The Efficacy of Prenatal Yoga on Labor Pain: A Systematic Review and Meta-analysis

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ABSTRACT

Objective • This study investigated the effects of prenatal yoga on labor pain.

Methods • A systematic review of articles on prenatal yoga for childbirth pain was conducted, and relevant pain score results data were collected for the meta-analysis. The intervention group was treated with yoga movement, and the control group, with routine prenatal examination. All randomized controlled trials were included, but pregnancies with internal complications were excluded.

Results • A total of 47 references were obtained from PubMed, Embase, the Cochrane database, and ClinicalTrials.gov. After applying the exclusion criteria, five studies were included for the review and meta-analysis. A total of 581 women were enrolled. The SMD value summarized for the four studies was -1.05, and the 95% confidence interval was -1.45 to -0.65, which was statistically significant ($z = 5.15$; $P < .01$), suggesting that yoga can significantly reduce labor pain.

Conclusions • Prenatal yoga can relieve labor pain and is recommended for pregnant women. (*Altern Ther Health Med.* [E-pub ahead of print.])

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INTRODUCTION

Childbirth is a natural physiological phenomenon, but the considerable changes that it induces in the maternal body could cause severe pain, affecting the delivery process.[1] In addition, pregnant women are prone to suffer from negative emotions, such as anxiety and nervousness,[2] and the psychological and physiological changes associated with pregnancy can sometimes lead to adverse delivery outcomes for both mothers and infants. Several studies have shown that with an increase in gestational age, pelvic muscle strength decreases, which interferes with the progress of delivery, prolonging labor and increasing the risk of adverse pregnancy outcomes.[3-5] During childbirth, along with labor pain, women are likely to experience serious emotional fluctuations.[6] Therefore, improving pelvic muscle strength in pregnancy and alleviation of labor pain have become the focus of clinical research.[7]

Labor pain can induce excessive tension, anxiety, and fear in the mother and other worries, such as concerns about the safety of the fetus as well as her own safety. This, in turn, could cause disruptions in the endocrine system, which could consequently activate the sympathetic nerve system, increasing the secretion of adrenaline. This leads to the contraction of vessels, decreasing the pain threshold; thus, labor pain is perceived as increased, and a vicious cycle ensues.[8] In this context, it was found that a combination of mindfulness meditation and Lamaze breathing during prenatal yoga *asana* practice can aid labor, reducing labor pain, which increases maternal confidence and reduces anxiety and tension.[9,10] There is evidence that yoga during pregnancy is safe, acceptable, and more beneficial than walking and standard prenatal exercises. It is also believed to provide pregnant women with opportunities that promote mental health, and it could also help in future communication with their babies.[11-13]

Yoga regulates the body and mind using breathing techniques and muscle exercises and is beneficial for both physical and mental health. The immune system is strengthened, contributing to an improved psychological state, which helps in pain regulation.[14,15] Although yoga exercises can be done for relaxation and pleasure alone, in the context of pregnancy, they increase pelvic floor smooth muscle tension and elasticity, thus increasing the chances of natural childbirth and other beneficial labor outcomes.[16-20]

There have been other reviews of the efficacy of yoga on childbirth, but these studies have focused only on descriptions of the related data and no meta-analysis has been conducted.

Figure 1. The PRISMA diagram.
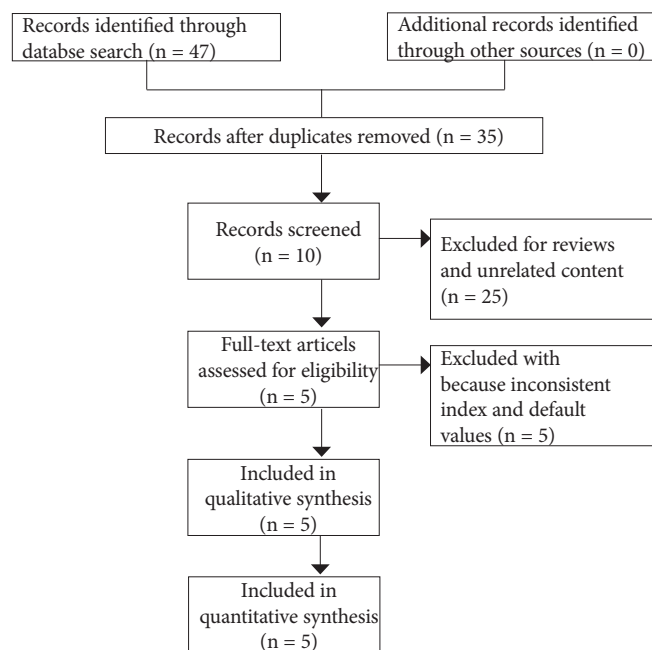
The aim of this article is to provide a systematic review and meta-analysis of studies that investigate the effects of yoga on labor pain. Specifically, we analyze the data in randomized controlled trials, so the level of evidence of the outcome is high.

MATERIAL AND METHODS

Literature Search

This systematic review and meta-analysis was performed in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-analyses (PRISMA) guidelines.

A combination of subject heading terms and similar words was used for the literature search. The PubMed, Embase, and Cochrane databases were searched from their inception up to August 30, 2022. ClinicalTrials.gov was also searched. The subject heading words that were used in the PubMed database were "Yoga"[Mesh], "labor pain"[Mesh], "pain, labor," "obstetric pain," and "pain, obstetric." The results were limited to the English language and humans. The search strategy was "(yoga[Title/Abstract]) AND ((((labor pain[Title/Abstract]) OR (pain, labor[Title/Abstract])) OR (obstetric pain[Title/Abstract])) OR (pain, obstetric[Title/Abstract]))." The PICOS (Participants, Intervention, Comparator, Outcome, and Study design) framework was established to guide article selection and data extraction.

A total of 47 references were found, with 12 articles from PubMed, 31 from Embase, 4 from the Cochrane database, and zero from ClinicalTrials.gov. After 12 duplicate references were removed, the abstracts of 35 were screened for exclusion of reviews and unrelated study designs. A total of 10 references were assessed for eligibility using the full text, whereas 5 references were excluded for reasons of inconsistent indexing and default results. Finally, the remaining five studies were included for this review and meta-analysis. The PRISMA diagram is shown in Figure 1.

Selection Criteria

Participants were pregnant women without obstetric complications. The intervention performed in the treatment group was prenatal yoga, whereas routine prenatal examination was performed in the comparator (control) group. The outcome indicators used were pain scores and adverse events. All studies in the English language that were randomized controlled trials (RCTs) and dealt with the effect of prenatal yoga on labor pain were included. The data were extracted by reading and searching through the articles identified. A standardized data extraction tool was used specifically for the review. Exclusion criteria were the following: pregnancy complicated by diseases such as hypertension and diabetes; repeatedly published literature, case reports, reviews, systematic evaluations and expert opinions, and other literature from which data could not be extracted; animal experiments; and absence of a control group.

Statistical Methods

RevMan 5.3 software was used for statistical analysis of the data. The pain score difference was expressed as mean difference (SMD) and 95% confidence interval (CI). A heterogeneity test was performed using the χ^2 test, and an I^2 >50% was considered as indicative of substantial statistical heterogeneity between the two groups. A meta-analysis was conducted using the random effects model. A funnel plot was used to analyze publication bias.

Quality Evaluation

To reduce the risk of bias, we used the Cochrane criteria to evaluate the quality of the studies. Two reviewers independently conducted the evaluation. The Cochrane criteria include the following items: random sequence generation, allocation concealment, blinding of the participants, blinding of the outcome assessment, incomplete results data, selective reporting, and other bias. For each item, there were specific evaluation criteria to define low, high, or unclear risk. The standardized data extraction tool was based on recommendations in the *Cochrane Handbook*. If there was any discrepancy in the trial inclusion or in the evaluation of risk of bias, the reviewers first tried to resolve it by negotiation with each other. If the discrepancy still existed, another reviewer would join the discussion. Evaluation of the risk of bias using the Cochrane criteria is shown in Figure 2 and Figure 3.

1. **Random sequence generation**: All studies in this review exhibited low risk of bias because allocation was done using computer-generated randomization, random numeric sequence, or sealed envelopes.
2. **Allocation concealment**: One study showed unclear risk because the information about concealment was not clearly stated, and four other studies were determined to be low risk due to the opaque, sealed envelope methods used.
3. **Blinding of the participants and personnel**: All five studies showed high risk of bias due to lack of blinding.

4. **Blinding of outcome assessment**: Four studies were determined to be high risk because there was no evidence of blinding of the outcomes assessor. One study was determined to be low risk because the authors clearly stated that the specialist interpreting the data was blinded to group assignment and intervention tests.

5. **Incomplete outcomes data**: Three studies were determined to be low risk due to a low dropout rate, whereas two studies were high risk because dropout rates were 25% to 56%.

6. **Selective reporting**: All studies had low risk of selective reporting bias because they clearly defined their hypothesis in the introduction or abstract.

7. **Other bias**: All studies showed low risk because they appeared to be free of other sources of bias.

RESULTS

Description of the Studies

The studies included in this review were conducted in Thailand (n = 1), Iran (n = 2), India (n = 1), and Turkey (n = 1). A total of 581 women were enrolled in the four trials, with 293 participants in the intervention group and 288 in the control group. Among them, 83 yoga participants dropped out and did not complete the pain scale; 48 of the controls dropped out because of emergency cesarean section and coinciding birth preparations or usage of pethidine. The majority of the participants enrolled in the trials were at least 18 years or older and in their second and third trimesters of pregnancy (see Table 1).

Bolanthakodi et al[17] demonstrated that the mean NPIS score at the onset of the second stage of labor was significantly lower in the yoga group, when compared with the control group. At the end of the second stage of labor, it remained lower in the yoga group, but did not reach significant significance. In the study by Chuntharapat et al,[21] the yoga program involved six 1-hour sessions at prescribed weeks of gestation. Labor pain was assessed when cervical dilation was 3–4 cm, 2 hours later, and then 2 hours later again. It was found that on each of the three occasions, pain was significantly lower in the yoga group.

Jahdi et al[16] showed that labor pain scores were significantly lower in the yoga group at 3–4 cm of cervical dilation and at 2 hours after the first and second measurements when compared to controls. Mohyadin et al[20] showed that the intervention group reported less pain at cervical dilation of 4–5 cm and 2 hours after the first measurement than the control group. Yilmaz et al[22] determined that yoga with meditation is an effective method of reducing pain.

Primary Outcome

The primary outcome was intensity of labor pain, and the heterogeneity test and meta-analysis of random effects were used to evaluate this.

The four RCTs were tested for heterogeneity: $I^2 = 73\%$ and $P = 0.006$. The average SMD value was -1.05, and the 95% CI was -1.45 to -0.65, which was statistically significant

Figure 2. The risk of bias graph of the review.
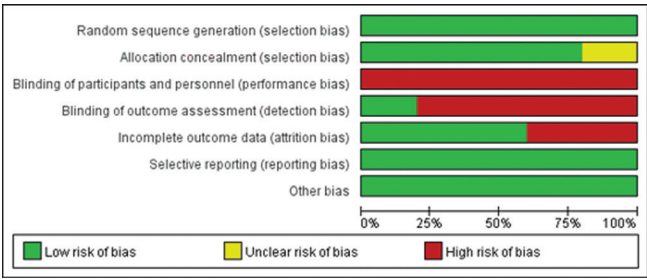

Figure 3. Summary of the risk of bias for the articles included in the review.

($z = 5.15$; $P < 0.01$), suggesting that yoga exercise could significantly reduce labor pain (see Figure 4).

Secondary Outcome

The secondary outcome was occurrence of adverse events. However, no such event was reported.

Bias Test

A funnel plot was drawn to investigate whether there was publication bias in this study (Figure 5). It can be clearly seen from the figure that the plot is basically symmetric, meaning that only a slight publication bias exists in this study.

Table 1. Description of the studies included in the review.

First author/ year	Location	Subjects	Intervention group	Control group	Outcome measure	Main results
Bolanthakodi et al,[17] 2018	Tehran, Iran	200 Primigravid women	30-Minute practice sessions at the 30th, 32nd, 34th, 36th, 38th, and 39th weeks of gestation	Standard antenatal care	Intensity of pain was assessed using numerical pain scores	The mean NPIS score was significantly lower in the study group
Chuntharapat et al,[21] 2008	Sonkahla, Thailand	74 Primigravid Thai women	The yoga program involved six 1-hour sessions at prescribed weeks of gestation	Patients in the control group received routine nursing care from hospital staff nurses	Labor pain when cervical dilation was 3–4 cm, 2 hours later, and 2 hours later again	The experimental group had significantly lower scores for labor pain than the control group
Jahdi et al,[16] 2017	Tehran, Iran	60 Primiparous pregnant women who had never practiced yoga before	Yoga class lasting 60 minutes, 3 times a week for 12 weeks (26–37 weeks of gestation)	Routine midwifery care through scheduled hospital visits	Labor pain at cervical dilation of 3–4 cm and then again 2 hours after second measurement	Significantly lower labor pain scores in the yoga group
Mohyadin et al,[20] 2020	Rafsanjan, Iran	84 Nulliparous women	Training sessions lasting 60 minutes was started every 2 weeks from week 26 of pregnancy and continued until 37 weeks of gestation	Control group only received routine midwifery care throughout this period	Labor pain was measured using the Visual Analogue Scale at a cervical dilation of 4–5 cm and 2 hours after the first measurement	Intervention group reported less pain
Yilmaz et al,[22] 2022	Istanbul, Turkey	90 Primiparous pregnant women	Yoga and meditation for 60 minutes, twice a week, for 10 weeks	Routine midwifery care	Visual Analogue Scale	Pain measurement scores were lower in the study group

Figure 4. Forest plot of the meta-analysis in this research.
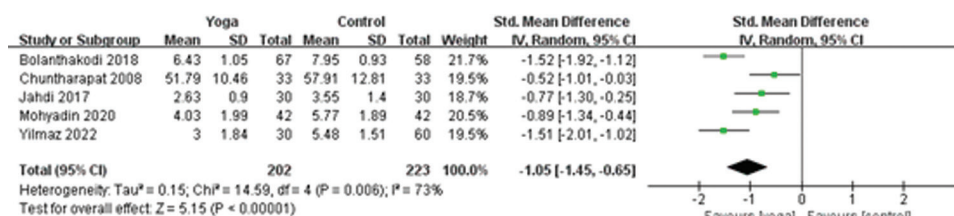
Figure 5. Funnel plot of the meta-analysis.
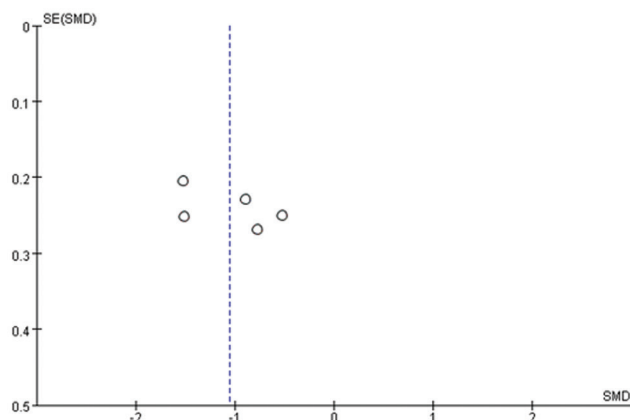
DISCUSSION

Yoga as a kind of aerobic exercise can enhance muscle strength in pregnant women, promote coordination of the body, and strengthen the hip, spine, and abdominal muscles. It also stretches the muscle fascia and ligaments, increases the flexibility of joints and pelvic floor muscles, called the birth canal, and increases the pelvic space, all of which creates an environment that is conducive to childbirth.[14,15]

Bolanthakodi et al[17] stressed that yoga is a noninvasive, easily achievable solution to reduce the labor pain score and decrease the risk of cesarean delivery because it provided an effective auxiliary method for the management and alleviation of labor pain. Prenatal yoga can shorten the labor process and relieve labor pain, thereby reducing the chances of dystocia and increasing the rates of natural delivery, to a certain extent. Chuntharapat et al[21] found that pregnant women who insisted on practicing yoga during pregnancy felt more comfortable when childbirth occurred than those who did not. Jahdi et al[16] reported that yoga during pregnancy contributed to a reduction in labor pain and improved adequacy of childbirth. Mohyadin et al[20] also found that practicing yoga can reduce anxiety, shorten the duration of labor stages, and decrease labor pain. Yilmaz et al[22] determined that yoga with meditation is effective in reducing pain.

This is the first review and meta-analysis to report that yoga during pregnancy reduces labor pain. The frequency, intensity, and duration of the intervention varied between articles, so there is some heterogeneity and publication bias, but the study still showed that the pain score of the experimental group was significantly lower than that of the control group. There were no side effects reported in any of the sources. Therefore, continuous yoga practice during pregnancy can improve delivery outcomes and is safe.

Recently, Corrigan et al[23] reported the positive effects of practicing yoga during pregnancy on anxiety, stress, depression, mode of birth, and duration of childbirth. However, they did not conduct a meta-analysis of the effect of yoga on labor pain. Byrne and Dennard[18] also carried out childbirth education classes based on yoga mindfulness meditation and encouraged women to maintain their mindfulness all the time during childbirth, which was conducive to reducing the fear of childbirth, facilitating the progress of labor and improving the rates of natural childbirth. Of note, other studies have reported clinically meaningful changes when yoga was used for pain management in multiple settings, for a multitude of conditions.[24-26] Oyarzabal et al[27] also remark that yoga is easy to implement, low cost, and safe to perform during pregnancy and therefore should be considered as an alternative, nonpharmaceutical intervention during pregnancy and postpartum care.

There are many other aspects of labor that need to be studied, such as endurance, anxiety, and complications. More randomized controlled studies with specific interventions and durations are warranted for conclusive evidence of the efficacy and safety of yoga on labor.

CONCLUSION

This systematic review and meta-analysis provides valuable information about the effects of prenatal yoga on labor pain, and the authors recommend that it be included in antenatal care. However, the sample size is not large, and further high-quality randomized controlled trials need to be conducted to verify its efficacy and safety.

CONFLICTS OF INTEREST
We declare that there are no conflicts of interest.

FUNDING SUPPORT

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