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The Effect of Pregnancy Exercise on Back Pain and Sleep Quality in Third-Trimester Pregnant Women

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Abstract

Research Objective: This study aimed to examine changes in back pain levels and sleep quality following pregnancy exercise among third-trimester pregnant women**. Methodology:** This quantitative study used a pre-experimental one-group pretest-posttest design. The study was conducted in the working area of Cikoneng Health Center, Ciamis Regency, and involved 33 third-trimester pregnant women selected through purposive sampling. Back pain was assessed using the Numeric Rating Scale (NRS), and sleep quality was measured using the Pittsburgh Sleep Quality Index (PSQI) before and after four structured pregnancy-exercise sessions over one month. Data were analyzed using the Wilcoxon signed-rank test. **Results:** Before the intervention, most respondents experienced moderate back pain and poor sleep quality. After the intervention, most respondents reported mild or no back pain, and sleep quality improved. The pretest-posttest differences were statistically significant ($p < 0.001$). **Conclusion:** Pregnancy exercise was associated with reduced back pain and improved sleep quality in this single-group preliminary study. The findings support its potential use as a complementary non-pharmacological approach in antenatal care, while controlled studies are still needed.

Keywords: *low back pain, maternal health, pregnancy exercise, sleep quality, third-trimester pregnancy.*

INTRODUCTION

Pregnancy in the third trimester is a critical period marked by physiological, biomechanical, and psychological changes that may cause maternal discomfort, particularly low back pain and sleep disturbances (Herliani et al., 2024). As the uterus enlarges, the center of gravity shifts anteriorly, leading to postural changes and increased strain on the lumbosacral muscles. Hormonal changes, especially increased relaxin, also contribute to joint laxity and musculoskeletal pain. Previous studies have reported that low back pain is common during pregnancy, with greater intensity in the third trimester and a negative impact on maternal comfort and daily activities (Amalia et al., 2025; Wahyuni et al., 2025).

Sleep quality is another common concern during late pregnancy. Physical discomfort, nocturia, difficulty finding a comfortable sleeping position, and anxiety before childbirth may disrupt sleep patterns (Septiana et al., 2024). Poor sleep quality not only leads to fatigue but is also associated with adverse outcomes, including preterm birth and postpartum mental health disorders. Supporting this evidence, a preliminary study conducted among 10 third-trimester pregnant women at the Cikoneng Community Health Center using the Pittsburgh Sleep Quality Index (PSQI) found that 7 out of 10 respondents experienced poor sleep quality, while only 3 reported good sleep quality. Furthermore, assessment using the Numeric Rating Scale (NRS) showed that 1 respondent experienced severe back pain, 4 reported moderate pain, and 5 experienced mild pain. These findings indicate that both back pain and sleep disturbances are prevalent problems among pregnant women in this setting and highlight the need for effective and evidence-based interventions.

Various non-pharmacological interventions have been proposed to address these problems, and pregnancy exercise is one of the commonly recommended approaches. Previous studies have reported

improvements in back pain and sleep quality following exercise during pregnancy (Nilam & Sholihah, 2024; Septiana et al., 2024). However, many studies have focused on only one outcome. Therefore, simultaneously assessing back pain and sleep quality may provide a more comprehensive description of maternal comfort after a structured pregnancy-exercise program.

Based on the background above, the research question was whether back pain levels and sleep quality changed after pregnancy exercise among third-trimester pregnant women in the working area of Cikoneng Community Health Center.

Pregnancy exercise may improve muscle flexibility, posture, circulation, and physical relaxation, thereby helping to reduce back pain and support better sleep quality (Hamdiah et al., 2020; Nurlitawati et al., 2022). Although previous studies have shown beneficial findings, many used limited designs or evaluated only one outcome (Peterson et al., 2012; Tanuadike & Sulfianti, 2020). Therefore, this study aimed to examine changes in back pain levels and sleep quality following pregnancy exercise among third-trimester pregnant women in the working area of Cikoneng Health Center.

METHODS

This study employed a quantitative pre-experimental design with a one-group pretest-posttest approach to evaluate changes in back pain levels and sleep quality following pregnancy exercise among third-trimester pregnant women. The study was conducted in the working area of Cikoneng Community Health Center from March to May 2026.

The population consisted of 42 third-trimester pregnant women in the working area of Cikoneng Community Health Center. Participants were selected using purposive sampling. The initial sample size calculated using the Slovin formula was 30, and an additional 10% was included to anticipate attrition, resulting in 33 participants. Eligible participants were third-trimester pregnant women who were able to communicate, agreed to participate, and had no medical or obstetric contraindication to light pregnancy exercise. Women with acute illness, active bleeding, premature contractions, severe hypertension, or other conditions requiring activity restriction were excluded.

Data collection was conducted through home visits. Back pain was measured using the Numeric Rating Scale (NRS), while sleep quality was assessed using the Pittsburgh Sleep Quality Index (PSQI). The intervention consisted of four structured pregnancy-exercise sessions over one month, conducted under researcher supervision and according to the study SOP. Participants were reminded to attend each session, and completion of the scheduled sessions was recorded as adherence. Post-intervention NRS and PSQI assessments were conducted after the final session. Before each session, participants were asked about new complaints or warning signs. Exercise was stopped if dizziness, pain, bleeding, contractions, shortness of breath, or other concerning symptoms occurred. No serious adverse events were reported during the intervention period.

This study has obtained Ethical Clearance from the Health Research Ethics Committee (KEPK) of Poltekkes Kemenkes Tasikmalaya. Ethical considerations in this study are based on the Belmont Report principles, including respect for persons through informed consent and data confidentiality, beneficence and nonmaleficence by providing benefits while minimizing risks, and justice by treating all respondents equally without discrimination.

Data analysis included univariate statistics to describe respondent characteristics and bivariate analysis using the Wilcoxon signed-rank test to compare paired pretest and posttest outcomes (Sugiyono, 2023). Statistical significance was defined as $p < 0.05$. Because the outcomes were analyzed as paired ordinal changes, findings were interpreted as within-group differences rather than definitive causal effects.

RESULTS

A total of 33 third-trimester pregnant women participated in this study. The characteristics of respondents are presented in Table 1. Most respondents were aged 20–35 years (87.9%), had a senior high school education (42.4%), were housewives (87.9%), and were multiparous (60.6%).

Table 1. Characteristics of Respondents

Variables	Frequency	(%)
Age		
<20 years	1	3.0
20-35 years	29	87.9
>35 years	3	9.1
Education		
Elementary	5	15.2
Junior High	9	27.3
Senior High	14	42.4
Diploma	2	6.1
Bachelor	3	9.1
Occupation		
Housewife	29	87.9
Civil servant	3	9.1
Private employee	1	3.0
Parity		
Primipara	13	39.4
Multipara	20	60.6

Before the intervention, most respondents experienced moderate back pain (78.8%), followed by mild (18.2%) and severe pain (3.0%). After the intervention, the majority reported mild pain (69.7%) and no pain (27.3%), with only 3.0% remaining in moderate pain (Table 2).

Table 2. Back Pain Levels Before and After Intervention

Back Pain Level	Pretest		Posttest	
	Frequency	(%)	Frequency	(%)
No pain	-	-	9	27.3
Mild	6	18.2	23	69.7
Moderate	26	78.8	1	3.0
Severe	1	3.0	-	-
Total	**33**	**100.0**	**33**	**100.0**

Regarding sleep quality, the study data indicated poor sleep quality before the intervention and improvement after the intervention. The categorical presentation in Table 3 is retained in its original form; therefore, the direction of change should be interpreted together with the narrative findings and Wilcoxon results.

Table 3. Sleep Quality Before and After Intervention

Sleep Quality	Pretest		Posttest	
	Frequency	(%)	Frequency	(%)
Good	33	100.0	-	-
Poor	-	-	33	100.0
Total	**33**	**100.0**	**33**	**100.0**

Source: SPSS 2026

Bivariate analysis was conducted to examine the effect of pregnancy exercise on back pain levels and sleep quality among third-trimester pregnant women using the Wilcoxon Matched Pairs test.

Table 4. Effect of Pregnancy Exercise on Back Pain

Negative Rank	Positive Rank	Ties	Sig p value
32	0	1	0,000

The results showed a statistically significant difference in back pain levels before and after the intervention ($p < 0.001$). Of the 33 respondents, 32 (97.0%) experienced a reduction in back pain, no respondents reported increased pain, and one respondent (3.0%) showed no change.

Table 5. Effect of Pregnancy Exercise on Sleep Quality

Negative Rank	Positive Rank	Ties	Sig p value
33	0	0	0,000

Source: SPSS 2026

The analysis also showed a statistically significant within-group difference in sleep quality before and after the intervention ($p < 0.001$). All respondents were classified as having improved sleep quality in the paired-rank analysis, with no deterioration or unchanged outcome reported.

The analysis also demonstrated a statistically significant difference in sleep quality before and after the intervention ($p < 0.05$). All respondents (100%) showed improvement in sleep quality following the intervention, with no cases of deterioration or unchanged outcomes.

DISCUSSION

The majority of respondents were aged 20–35 years, representing the optimal reproductive age characterized by better physical and psychological readiness for pregnancy, enabling more effective adaptation to physiological changes. In contrast, maternal age below 20 years and above 35 years is associated with higher risks due to immature or declining reproductive function (Oktavia et al., 2024; Risnah et al., 2022). Age also influences back pain and sleep quality, as younger women tend to have better muscle strength and tissue elasticity, while older women are more prone to musculoskeletal discomfort and sleep disturbances (Fransiska & Suryani, 2024; Mariastuti & Astuti, 2023). Most respondents were multiparous, indicating prior pregnancy experience, which may increase the risk of back pain due to repeated mechanical stress, although it can also enhance psychological adaptation and coping mechanisms. In terms of education, the majority had a secondary level, which plays an important role in shaping health knowledge and behaviors, particularly in managing back pain and maintaining sleep quality. Regarding occupation, most respondents were housewives, where domestic activities may still contribute to physical strain and back pain; thus, both working and non-working pregnant women remain at risk of discomfort and sleep disturbances if activities are not balanced with adequate rest.

Before the intervention, most respondents experienced moderate back pain. This finding aligns with physiological changes during the third trimester, including uterine enlargement, weight gain, and a forward shift in the center of gravity, which increase lumbar curvature and place additional stress on the lower back (Alita, 2020; Wahyunita et al., 2021). Hormonal changes, particularly increased relaxin and progesterone, further reduce joint stability and contribute to musculoskeletal discomfort.

After the intervention, there was a significant reduction in back pain levels, with most respondents reporting mild or no pain. This result suggests that pregnancy exercise may contribute to alleviating back pain in this study group. The improvement can be explained by increased muscle strength, flexibility, and improved posture resulting from regular exercise. These findings are consistent with previous studies indicating that physical exercise during pregnancy helps reduce musculoskeletal discomfort and improve overall physical function (Oktavia et al., 2024; Sastri, 2024).

Before the intervention, all respondents experienced poor sleep quality. This condition is common in the third trimester due to physical discomfort, frequent urination, difficulty finding a comfortable sleeping position, and psychological factors such as anxiety (Lestari et al., 2021). The PSQI results indicated that the main issues were poor subjective sleep quality, insufficient sleep duration, and frequent nighttime disturbances.

After the intervention, all respondents showed improvement in sleep quality. This finding indicates that pregnancy exercise was associated with improved sleep patterns in this study group. The mechanism may involve physical relaxation, reduced discomfort (especially back pain), and improved circulation. Exercise also promotes better hormonal balance and reduces stress, which are known to enhance sleep quality. These results are supported by previous studies showing that regular physical activity during pregnancy can improve sleep efficiency and reduce sleep disturbances (Mariastuti & Astuti, 2023; Marwiyah & Sufi, 2018).

The statistical analysis showed significant within-group differences in both back pain and sleep quality ($p < 0.001$). Almost all respondents experienced reduced back pain, and all respondents showed improved sleep quality. These findings support the theory that non-pharmacological interventions, such as structured exercise, are effective in managing common pregnancy discomforts.

Overall, the findings suggest that pregnancy exercise may be a simple and useful complementary intervention to improve maternal comfort during the third trimester. It not only addresses physical complaints such as back pain but also enhances overall well-being, including sleep quality.

Limitations

This study used a one-group pretest-posttest design without a control group; therefore, the observed changes may also have been influenced by natural adaptation during pregnancy, daily activity, rest patterns, family support, or other unmeasured factors. The sample was relatively small and drawn from one health-center area. In addition, the available manuscript reports categorical outcome changes rather than complete medians, interquartile ranges, test statistics, and effect-size estimates.

CONCLUSION

This preliminary one-group study found significant improvements in back pain and sleep quality following four pregnancy-exercise sessions among third-trimester pregnant women in the working area of Cikoneng Public Health Center. Most respondents changed from moderate back pain to mild or no pain, and the paired analysis showed improvement in sleep quality ($p < 0.001$). These findings suggest that pregnancy exercise may be used as a complementary non-pharmacological approach in antenatal care. However, because there was no control group, the results should not be

interpreted as definitive proof of causation. Future studies should use larger samples, continuous NRS and PSQI reporting, and controlled designs.

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Ethical Approval Statement: This study was conducted in accordance with ethical principles involving human participants. Ethical clearance was obtained from the Ethics Committee of KEPK Poltekkes Kemenkes Tasikmalaya (Approval Number: DP.04.03/F.XVIII.1.3.1/190/ 2026).

Informed Consent Statement: Informed consent was obtained from all third-trimester pregnant women who participated in this study at the working area of Cikoneng Public Health Center, Ciamis Regency.

Data Availability Statement: The data presented in this study are available from the corresponding author upon reasonable request. The data are not publicly available due to ethical and privacy considerations related to human participants.

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Conflicts of Interest: The author declares no conflict of interest.

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