Effectiveness of Prenatal Yoga on Reducing Back Pain in Pregnant Women: A Meta-Analysis Study

Hainas Sani Privetera[1], Mumpuni IntanPertiwi[1]*, Hepti Widia Ningsih[1], Elisa De Deus[2]

[1]Departement of Midwife Professional Education, Faculty of Health Sciences, Universitas Duta Bangsa Surakarta, Indonesia
[2]Universitas Nasional Timor Lorosae
Email: *mumpuni_intan@udb.ac.id

ABSTRACT

Background: Back pain is one of the most common musculoskeletal complaints experienced by pregnant women due to physiological and biomechanical changes during pregnancy. Prenatal yoga is one of the non-pharmacological interventions widely used to reduce this discomfort. **Objective:** This study aims to analyse the effectiveness of prenatal yoga in reducing back pain in pregnant women through a meta-analysis approach. **Methods:** This study used a meta-analysis method on published primary studies that met the inclusion criteria. A total of five experimental studies comparing prenatal yoga groups with control groups were analysed using Review Manager (RevMan) 5.4 software. Effect sizes were calculated using Standardised Mean Difference (SMD) with a 95% confidence interval. **Results:** The analysis showed that prenatal yoga was effective in reducing back pain in pregnant women with an SMD value of -1.35 (95% CI: -2.23 to -0.47; p = 0.003). This finding indicates that the group participating in prenatal yoga experienced a greater reduction in back pain than the control group. The level of heterogeneity between studies was high (I^2 = 89%), so the analysis used a Random Effect Model. **Conclusion:** Prenatal yoga has been shown to be effective as a non-pharmacological intervention to reduce back pain in pregnant women and can be recommended as part of holistic antenatal care.

Keywords prenatal yoga; back pain; pregnant women; meta-analysis.

INTRODUCTION

Pregnancy is a physiological process that causes various anatomical, biomechanical, hormonal, and psychological changes in a woman's body that have the potential to cause discomfort during gestation (1). One of the most common complaints experienced by pregnant women is back pain, especially in the second and third trimesters, which occurs due to increased body weight, changes in the body's centre of gravity, stretching of ligaments, increased lumbar lordosis, and the influence of the hormone relaxin on the stability of the pelvic joints and spine (2). The prevalence of back pain in pregnancy is reported to be quite high and can affect the quality of life, sleep quality, daily activities, work productivity, and the psychological health of pregnant women (3). Complaints of back pain that are not handled properly can increase the risk of impaired mobility, anxiety, stress, and reduce the mother's readiness for childbirth (4) (5). Therefore, non-pharmacological interventions are needed that are safe, effective, easy to implement, and appropriate to the physiological conditions of pregnancy to reduce the intensity of back pain in pregnant women (6).

One of the complementary interventions widely used in maternal health services is prenatal yoga (7). Prenatal yoga is a modification of yoga exercises specifically designed for pregnant women by combining stretching techniques, posture training, muscle strengthening, breathing regulation, relaxation, and meditation with the aim of improving physical and psychological well-being during pregnancy (8) (9). Various primary studies conducted on pregnant women have shown that prenatal yoga can reduce the intensity of back pain by increasing muscle flexibility, improving posture, reducing musculoskeletal tension, and increasing blood circulation in the lumbopelvic area (10). In addition, regular prenatal yoga practice has also been reported to improve sleep quality, reduce anxiety, increase pregnancy comfort, and support maternal physiological and psychological adaptation during the antenatal period (11). However, the results of available studies still show variations in study design, sample size, intervention frequency, duration of practice, and the magnitude of the resulting effect. Therefore, a more comprehensive synthesis of evidence is needed to obtain stronger conclusions regarding the effectiveness of prenatal yoga in reducing back pain in pregnant women (12).

Meta-analysis is a research method that combines the results of various primary studies, resulting in more accurate estimates of effects and a higher level of evidence than individual studies. The use of meta-analysis on the topic of prenatal yoga is important because it can evaluate the consistency of research results, identify heterogeneity between studies, and provide a strong scientific basis for health professionals in recommending prenatal yoga as a non-pharmacological intervention to manage back pain during pregnancy. To date, research on the effectiveness of prenatal yoga for back pain in pregnant women continues to grow both nationally and internationally, but few studies have systematically integrated all the latest primary evidence from 2021–2026. Therefore, this meta-analysis was conducted to analyse and synthesise the latest scientific evidence on the effectiveness of prenatal yoga in reducing back pain in pregnant women, thus providing a basis for developing evidence -based midwifery practice in antenatal care.

METHODS

1. Research Design

This study used a systematic review and meta-analysis. Article searches were conducted using electronic databases such as Google Scholar, PubMed, and Research Gate. The articles used were published between 2021 and 2025. The keywords used to retrieve articles were: ("Pregnant Women") AND ("Prenatal Yoga" OR "Pregnancy Yoga") AND ("Back Pain" OR "Low Back Pain") AND ("Experiment" OR "Randomised Controlled Trial"). The article search results were listed in a PRISMA diagram and analysed using the Review Manager 5.4 application.

2. Inclusion and Exclusion Criteria

Inclusion criteria are full paper articles with experimental studies (Randomised Controlled Trial), analysis with mean and SD. To measure the estimated effect, the research subjects were pregnant women; the intervention in the research was doing pregnancy yoga, or the comparison was not doing prenatal yoga. The outcome of the study was a reduction in the pain scale. Exclusion criteria included primary articles published from meta-analyses, articles that were not freely accessible, and duplicate articles.

3. Operational Definition of Variables

PICO was used to formulate the research problem. The population was pregnant women. The research intervention was prenatal yoga. The comparison was no prenatal yoga, and the outcome was a reduction in back pain. The independent variable was prenatal yoga, and the dependent variable was a reduction in back pain in pregnant women.

4. Instruments and Data Analysis

The quality assessment in this study used the Critical Appraisal Checklist for Randomised Controlled Studies published by CEBM University of Oxford . Articles were collected using the PRISMA diagram and analysed using the Review Manager 5.4 application by calculating effect sizes and heterogeneity to determine the combined research model and form the final results of the meta-analysis.

RESULTS

The article search process was carried out by searching electronic databases through Google Scholar 118, PubMed 10, and Research Gate 21. The article search results listed five articles.

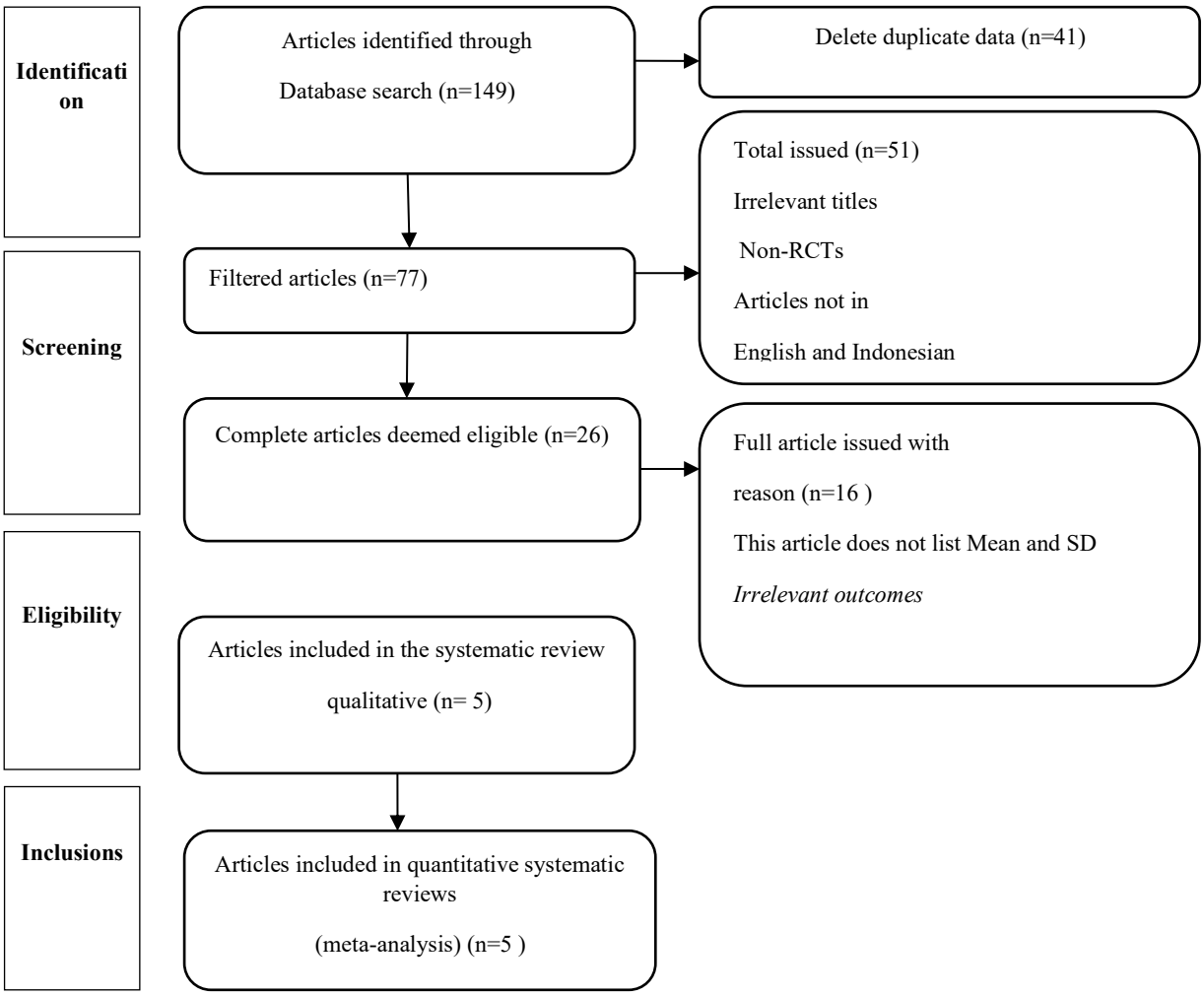

Figure 1. PRISMA Flowchart

Figure 2. The forest plot in the figure shows the effectiveness of prenatal yoga in reducing back pain in pregnant women. Pregnant women do prenatal yoga.have a possibility of experiencing a decrease in back pain of 1.35 units greater than without doing prenatal yoga pregnant women, and the effect is statistically significant (SMD = -1.35; 95% CI = -2.23 to -0.47 ; p <0.001). The forest plot also shows high heterogeneity in the effect estimates of the 5 primary studies conducted in this meta-analysis with I 2 = 89%. Thus, the synthesis to calculate the average effect estimate of all these studies was carried out using the Random Effect Model (REM) approach.

Table 1. Primary Research

Writer (Year)	Number of Samples		Population	Intervention	Comparison	Outcome	Mean		Elementary School	
	Intervention	Control					Intervention	Control	Intervention	Control
Laliyo et al, 2025	24	24	Pregnant mother	Pregnancy Yoga	No Pregnancy Yoga	Pain Reduction	1.08	1.17	0.99	0.93
Mustofa et al, 2023	20	20	Pregnant mother	Pregnancy Yoga	No Pregnancy Yoga	Pain Reduction	1.4	2.6	1.5	1.7
Rustiningsih et al, 2022	23	23	Pregnant mother	Pregnancy Yoga	No Pregnancy Yoga	Pain Reduction	1.3	4.75	0.88	1.29
Simanjuntak et al, 2022	30	30	Pregnant mother	Pregnancy Yoga	No Pregnancy Yoga	Pain Reduction	0.73	2.63	0.9	1.81
Vanisa et al, 2024	24	24	Pregnant mother	Pregnancy Yoga	No Pregnancy Yoga	Pain Reduction	2.2	4.27	1.01	1.33

Table 1 illustrates the primary research on the effectiveness of prenatal yoga in reducing back pain in pregnant women, which was conducted through a meta-analysis of five articles from varying research locations. Similarities were found in the research design: a randomised controlled trial, subjects were pregnant women, and the intervention was prenatal yoga for at least two weeks. However, there were differences in the sample size used, with the smallest sample size being 20 and the largest sample size being 30.

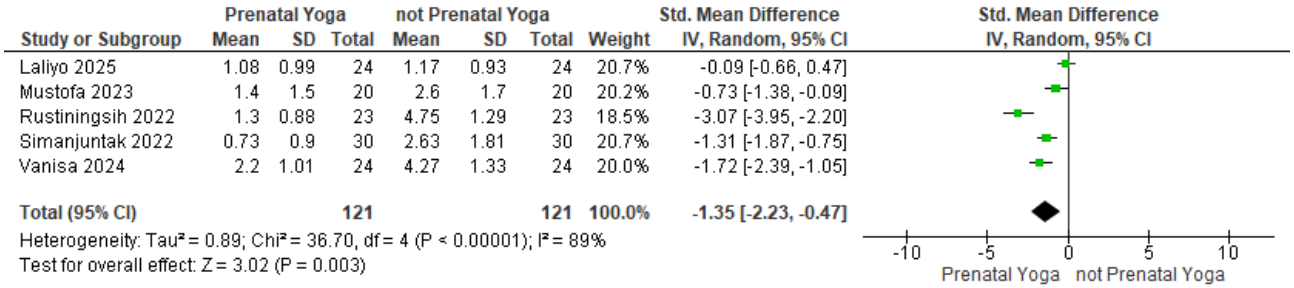

Figure 2. Results of Prenatal Yoga Meta-Analysis on Reducing Back Pain in Pregnant Women

DISCUSSION

The results of a meta-analysis conducted on five primary studies showed that prenatal yoga is effective in reducing back pain in pregnant women. The combined analysis produced a Standardised Mean Difference (SMD) value of -1.35 with a 95% confidence interval between -2.23 and -0.47 and a significance value of p = 0.003. The negative SMD value indicates that the group of pregnant women who participated in prenatal yoga experienced lower levels of back pain compared to the control group who did not participate in prenatal yoga. The magnitude of this effect is included in the large effect size category, thus indicating that prenatal yoga not only provides clinical benefits but also has a statistically significant impact (13). These findings support the theory that prenatal yoga practice can increase muscle flexibility, improve posture, and reduce tension in the back muscles that often occur due to biomechanical changes during pregnancy (14). As pregnancy progresses, the body's centre of gravity shifts forward, increasing the load on the lumbar spine and causing back pain (15). Through a combination of stretching movements, muscle strengthening, breathing exercises, and relaxation, prenatal yoga helps the body adapt to these changes so that pain complaints can be reduced significantly (16).

The results of this study are also in line with various theories and previous studies, which state that prenatal yoga is an effective non-pharmacological intervention in overcoming discomfort during pregnancy (17). In addition to providing physical benefits, prenatal yoga can improve the balance between the sympathetic and parasympathetic nervous systems, resulting in a relaxing effect that contributes to reduced pain perception (18). When doing yoga, the body stimulates the release of endorphins, which function as natural analgesics, thereby increasing the pain threshold and reducing discomfort (19). The forest plot shows that most studies show a consistent direction of effect that benefits the prenatal yoga group, although there is variation in the magnitude of the effect between studies. One study showed a relatively larger effect compared to other studies. This difference may be influenced by variations in respondent characteristics, gestational age, frequency of exercise, duration of the yoga program, level of participant compliance, and the pain measurement instruments used (20). Nevertheless, the overall synthesis of results still leads to the conclusion that prenatal yoga provides real benefits in reducing back pain in pregnant women (21).

However, the results of this meta-analysis showed a very high level of heterogeneity (I^2=89%; p<0.00001), indicating substantial variation between the studies analysed. This high heterogeneity may be due to differences in study design, sample size, population characteristics, gestational age of respondents, intensity and duration of prenatal yoga, and pain measurement methods used in each study (22). Therefore, a Random Effect Model (REM) approach was used in the analysis to accommodate variations between studies and produce more conservative effect estimates. Despite the high heterogeneity, the combined effect results still showed strong statistical significance, thus strengthening the evidence that prenatal yoga is an effective intervention in reducing back pain during pregnancy (23) (24). These findings have important implications for obstetric practice, as prenatal yoga can be recommended as part of a holistic, safe, affordable, and easy-to-implement antenatal care program. Integrating prenatal yoga into prenatal class programs has the potential to improve maternal comfort during pregnancy, reduce reliance on pharmacological therapy, and support the overall quality of life of pregnant women (19) (25). In addition, further research is needed with larger randomised controlled trial designs and uniform intervention standards to improve the quality of scientific evidence and reduce heterogeneity in future research.

CONCLUSION

Based on the results of a meta-analysis of five primary studies, it can be concluded that prenatal yoga is effective in reducing back pain in pregnant women. The analysis results

showed a significant difference between the group that did prenatal yoga and the control group, with a Standardised Mean Difference (SMD) value of -1.35 (95% CI: -2.23 to -0.47; p = 0.003), which indicates that pregnant women who participated in prenatal yoga experienced a greater reduction in back pain than those who did not participate in prenatal yoga. Although high heterogeneity was found between studies (I^2 = 89%), the use of the Random Effect Model still showed the consistent benefits of prenatal yoga as a safe, effective, non-pharmacological intervention, and has the potential to be part of holistic antenatal care. Therefore, prenatal yoga is recommended as a promotive and preventive effort to improve the comfort and quality of life of mothers during pregnancy.

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