

THE EFFECT OF PRENATAL YOGA ON THE INTENSITY OF LOWER BACK PAIN AMONG THIRD-TRIMESTER PREGNANT WOMEN: A TRUE-EXPERIMENTAL STUDY AT NAMLEA COMMUNITY HEALTH CENTER

Mentari¹, Endyka Erye Frety¹, Euvanggelia Dwilda¹, Bambang Purwanto²

¹⁾Midwifery Study Program, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

²⁾Department of Medical Physiology, Faculty of Medicine, Universitas Airlangga, Surabaya, Indonesia

ABSTRACT

Background: Low back pain is common among pregnant women, particularly in the third trimester, and is mainly associated with physiological changes, including hormonal fluctuations affecting connective and supportive soft tissues, leading to reduced muscle flexibility and elasticity. Pain management during pregnancy involves pharmacological and non-pharmacological approaches, with this study focusing on prenatal yoga as a non-pharmacological intervention. **Objective:** To examine the effect of prenatal yoga on reducing the intensity of low back pain in women during the third trimester of pregnancy. **Methods:** This study employed a true experimental pretest–posttest control group design with 32 samples equally assigned to an intervention group ($n = 16$) and a control group ($n = 16$). The intervention was conducted four times over two weeks, with each session lasting 30–60 minutes. Data were collected using a structured checklist and the Numeric Rating Scale (NRS). Statistical analysis used the Wilcoxon signed-rank test and the Mann–Whitney U test. **Results:** The prenatal yoga group demonstrated a statistically significant reduction in low back pain intensity following the intervention ($p = 0.001$), with mean pain scores decreasing from 2.00 to 1.29, indicating a mean difference of 0.71. In contrast, the pregnancy gymnastics group showed a smaller reduction, with mean scores declining from 2.06 to 1.82, yielding a mean difference of 0.24. Between-group analysis confirmed a statistically significant difference in pain intensity ($p = 0.001$). **Conclusion:** Prenatal yoga significantly reduces the intensity of low back pain in women during the third trimester of pregnancy.

Keywords: low back pain, pregnancy, third trimester, prenatal yoga, non-pharmacological intervention.

Correspondence: mentari-2024@fk.unair.ac.id

Name of corresponding author: Mentari

Affiliation: Midwifery Study Program, Faculty of Medicine, Universitas Airlangga, Surabaya

Email address: mentari-2024@fk.unair.ac.id

INTRODUCTION

Pregnancy is a natural process that brings about numerous physical and emotional changes in women. From early pregnancy until childbirth, many women experience various forms of discomfort. If not managed properly, these conditions may interfere with daily activities and potentially affect fetal health (Yulizawati et al., 2017). One of the most common complaints during the third trimester of pregnancy is low back pain. Many pregnant women report radiating pain extending from the lower back to the waist during this phase. This condition is primarily caused by a shift in the center of gravity resulting from weight gain, particularly due to uterine enlargement (Mardliyana, Nadhiroh, & Puspita, 2022).

Low back pain in late pregnancy is a common condition. Research indicates that approximately 70% of pregnant women in Indonesia experience this symptom. Other data show that 40%–60% of pregnant women report back pain, with approximately 30% experiencing moderate pain, 23% mild pain, and 7% severe pain. Globally, the prevalence of low back pain among pregnant women ranges from 20% to 80%, with many studies reporting rates of around 50% (Purnamasari, 2019). At the Namlea Community Health Center, from January to October 2024, 30 out of 84 pregnant women reported complaints of low back pain, indicating that this problem is relatively common and warrants attention.

From a medical perspective, low back pain during pregnancy arises as a result of hormonal changes that affect the body's soft supporting tissues, leading to reduced muscle elasticity and flexibility. Additionally, increased body weight and the forward displacement of the center of gravity place extra pressure on the lower back, thereby exacerbating pain (Mardliyana, Nadhiroh, & Puspita, 2022).

Consequently, this pain not only disrupts physical comfort but may also negatively affect the psychological well-being of pregnant women. If not properly managed, low back pain may become chronic, persist postpartum, and interfere with the recovery process (Hamdiah, Tanuadike, & Sulianti, 2020). As the fetus grows and the uterus enlarges, the body's center of gravity continues to shift forward. Therefore, it is essential for pregnant women to maintain proper posture while standing, sitting, and moving. If the body is unable to adapt to the increasing load, particularly on the spinal structures, fatigue and musculoskeletal strain may occur. This condition may also influence fetal positioning, as the fetus adapts to the available intrauterine space. Spinal problems may contribute to suboptimal fetal positioning prior to delivery (Pulungan et al., 2020).

Management of low back pain during pregnancy generally involves two main approaches: pharmacological and non-pharmacological. Pharmacological treatments include the use of analgesics, calcium supplements, muscle relaxants, nonsteroidal anti-inflammatory drugs (NSAIDs), and antidepressants for chronic pain management. However, many pregnant women prefer non-pharmacological interventions to ensure fetal safety. Common non-pharmacological methods that can be practiced at home include relaxation techniques, warm compresses, yoga, aromatherapy, warm baths, music therapy, postural adjustments, gentle massage, and breathing exercises (Sulastri et al., 2022).

Prenatal yoga is one of the most effective non-pharmacological interventions for pregnant women. Through gentle movements combined with breathing techniques and meditation, prenatal yoga helps promote physical relaxation and mental calmness. Yoga practice can reduce oxygen demand, improve blood circulation, and stimulate the release of calming hormones. As a result, muscle tension decreases, anxiety is reduced, and overall physical comfort improves (Suananda, 2018). A previous study reported that 94% of third-trimester pregnant women who initially experienced low back pain with intensity levels ranging from 4 to 10 reported pain reduction to levels between 1 and 3 after regularly participating in prenatal yoga sessions. These findings indicate that prenatal yoga can significantly reduce pain experienced during late pregnancy (Finisia, Rahayu, & Triningsih, 2024).

At the Namlea Community Health Center, prenatal yoga programs are conducted regularly every three months. However, the outcomes achieved have not yet been considered optimal.

Therefore, further research is necessary to evaluate the effectiveness of prenatal yoga in reducing low back pain among pregnant women in the third trimester in this region. This study aims to analyze low back pain levels before and after participation in prenatal yoga, assess the changes that occur, and evaluate the extent to which prenatal yoga can alleviate low back pain complaints in women approaching childbirth.

METHOD

This study employed a true experimental design using a pretest–posttest control group approach. The study population consisted of all pregnant women in their third trimester who experienced lower back or pelvic pain and met the eligibility criteria for inclusion. The inclusion criteria were third-trimester pregnancy with moderate low back pain, willingness to provide informed consent, and commitment to participate in four prenatal yoga sessions and prenatal exercise sessions.

The sampling process was conducted using a disproportionate stratified random sampling technique. Based on sample size calculations using Federer's formula, a total of 32 participants were recruited, with 16 participants assigned to the intervention group and 16 to the control group.

This study was conducted at the Namlea Community Health Center, Buru Regency, Maluku, from January to March 2025. Prenatal yoga served as the independent variable, while the intensity of lower back pain was the dependent variable. Control variables included maternal age, parity, physical activity level, and the use of alternative therapies.

Data were collected using a structured checklist and a Numeric Rating Scale (NRS) questionnaire. The Wilcoxon signed-rank test was applied to compare pain intensity within related (paired) samples, while the Mann–Whitney U test was used to compare differences between independent groups.

RESULT

Respondents Characteristics

Tabel 1: Respondents Characteristics

| Respondent Characteristics | Prenatal Yoga | | Prenatal exercise | | P value |
|----------------------------|---------------|------|-------------------|------|---------|
| | n | % | n | % | |
| Mother's Age | | | | | |
| < 20 years | 2 | 12.5 | 0 | 0 | 0.202 |
| 20-35 years | 8 | 50 | 12 | 75 | |
| > 35 years | 6 | 37.5 | 4 | 25 | |
| Gestational Age | | | | | |
| 28 mg | 8 | 50 | 7 | 43.8 | 0.71 |
| 32 mg | 6 | 37.5 | 8 | 50 | |
| 36 mg | 2 | 12.5 | 1 | 6.3 | |
| Education | | | | | |
| Elementary School | 1 | 6.3 | 2 | 12.5 | 0.48 |
| Junior High School | 2 | 12.5 | 0 | 0 | |
| Senior High School | 10 | 62.5 | 10 | 62.5 | |
| Diploma/University | 3 | 18.8 | 4 | 25 | |
| Work | | | | | |
| Doesn't work | 10 | 62.5 | 8 | 50 | 0.722 |
| Work | 6 | 37.5 | 8 | 50 | |
| Gravida | | | | | |
| Primigravida | 3 | 18.8 | 6 | 37.5 | 0.422 |
| Multigravida | 9 | 56.2 | 8 | 50 | |

| | | | | | |
|---------------------------|-----------|------------|-----------|------------|-------|
| Grandemultigravida | 4 | 25 | 2 | 12.5 | |
| Activity Patterns | | | | | |
| Light | 3 | 18.8 | 3 | 18.8 | 0.648 |
| Currently | 9 | 56.2 | 11 | 68.8 | |
| Heavy | 4 | 24 | 2 | 12.5 | |
| Nutritional status | | | | | |
| Normal | 6 | 37.5 | 5 | 31.3 | 0.109 |
| Overweight | 5 | 31.3 | 10 | 62.5 | |
| Obesity | 5 | 31.3 | 1 | 6.2 | |
| Total | 16 | 100 | 16 | 100 | |

The analysis showed that the baseline characteristics of respondents in both the intervention and control groups were homogeneous, with no statistically significant differences across the variables studied ($p > 0.05$). The majority of respondents were within the productive age range of 20–35 years (prenatal yoga group: 50.0%; prenatal exercise group: 75.0%; $p = 0.202$) and were at approximately 28 weeks of gestation (prenatal yoga: 50.0%; prenatal exercise: 43.8%; $p = 0.710$). Educational attainment was predominantly at the high school level in both groups (prenatal yoga: 68.8%; prenatal exercise: 62.5%; $p = 0.480$).

Most respondents were unemployed (prenatal yoga: 68.8%; prenatal exercise: 50.0%; $p = 0.722$) and were multigravida (prenatal yoga: 56.2%; prenatal exercise: 50.0%; $p = 0.422$). Daily physical activity levels were largely moderate in both groups (prenatal yoga: 56.2%; prenatal exercise: 68.8%; $p = 0.648$). Nutritional status tended toward overweight, particularly in the prenatal exercise group (prenatal yoga: 31.3%; prenatal exercise: 62.5%; $p = 0.109$).

All p -values exceeded 0.05, indicating no statistically significant differences between the two groups. Therefore, the respondent characteristics were considered comparable, allowing for valid subsequent analysis of the intervention effects.

Analysis Results

Cross-Tabulation of Low Back Pain Intensity Before and After the Intervention

Table 2: Cross Tabulation of Lower Back Pain Intensity Before and After Intervention

| Lower Back Pain Intensity | Prenatal Yoga | | Prenatal exercise | |
|----------------------------|---------------|------------|-------------------|------------|
| | n | % | n | % |
| Before Intervention | | | | |
| No Pain | 0 | 0 | 0 | 0 |
| Mild Pain | 2 | 12.5 | 2 | 12.5 |
| Moderate Pain | 11 | 68.8 | 10 | 62.5 |
| Severe Pain | 3 | 18.8 | 4 | 25 |
| After Intervention | | | | |
| No Pain | 11 | 68.8 | 2 | 12.5 |
| Mild Pain | 5 | 31.3 | 14 | 87.5 |
| Moderate Pain | 0 | 0 | 0 | 0 |
| Severe Pain | 0 | 0 | 0 | 0 |
| Total | 16 | 100 | 16 | 100 |

Based on cross-sectional analysis, prior to the intervention, both groups predominantly exhibited moderate intensity of low back pain, with 68.8% of respondents in the prenatal yoga group and 62.5% in the prenatal exercise group reporting moderate pain. Following the intervention, a more substantial reduction in pain intensity was observed in the prenatal yoga group, in which 68.8% of respondents reported no low back pain. In contrast, in the prenatal exercise group, the majority of respondents (87.5%) continued to experience mild pain.

These findings indicate that the prenatal yoga intervention was more effective than prenatal exercise in reducing the intensity of low back pain among pregnant women.

Normality Data test

Tabel 3: Normality Data test

| Shapiro-Wilk | Statistics | df | Sig. (2-tailed) |
|---------------------|------------|----|-----------------|
| Before Intervention | .753 | 32 | .000 |
| After Intervention | .625 | 32 | .000 |

The table above presents the results of the normality test using the Shapiro–Wilk test. The p-values obtained for both pre- and post-intervention measurements were 0.000, which are less than 0.05, indicating that the data were not normally distributed. Therefore, non-parametric statistical tests, namely the Wilcoxon signed-rank test and the Mann–Whitney U test, were applied for data analysis.

The Differences in Low Back Pain Intensity Before and After Prenatal Yoga

Tabel 4: The Differences in Low Back Pain Intensity Before and After Prenatal Yoga

| Prenatal Yoga | N | Mean | Std. Deviation | Mean Rank | Sum of Rank | Z-Value | p-value |
|----------------|----|------|----------------|-----------|-------------|---------|---------|
| Positive Ranks | 12 | 2.06 | .574 | 6.50 | 78.00 | -3.464 | .001 |
| Negative Ranks | 4 | 1.31 | .479 | 0.00 | 0.00 | | |

The table above presents the results of the Wilcoxon signed-rank test examining the intensity of low back pain before and after the prenatal yoga intervention. The mean pain score before the intervention was 2.06, which decreased to 1.31 after the intervention, indicating a mean difference of 0.75. This finding demonstrates a substantial reduction in low back pain intensity following prenatal yoga.

The statistical analysis yielded a Z value of -3.464 with a p-value of 0.001 ($p < \alpha = 0.05$), indicating a statistically significant difference in low back pain intensity before and after the prenatal yoga intervention.

Difference between back lower before and after prenatal exercise intensity painful

Tabel 5: Difference between back lower before and after prenatal exercise intensity painful

| prenatal exercise | N | Mean | Std. Deviation | Mean Rank | Sum of Rank | Z-Value | p-value |
|-------------------|----|------|----------------|-----------|-------------|---------|---------|
| Positive Ranks | 4 | 2.13 | .619 | 2.50 | 10.00 | -2.000 | .046 |
| Negative Ranks | 12 | 1.87 | .342 | 0.00 | 0.00 | | |

The table above presents the results of the Wilcoxon signed-rank test on the intensity of low back pain before and after prenatal exercise. The mean pain score decreased from 2.13 before the intervention to 1.87 after the intervention, resulting in a mean difference of 0.26, which indicates a relatively weak reduction in pain intensity following prenatal exercise.

The statistical analysis yielded a Z value of -2.000 with a p-value of 0.046 ($p < 0.05$), indicating a statistically significant difference in low back pain intensity before and after the prenatal exercise intervention.

Results of the Intervention Analysis in the Prenatal Yoga and Prenatal exercise Groups

Tabel 6: Results of the Intervention Analysis in the Prenatal Yoga and Prenatal exercise Groups

| Mann-Whitney Test | N | Mean Rank | Sum of Rank | Z-Value | p-value |
|--------------------------|----|-----------|-------------|---------|---------|
| Prenatal Yoga | 16 | 12.00 | 192.00 | -3.188 | .001 |
| prenatal exercise | 16 | 21.00 | 336.00 | | |

The table above presents the results of the Mann-Whitney U test. The analysis yielded a Z value of -3.188 with a p-value of 0.001 ($p < \alpha = 0.05$), indicating a statistically significant difference between groups. Therefore, the research hypothesis was accepted, demonstrating that prenatal yoga has a significant effect on reducing the intensity of low back pain among women in the third trimester of pregnancy at the Namlea Community Health Center, Buru Regency, Maluku Province.

DISCUSSION

Intensity of Lower Back Pain Before Prenatal Yoga and Prenatal exercise

Based on the data collected, both the prenatal yoga group and the prenatal exercise group reported moderate levels of lower back pain prior to the intervention. The proportion of respondents experiencing moderate pain was 68.8% in the prenatal yoga group and 62.5% in the prenatal exercise group. According to Rosyidah and Azizah (2019), several factors—including maternal age, gestational age, parity, and daily activity patterns—contribute to the occurrence of lower back pain during pregnancy.

Maternal age plays an important role in determining the severity of lower back pain. Women aged 20–24 years are prone to experiencing lower back pain, with a notable increase in prevalence after the age of 40 years (Arummega, Rahmawati, & Meiranny, 2022). Muscle strength generally peaks between the ages of 20 and 29 years and gradually declines thereafter, with a more pronounced reduction after the age of 60 years (Carvalho et al., 2020). Pregnant women over 40 years of age are therefore at a higher risk of experiencing lower back pain compared to those within the reproductive age range (Syalfina, Priyanti, & Irawati, 2021).

Gestational age is also closely associated with lower back pain. As pregnancy progresses, uterine enlargement leads to weight gain and biomechanical changes, including ligament laxity, altered spinal curvature, and stretching of the abdominal muscles, which contribute to joint instability and pain (Shiri et al., 2019). A study conducted at the Wirahusada Medical Center Clinic in Makassar found that 58.9% of pregnant women experienced back pain in the third trimester, compared to 41.1% in the second trimester (Yazir, 2022). Similarly, research at the Kemu Community Health Center in South OKU Regency reported that 76.4% of pregnant women experienced lower back pain during the third trimester (Elkhapi et al., 2023).

Parity is another contributing factor, as multigravida and grandmultiparous women are more susceptible to severe lower back pain due to weakened pelvic muscles that are less capable of supporting the growing uterus (Gozali, Astini, & Permadi, 2020). Weakness of the abdominal and pelvic floor muscles may lead to excessive lumbar curvature, further exacerbating pain (Yazir, 2022).

Daily physical activities, such as cooking, cleaning, childcare, washing clothes, and mopping, may aggravate lower back pain, particularly during the third trimester. Household activities increase physical workload and strain, negatively affecting maternal comfort and quality of life

(Elkhapi et al., 2023). A study involving 55 pregnant women demonstrated a significant association between daily physical activity and the incidence of lower back pain ($p < 0.001$).

Lower Back Pain Intensity After Prenatal Yoga and Prenatal exercise

Post-intervention analysis demonstrated a greater reduction in lower back pain intensity in the prenatal yoga group compared to the prenatal exercise group. In the prenatal yoga group, 68.8% of participants reported complete relief from pain, whereas 87.5% of participants in the prenatal exercise group continued to experience mild pain. Although both interventions resulted in a reduction in pain intensity, prenatal yoga produced a more pronounced improvement.

These findings are consistent with the study by Liddle and Pennick (2023), which reported that low-intensity physical activities such as yoga and gentle exercise are effective in reducing lower back pain during pregnancy. Additional research conducted in Canada found that lower back pain negatively affects daily activities, increases anxiety, reduces quality of life, and contributes to work absenteeism among pregnant women. Low-intensity physical activity is considered a safe, cost-effective, and accessible approach for managing pregnancy-related lower back pain (Davenport et al., 2019).

Physiologically, pain and discomfort during pregnancy may increase muscle tension and activate the sympathetic nervous system, inhibiting muscle relaxation and exacerbating pain. Non-pharmacological relaxation techniques such as yoga reduce oxygen demand, improve blood circulation, and stimulate the release of neurotransmitters that promote relaxation and nervous system regulation (Aprilia, 2020).

Difference in Lower Back Pain Intensity Before and After Prenatal Yoga

Wilcoxon signed-rank analysis revealed a significant reduction in lower back pain intensity following prenatal yoga. The mean pain score decreased from 2.06 before the intervention to 1.31 after the intervention, resulting in a mean difference of 0.75. The statistical analysis yielded a Z value of -3.464 and a p-value of 0.001 ($p < 0.05$), indicating a statistically significant reduction in pain intensity.

These findings are consistent with previous studies demonstrating that prenatal yoga effectively reduces lower back pain by strengthening core muscles, improving flexibility, enhancing relaxation, and reducing stress-related hormonal responses (Hardianti, 2019). Prenatal yoga has also been shown to improve postural stability, restore muscle flexibility, and alleviate musculoskeletal pressure (Khairiah, 2023; Rahmawati et al., 2021; Destyana, 2024).

Prenatal yoga emphasizes slow, controlled movements, breathing techniques, and mindfulness, which together enhance muscle coordination and reduce discomfort. Yoga poses such as cat-cow (Marjaryasana–Bitilasana), Janu Sirsasana, Parsvakonasana, and Prasarita Padottanasana are particularly effective in relieving lower back tension and improving pelvic flexibility. Regular prenatal yoga practice increases endorphin release, providing natural pain relief and enhancing maternal well-being.

Difference in Lower Back Pain Intensity Before and After Prenatal exercise

The Wilcoxon signed-rank test also demonstrated a statistically significant reduction in lower back pain following prenatal exercise. The mean pain score decreased from 2.13 to 1.87, yielding a mean difference of 0.26. The Z value was -2.000 with a p-value of 0.046 ($p < 0.05$), indicating a modest but statistically significant effect.

Prenatal exercise contributes to pain reduction by improving biomechanical alignment, stabilizing joints, strengthening muscles, and enhancing pain tolerance (Shijagurumayum Acharya et al., 2019). Exercises targeting the abdominal muscles, pelvic floor, and ligaments increase flexibility and reduce stiffness, thereby promoting relaxation and reducing discomfort (Al-Umamanir & Megasari, 2023).

The Effect of Prenatal Yoga on Reducing Lower Back Pain Intensity in Third-Trimester Pregnant Women

Mann-Whitney the U test results showed a Z value of -3.188 and a p-value of 0.001 ($p < 0.05$), confirming a statistically significant difference between the prenatal yoga and prenatal exercise groups. These findings indicate that prenatal yoga is more effective than prenatal exercise in reducing lower back pain intensity among third-trimester pregnant women at the Namlea Community Health Center.

Previous studies support these results, demonstrating that prenatal yoga is more effective than standard physical activity or walking in alleviating pregnancy-related lower back pain and pelvic pain (Rahayu & Ariningtyas, 2023; Kwon et al., 2020). Prenatal yoga not only improves physical strength and flexibility but also promotes psychological well-being through breathing exercises, meditation, and relaxation.

Quantitatively, prenatal exercise reduced pain scores by approximately 21.27%, whereas prenatal yoga achieved a reduction of up to 59.13%, underscoring the superior effectiveness of prenatal yoga in managing lower back pain during late pregnancy. Factors influencing the effectiveness of prenatal yoga include consistency of practice, accuracy of movement execution, professional supervision, and maternal understanding of the benefits of the intervention (Rustiningsih, Asih, & Solihin, 2022).

CONCLUSION

Based on the findings of this study, it can be concluded that prior to the intervention, participants in both groups predominantly experienced moderate lower back pain. In the prenatal yoga group, 11 respondents (68.8%) reported moderate pain, while in the prenatal exercise group, 10 respondents (62.5%) experienced moderate pain. Following the intervention, a greater reduction in lower back pain intensity was observed in the prenatal yoga group compared to the prenatal exercise group. In the prenatal yoga group, the majority of respondents (11 participants; 68.8%) reported complete relief from lower back pain, whereas in the prenatal exercise group, most respondents (14 participants; 87.5%) continued to experience mild pain.

A statistically significant difference in lower back pain intensity before and after the prenatal yoga intervention was identified, with the mean pain score decreasing from 2.06 to 1.31, representing a mean difference of 0.75. In contrast, the prenatal exercise group demonstrated a weaker reduction in pain intensity, with mean scores decreasing from 2.13 to 1.87, yielding a mean difference of 0.26. Statistical analysis confirmed a significant effect of prenatal yoga on reducing lower back pain intensity, as indicated by a p-value of 0.001 ($p < \alpha = 0.05$).

RECOMMENDATION

Based on these conclusions, it is recommended that the Namlea Community Health Center incorporate prenatal yoga as a routine activity to help minimize discomfort and musculoskeletal complaints among pregnant women. Collaborative programs should be developed to support the implementation of prenatal yoga and to increase pregnant women's interest and participation in this activity throughout pregnancy.

Furthermore, pregnant women are encouraged to explore additional benefits of prenatal yoga beyond the reduction of lower back pain, including its potential effects on anxiety, stress levels, sleep quality, and physical and psychological preparedness for childbirth. Future research should also investigate the impact of prenatal yoga on labor duration and fetal well-being. Expanding research in this area is expected to provide a more comprehensive understanding of prenatal yoga as a holistic intervention for improving maternal health outcomes.

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