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THE EFFECTIVENESS OF PREGNANCY BELTS ON LOW BACK PAIN AMONG THIRD-TRIMESTER PREGNANT WOMEN ATTENDING ANTENATAL CLASSES

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ABSTRACT
Low back pain is a common musculoskeletal complaint experienced by pregnant women, particularly during the third trimester, due to physiological and biomechanical changes. Although pregnancy belts and prenatal yoga have been studied independently, research examining the effectiveness of their combined use remains limited. This study aimed to evaluate the effectiveness of combining pregnancy belt use with prenatal yoga in reducing low back pain intensity among third-trimester pregnant women attending antenatal classes. A quasi-experimental study with a pretest-posttest control group design was conducted involving 60 third-trimester pregnant women selected using [purposive sampling] and equally divided into an intervention group (n = 30) and a control group (n = 30). The intervention group received a combination of pregnancy belt use and prenatal yoga, whereas the control group received prenatal yoga alone. Data were collected before and after the intervention through [structured interviews/questionnaires and pain intensity measurements using the Numeric Rating Scale (NRS)]. The results showed that both interventions reduced pain intensity; however, the combination therapy in the intervention group demonstrated greater effectiveness in reducing low back pain compared to the control group. These findings indicate that combining a pregnancy belt with prenatal yoga is a more effective non-pharmacological approach for managing low back pain during the third trimester of pregnancy.

Keywords: antenatal class; low back pain; pregnancy belt; prenatal yoga; third-trimester pregnancy

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INTRODUCTION

Low back pain is a common complaint during pregnancy. It is experienced by approximately 24%–90% of pregnant women at some point during gestation. Several factors contribute to the occurrence of this condition. including pelvic changes and alterations in weight-bearing as gestational age increases (van Benten et al.. 2014). As pregnancy progresses. a woman's posture changes to compensate for the increasing weight of the growing uterus. resulting in a hyperlordotic posture to maintain body balance. Relaxation of the sacroiliac joints may lead to varying degrees of low back pain due to excessive strain and fatigue. which can affect daily activities in up to 57% of pregnant women and consequently reduce their quality of life. The intensity of pain ranges from mild and moderate to severe (Kashif et al., 2020).

Pregnancy-related low back pain is defined as pain occurring in the lumbosacral region. The intensity of this pain generally increases with advancing gestational age. as it results from a shift in the center of gravity and postural changes during pregnancy (King et al.. 2013). A survey conducted by the University of Ulster in 2014 reported that 70% of 157 pregnant women experienced low back pain (Close et al.. 2016). Another study by Meyer et al. (1994) found that 45% of pregnant women experienced low back pain. with the prevalence increasing to 69% by the 28th week of gestation. A subsequent study conducted at Ungaran Community Health Center reported that 45 third-trimester

pregnant women experienced low back pain (Pravikasari et al.. 2014). These findings indicate that the majority of women experience low back pain during pregnancy.
Various non-pharmacological therapies have been recommended to reduce pain complaints during pregnancy. These interventions include physical activity, adequate rest, massage, acupuncture, hot or cold compresses, chiropractic therapy, relaxation techniques, aromatherapy, prenatal yoga or exercise, Reiki, and the use of pregnancy belts. Pregnancy belts are specifically designed to support the abdomen and lower back of pregnant women. providing comfort and promoting fetal safety. Pregnancy belts are considered a practical. safe. affordable. and easily accessible supportive garment. and are therefore commonly recommended by healthcare providers. The use of a pregnancy belt may reduce low back pain by applying gentle compression that enhances body awareness (proprioception), limits excessive spinal movement, stabilizes the lumbar and pelvic regions, reduces mechanical load on specific areas, stimulates muscle activity around the abdomen, spine, and pelvic floor. and provides a placebo effect.

Poor posture places additional strain and fatigue on the body, particularly the spinal structures, which can lead to back pain in pregnant women (Glinkowski et al.. 2016). If pregnancy-related low back pain is not properly managed, it may negatively affect maternal quality of life and persist as recurrent or worsening musculoskeletal problems as pregnancy progresses. Although the use of pregnancy belts has been shown to help reduce pain during pregnancy by providing support to the lower spine and pelvic regions, limited research has examined the effectiveness of combined interventions, particularly the use of pregnancy belts in conjunction with prenatal yoga, in reducing low back pain among third-trimester pregnant women.

METHOD

This study employed a quantitative approach using a quasi-experimental method with a pretest–posttest control group design. Following the initial observation (pretest). this design allows the researcher to examine changes that occur after the implementation of the intervention (posttest). The study population consisted of all pregnant women attending Puskemas Pasar Minggu. who were divided into two groups: a control group and an intervention group. The control group received prenatal yoga therapy, whereas the intervention group received a combination of pregnancy belt use and prenatal yoga therapy. The inclusion criteria were third-trimester pregnant women and pregnant women who agreed to participate as respondents. The exclusion criteria included pregnant women with pregnancy-related risks or complications. Samples were selected using purposive sampling. with a total of 30 participants in each group. Statistical analysis was conducted to test the study hypothesis. namely to determine the effect of pregnancy belt use on low back pain scale among third-trimester pregnant women.

Prior to hypothesis testing, data normality was assessed using the Kolmogorov–Smirnov test. If the data were normally distributed, a paired t-test was applied, whereas non-normally distributed data were analyzed using the Wilcoxon signed-rank test. Both paired t-test and Wilcoxon test were used to determine the significance of changes in low back pain scores before and after the intervention. To examine differences between the intervention and control groups. an independent t-test was performed for normally distributed data, while the Mann–Whitney U test was applied for non-normally distributed data. This study has received ethical approval from the Ethics Committee of the Health Polytechnic of the Ministry of Health Jakarta I (Poltekkes Kemenkes Jakarta I) on September 10, 2025, under approval letter number 029/KEPK-PKJI/IX/2025. This study aimed to evaluate the effectiveness of combining pregnancy belt use with prenatal yoga in reducing low back pain intensity among third-trimester pregnant women attending antenatal classes at Puskesmas Pasar Minggu, South Jakarta. Specifically, this research sought to analyze changes in pain intensity before and after the intervention within both the combined therapy group and the prenatal yoga-only control group, as well as to compare the magnitude of pain reduction between the two groups to determine whether adding external lumbopelvic mechanical support enhances the therapeutic benefits of prenatal exercise.

This quantitative study employed a quasi-experimental pretest–posttest control group design conducted across the working area of Puskesmas Pasar Minggu, South Jakarta, encompassing nine auxiliary community health centers. Prior to data collection, ethical clearance was granted by the Ethics Committee of Poltekkes Kemenkes Jakarta I on September 10, 2025 (No. 029/KEPK-PKJI/IX/2025). A total of 60 third-trimester pregnant women were recruited via purposive sampling based on specific inclusion criteria third trimester gestation and willingness to participate while excluding women with pregnancy-related risks or complications.

Respondents were equally allocated into an intervention group (n = 30) and a control group (n = 30). Data collection was carried out through four sequential stages. First, during the preparation and screening stage, eligible pregnant women attending antenatal classes were identified, briefed on the study objectives and procedures, and asked to sign written informed consent. Second, in the pretest stage, baseline data were collected using structured questionnaires and clinical assessment sheets covering maternal characteristics (age, parity, occupation, body mass index, estimated fetal weight, and prior low back pain history), pain profiles (type, duration, and timing), initial pain intensity, and functional disability measured via the Oswestry Disability Index. Third, during the intervention stage, the control group practiced prenatal yoga only, whereas the intervention group received combined therapy consisting of regular pregnancy belt use alongside prenatal yoga, with guidance provided on proper belt application to ensure safety and adherence. Fourth, in the posttest stage, low back pain intensity was re-evaluated following the intervention period using the same pain scale. Finally, collected data were analyzed statistically using the Kolmogorov–Smirnov normality test, paired t-tests or Wilcoxon signed-rank tests for within-group changes, and independent t-tests or Mann–Whitney U tests for between-group comparisons.

RESULT

This study was conducted in the service area of Puskesmas Pasar Minggu. South Jakarta. which is a primary healthcare facility providing maternal and child health services. including antenatal care for pregnant women and a structured prenatal exercise program. The implementation of the study covered the working area of Pasar Minggu Community Health Center, which includes several auxiliary community health centers (Puskesmas Pembantu) serving as extensions of healthcare services at the community level. These auxiliary centers consist of Pejaten Barat I, Pejaten Barat II, Pejaten Barat III, Pasar Minggu I, Kebagusan, Pejaten Timur, Ragunan, Jati Padang, and Cilandak Timur. The study was conducted in the service area of Puskesmas Pasar Minggu Community Health Center and involved two groups. The intervention group consisted of 30 participants who received a combination of pregnancy belt use and prenatal yoga, while the control group consisted of 30 participants who received prenatal yoga only. The following section presents the results of the study.

Table 1 present that most respondents in both the intervention and control groups were in their second pregnancy. accounting for 12 participants (40%) in the intervention group and 11 participants (36.7%) in the control group. The majority of participants in the intervention group were aged 26–35 years. In terms of occupation. most respondents in both groups were homemakers. with 20 participants (66.7%) in the intervention group and 18 participants (60%) in the control group. Regarding body mass index (BMI). most participants in both groups were classified as having a normal BMI. comprising 19 participants (63.3%) in the intervention group and 20 participants (66.7%) in the control group. With respect to previous pain history. most participants in the intervention group reported a prior history of pain (66.7%). whereas the majority in the control group reported no previous pain history (56.7%).

Table 1.
Characteristics of Respondents

Variabel	Intervention Group		Control Group	
	f	%	f	%
Age				
20-25	4	13.3	3	10.0
26-30	12	40.0	10	33.3
31-35	12	40.0	11	36.7
35-40	2	6.7	6	20.0
Occupation				
Housewife	20	66.7	18	60.0
Employee	10	33.3	12	40.0
BMI				
Underweight (<18.5)	3	10.0	1	3.3
Normal (18.5 – 22.9)	19	63.3	20	66.7
Overweight (23 – 24.9)	8	26.7	9	30
History of Previous Pain				
Yes	20	66.7	13	43.3
No	10	33.3	17	56.7
Type of Pain				
Throbbing Pain	4	13.3	5	16.7
Stabbing Pain	2	6.7	0	0
Pressure-like Pain	15	50.0	10	33.3
Dull Pain	9	30.0	15	50.0
Duration of Pain				
< 30 minute	15	50.0	9	30.0
30-60 minute	2	6.7	8	26.7
> 60 minute	13	43.3	13	43.3
Timing of Pain				
During Activity	9	30.0	10	33.3
At Night	14	46.7	7	23.3
During Prolonged Standing	7	23.3	13	43.3
Pain Intensity				
Mild Pain	9	30.0	10	33.3
Intermittent Pain	14	46.7	10	33.3
Moderate Pain	7	23.3	10	33.3
Oswerty Disability Index				
Minimal Disability	13	43.3	14	46.7
Moderate Disability	17	56.7	16	53.3

Regarding pain characteristics. pressure-like pain was most common in the intervention group (50%). while dull pain predominated in the control group (50%). Pain lasting less than 30 minutes was most frequently reported in the intervention group (50%), whereas pain lasting approximately 60 minutes was most common in the control group (43.3%). Pain was most commonly experienced at night in the intervention group (46.7%). while prolonged standing was the most frequent trigger in the control group (43.3%). In terms of pain intensity. intermittent pain predominated in the intervention group (46.7%), whereas moderate pain with minimal variation was most common in the control group (33.3%). Based on the Oswestry Disability Index, most participants in both groups were classified as having moderate disability (56.7% in the intervention group and 53.3% in the control group). The mean estimated fetal weight was 2.564 g (range: 1.900–3.198 g) in the intervention group and 2.475 g (range: 2.016–3.124 g) in the control group.

During the second and third trimesters of pregnancy. postural changes occur due to the increasing fetal load. resulting in greater spinal curvature and a higher risk of low back pain. Several factors have been reported to influence pregnancy-related low back pain. including body mass index (BMI). sleeping position. age. occupation. prenatal exercise. and parity (Arummega et al.. 2022). In this study. low back pain in the intervention group predominantly occurred during the first pregnancy. whereas in the control group it was more common during the second pregnancy. This finding is consistent with Arummega et al. (2022). who reported that higher parity increases the risk

of low back pain due to weakening of the abdominal muscles. reduced uterine support. and increased lumbar curvature.

Maternal occupation also contributes to low back pain during pregnancy. particularly in women with long working hours and high physical workloads. Homemakers were the predominant occupational group in this study. Household activities such as sweeping. mopping. lifting and carrying water containers. cooking. and childcare place repetitive mechanical stress on the lower back. When combined with pregnancy-related biomechanical changes. these activities may exacerbate low back pain (Arummega et al.. 2022). Maternal age is another contributing factor to low back pain during pregnancy. Previous studies have shown that women aged 20–35 years are vulnerable to low back pain. with the risk increasing at older ages (Arummega et al.. 2022). In this study, intermittent pain intensity was most frequently reported among women aged 26–35 years. Age-related reductions in muscle elasticity, ligament flexibility, and spinal support strength, together with pregnancy-related biomechanical changes such as weight gain, a shift in the center of gravity, and increased lumbar lordosis, may intensify low back pain, particularly in women with limited musculoskeletal adaptability (Kovacs et al.. 2012; Van Kieu et al.. 2023).

A significant association was also found between a history of low back pain in previous pregnancies and current pain intensity. This finding is consistent with Manyozo (2019). who reported that women who experienced low back pain in a previous pregnancy were more likely to experience similar complaints in subsequent pregnancies. Previous low back pain may cause persistent weakening and stretching of muscles. ligaments. and joints. thereby increasing susceptibility to recurrent pain (Pisoh et al.. 2025). The predominant pain characteristics reported in this study were dull and pressure-like pain. which are typical features of mechanically induced low back pain during pregnancy. Such pain arises from postural changes, increased lumbar lordosis, ligament stretching, and excessive mechanical loading of the musculoskeletal structures, resulting in non-sharp, diffuse pain sensations (Van Kieu et al.. 2023). Most respondents reported pain durations of less than 30 minutes to approximately 60 minutes. indicating that pregnancy-related low back pain is generally episodic and activity-related (Arummega et al.. 2022). Pain was most frequently reported at night and during prolonged standing, which may be associated with cumulative muscle fatigue and increased mechanical stress on the lumbar spine due to altered body biomechanics during pregnancy (Caputo et al.. 2021; Carvalho et al.. 2017). Most respondents experienced mild to moderate pain intensity with an intermittent pattern. Although not fully chronic. this level of pain may significantly interfere with daily activities. This finding is consistent with the Oswestry Disability Index results. which showed that most respondents experienced moderate disability. indicating limitations in activities such as sitting. lifting. and standing (Manyozo. 2019).

Table 2.
Effectiveness of Pregnancy Belt on Low Back Pain in the Intervention Group

Pain Intensity	N	Mean Rank	P-value
Negative Rank	26	13.50	0.001
Positive Rank	0		
Ties	4		

Table 2 shows that 26 respondents experienced a reduction in pain intensity after the use of a pregnancy belt. The obtained p-value was 0.001, indicating a statistically significant difference in pain intensity among pregnant women after the intervention.

Table 3.
Effectiveness of Pregnancy Belt on Low Back Pain in the Control Group

Pain Intensity	N	Mean Rank	P-value
Negative Rank	20	13.95	0.006
Positive Rank	6		
Ties	4		

Table 3 shows that 20 respondents experienced a reduction in pain intensity after receiving prenatal yoga. The obtained p-value was 0.006. indicating a statistically significant difference in pain intensity among pregnant women following the prenatal yoga intervention.

Table 4.
Comparison of the Effectiveness of Pregnancy Belt on Low Back Pain Between Intervention and Control Groups

Pain Intensity	N	Mean Ranks	P-Value
Intervention Group	30	23.28	0.001
Control Group	30	37.72	

The analysis in table 4 showed a p-value of 0.001. indicating a statistically significant difference in pain intensity between the intervention group and the control group. The mean rank analysis demonstrated that the intervention group had a lower average pain intensity than the control group. Various non-pharmacological interventions have been reported to be effective in reducing low back pain among pregnant women. Previous studies have shown that prenatal exercise, including prenatal yoga, the use of pregnancy belts, warm compresses, stretching exercises, and relaxation and breathing techniques can reduce the intensity of back pain. These findings are consistent with the results of the present study, which demonstrated a reduction in pain intensity following the provision of pregnancy belts and prenatal yoga. Prenatal exercise, particularly prenatal yoga, has been shown to reduce back pain intensity by improving flexibility, strengthening the muscles that support the spine, and enhancing posture (Ho et al., 2009; Holden et al., 2019; TA, 2025)In addition, the use of pregnancy belts has been reported to provide support to the lumbar and pelvic regions, thereby reducing mechanical load on the spine and alleviating low back pain (Lauridsen et al., 2025; Quintero Rodriguez & Troynikov, 2019).These non-pharmacological approaches are considered relatively safe for pregnant women, as they do not involve pharmacological agents and can be implemented independently or under the supervision of healthcare professionals.

Combined non-pharmacological interventions have been reported to be more effective in reducing low back pain among pregnant women than the application of a single intervention alone. This finding is consistent with the results of the present study. which demonstrated a significant difference in pain intensity between the group receiving a combination of pregnancy belt use and prenatal yoga and the group receiving prenatal yoga alone. The analysis indicated that the combined intervention was more effective in reducing pain intensity than a single intervention. Previous studies have suggested that combining prenatal exercise, such as prenatal yoga with the use of pregnancy belts provides more optimal benefits through mechanisms including muscle strengthening and stretching. postural improvement. and mechanical support to the lumbar and pelvic regions (Lauridsen et al., 2025; Quintero Rodriguez & Troynikov, 2019)

In the present study, the statistically significant p-value (0.001) further confirms the effectiveness of the combined intervention. The lower mean rank observed in the intervention group compared to the control group indicates that participants who received both prenatal yoga and pregnancy belt support experienced a greater reduction in pain intensity. This suggests that the addition of external lumbar and pelvic stabilization enhances the therapeutic effects of exercise-based interventions. Recent evidence supports the role of multimodal conservative management in pregnancy-related lumbopelvic pain, emphasizing that exercise combined with supportive devices can more effectively address biomechanical stress and muscular imbalance during pregnancy (Davenport et al., 2019)

Moreover, contemporary systematic reviews have highlighted that prenatal exercise significantly reduces the severity of low back and pelvic girdle pain by improving core stability, flexibility, and neuromuscular coordination (Asghari et al., 2024). When complemented by the use of pelvic or pregnancy support belts, mechanical loading on the lumbar spine and sacroiliac joints is reduced, thereby decreasing pain perception and improving functional mobility. Clinical evaluations conducted within the last five years have demonstrated that pelvic support belts contribute to

significant reductions in pain scores and improvements in daily activity performance among pregnant women experiencing lumbopelvic pain (Jafarian et al., 2025; Yoseph et al., 2025). Taken together, the findings of this study reinforce current evidence advocating integrated, non-pharmacological strategies as safe and effective first-line management for pregnancy-related low back pain. The combination of prenatal yoga and pregnancy belt use appears to provide synergistic benefits by simultaneously enhancing intrinsic muscular support and external biomechanical stabilization, thereby optimizing pain reduction outcomes.

DISCUSSION

The findings of this study demonstrate that both prenatal yoga alone and the combined use of a pregnancy belt with prenatal yoga significantly reduced low back pain intensity among third trimester pregnant women. Within-group Wilcoxon analysis revealed statistically significant pain reductions in the intervention group ($p = 0.001$, with 26 of 30 respondents showing decreased pain scores) as well as in the control group ($p = 0.006$, with 20 respondents reporting improvement). Crucially, however, between-group comparison using the Mann–Whitney U test confirmed a statistically significant difference ($p = 0.001$), where the intervention group achieved a substantially lower mean rank (23.28) than the control group (37.72). These results indicate that integrating a pregnancy belt with prenatal yoga yields superior analgesic outcomes compared to prenatal yoga alone.

Understanding the baseline characteristics of the respondents contextualizes why multimodal support is particularly beneficial during late pregnancy. Most participants in both groups were aged 26–35 years (80.0% in the intervention group and 70.0% in the control group) and were predominantly in their second pregnancy. Advancing maternal age is associated with gradual declines in muscle elasticity and ligament flexibility, which when compounded by gestational weight gain, anterior displacement of the center of gravity, and compensatory lumbar hyperlordosis heighten mechanical stress on the lumbosacral spine (Kovacs et al., 2012; Van Kieu et al., 2023). Higher parity further predisposes women to low back pain due to cumulative stretching and weakening of the abdominal musculature and reduced uterine support (Arummega et al., 2022).

Additionally, homemakers comprised the majority of respondents (66.7% and 60.0%), whose daily routines involve repetitive physical tasks such as sweeping, mopping, lifting water containers, and childcare that exert continuous mechanical strain on the lower back (Arummega et al., 2022). A prior history of pregnancy-related low back pain, reported by 66.7% of the intervention group, also served as an important predisposing factor due to persistent ligamentous laxity and joint vulnerability (Manyozo, 2019; Pisoh et al., 2025). The clinical pain profiles observed prior to the intervention align with mechanically induced lumbopelvic pain. Respondents primarily described pressure-like pain (50.0% in the intervention group) and dull pain (50.0% in the control group), occurring intermittently for durations ranging from under 30 minutes to approximately 60 minutes. Pain episodes were most frequently triggered at night (46.7% in the intervention group) and during prolonged standing (43.3% in the control group), reflecting cumulative paraspinal muscle fatigue and sustained gravitational loading on spinal structures throughout the day (Caputo et al., 2021; Carvalho et al., 2017; Van Kieu et al., 2023). Although intermittent, this pain notably impaired maternal daily functioning, as evidenced by the Oswestry Disability Index showing moderate disability in 56.7% of the intervention group and 53.3% of the control group, limiting routine activities such as standing, sitting, and lifting (Manyozo, 2019).

Individually, both non pharmacological modalities target distinct mechanisms underlying pregnancy related low back pain. Prenatal yoga reduces pain intensity by enhancing spinal flexibility, strengthening core and lumbar stabilizing muscles, correcting postural alignment, and improving neuromuscular coordination alongside breathing-induced relaxation (Ho et al., 2009; Holden et al., 2019; Asghari et al., 2024; TA, 2025). Conversely, pregnancy belts act externally by supporting the gravid abdomen, stabilizing the lumbar spine and sacroiliac joints, restricting excessive pelvic

motion, enhancing proprioceptive awareness, and redistributing mechanical loads away from strained musculoskeletal structures (Quintero Rodriguez & Troynikov, 2019; Lauridsen et al., 2025; Yoseph et al., 2025).

When applied concurrently, prenatal yoga and pregnancy belt use produce a complementary, synergistic therapeutic effect. While prenatal yoga builds intrinsic muscular endurance and postural control during structured exercise sessions, the pregnancy belt maintains continuous external lumbopelvic stabilization during prolonged standing and household activities. This dual mechanism aligns with current clinical guidelines advocating multimodal conservative management for pregnancy-related lumbopelvic pain, which emphasize combining targeted exercise with supportive orthotic garments to simultaneously address muscular imbalance and biomechanical overload (Davenport et al., 2019; Jafarian et al., 2025). Given that pregnancy belts are safe, affordable, non-invasive, and easily accessible, integrating their use into routine antenatal yoga programs offers primary healthcare facilities an effective first-line strategy to alleviate third-trimester low back pain and enhance maternal quality of life.

CONCLUSION

The results of the study showed that back pain in pregnant women was generally characterized by intermittent pain intensity with a dull and pressure-like sensation. The analysis of the relationship between respondent characteristics and pain intensity indicated that parity. type of occupation. and previous history of back pain had a significant association with the intensity of low back pain in pregnant women during the second and third trimesters. Pregnant women with higher parity. occupational activities involving physical workload or prolonged static positions. and a prior history of back pain tended to experience higher pain intensity.

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