches, core–diaphragm–pelvic floor activation, and rhythmic breathing. To ensure safety and quality, a brief screening process for obstetric contraindications, documentation of adherence and adverse events, and monitoring of pain levels using the Numeric Rating Scale (NRS) at each visit are recommended. Personalization through risk stratification, such as balance complaints or weight gain patterns, can guide adjustments in pose intensity and progression. Detailed reporting of interventions in accordance with the TIDieR (Template for Intervention Description and Replication) framework will support cross-facility replication and long-term program evaluation.

This study provides pragmatic, real-world evidence from a primary care antenatal setting, thereby enhancing the external validity of its findings for routine midwifery practice. The intervention, a structured antenatal-yoga program, was delivered to third-trimester pregnant women, a population frequently affected by pregnancy-related low back pain (LBP). Pre–post assessment using a standardized patient-reported pain scale revealed a clear clinical shift from moderate to mild pain categories, accompanied by statistically significant results. These findings support the potential utility of yoga as a non-pharmacological option within antenatal care. The intervention components – postural training, mobility/stretching, and paced breathing - were well clearly defined, facilitating replication and future fidelity monitoring. Implementing the program within a community clinic further highlights its feasibility, acceptability, and potential scalability in resource-constrained settings.

The single-group pretest–posttest design limits causal inference and remains susceptible to threats to internal validity, including regression to the mean, temporal confounders, co-interventions, and expectancy or Hawthorne effects. The modest sample size and single-site context constrain the generalizability of findings beyond the study clinic. Outcomes were collected immediately following the intervention, leaving the durability of benefit uncertain in the absence of short-term follow-up. Effect magnitude and statistical uncertainty were not fully quantified (e.g., effect size with 95% confidence intervals), and key

functional outcomes, such as disability indices, were not assessed. Additionally, intervention fidelity, participant adherence, and adverse events were not systematically monitored, limiting conclusions regarding dose–response relationships and safety. Future controlled or quasi-experimental trials with standardized reporting and follow-up are warranted to strengthen causal inference and inform optimization of dose and intervention components.

CONCLUSIONS

This single-group pre-experimental study demonstrates that antenatal yoga is associated with a reduction in the severity of lower back pain among third-trimester pregnant women, with a significant shift toward milder pain categories. These findings clinically support the feasibility of integrating structured antenatal yoga classes as a non-pharmacological option within antenatal care (ANC) services, particularly when combined with posture education and breathing exercises. However, limitations related to the absence of a control group, a modest sample size, and the lack of reporting on effect size, confidence intervals, and comprehensive fidelity and safety measures warrant caution in drawing causal inferences. Further research employing comparative design (e.g., randomized controlled trials or quasi-experimental studies), reporting effect sizes with 95% confidence intervals, assessing core outcomes (pain, function, sleep), and systematically tracking adherence and adverse events with follow-up is needed to confirm effectiveness and guide optimal dose–response strategies.

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