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The effect of prenatal yoga and reflexology in reducing labor duration and perceived pain; a systematic review and meta-analysis

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Abstract

Background Yoga and Reflexology is a non-pharmacological pain relief method, the effects of which remain unclear on obstetric interventions. This systematic review and meta-analysis aimed to assess the effect of yoga and reflexology on the length of labor and its pain.

Methods In this review, PubMed, Medline, Scopus, Cochrane, PsycINFO, and Google scholar databases were searched from inception till April 22, 2024. The protocol registry number (ID: CRD 42022362769) assigned. English-language of studies in randomized controlled trials (RCTs were included in the review. The Cochrane risk of bias tool was used to assess the risk of bias. Two independent reviewers extracted data and assessed the quality of the trials. Using Rev Man 5.4 software, the results were presented in form of forest plots.

Results Ten studies including 1,253 pregnant women were included for meta-analysis. Prenatal yoga and reflexology interventions has significant effect in reducing labor duration at fist stage (SMD: −0.43; 95% CI: −0.74, −0.13; $I^2 = 77\%$), second stage (SMD: −0.34; 95% CI: −0.53, −0.15; $I^2 = 21\%$) and third stage (SMD: −1.05; 95% CI: −1.34, −0.76; $I^2 = 0\%$, $P = 0.0001$). Moreover, the labor pain perceived in the active phase was found to be significantly reduced in the intervention group (SMD: −1.56; 95% CI: −2.78, −0.34; $P = 0.0001$).

Conclusion The review has demonstrated that yoga and reflexology is a non-invasive health exercises during prenatal period which is useful in reducing labor pain and its length at each stage of labor. Therefore, through applying this technique, a goal of midwifery, which is reducing labor pain and its length, can be achieved. It also may enable moms to fully enjoy their pregnancy and delivery.

Keywords Prenatal yoga, Reflexology, Labor duration, Labor pain, Meta-analysis

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Introduction

For decades, people have utilized yoga and reflexology to enhance their mental and physical health. Applying pressure to particular areas on the hands, feet, and ears is a therapeutic practice called reflexology that encourages the body's natural healing process [1].Yoga is a holistic practice that promotes strength, flexibility, and relaxation through a combination of physical postures, breathing techniques, and meditation [2]. Labor pain is considered to be one of the most painful events in human experience. There are two dimensions to it: the physical or sensory dimension, where pain is perceived by the brain, and the affective dimension, which results from the interpretation of these inputs by an intersection of personal emotional, social, cultural, and cognitive elements [3]. Labor pain management incorporate both pharmacological and non-pharmacological approaches [4]. Most of the women, 25% in the UK, and 58% in the USA, and 61% in Spain used pharmacological approach [5–7]. However, there is increasing evidence that women who receive epidural anesthetic have longer second stages of labor and are more likely to require cesarean and instrumental delivery [8]. The cesarean birth, increases a three-fold of maternal mortality and postpartum infection rates compared to normal delivery [9]. Pain control is considered as the key issue in modern midwifery. Along with medical painkillers, yoga and reflexology is viewed as a non-medical and noninvasive method [10]. These complementary therapies compliment each other: reflexology helps relieve the pain or tightness in the muscles that occasionally follows a more strenuous yoga practice, while yoga promotes flexibility, posture, and breath awareness [11]. Yoga is a kind of an exercise to stretches and postures (asana) coupled with deep breathing (pranayama) and meditation [12]. Evidence to date has demonstrated that prenatal yoga increases the flexibility of the mother's body and mind while strengthening the pelvic floor muscles, abdomen, and pelvis during labor, which helps to lessen the intensity and duration of labor pain [13]. Reflexology also helps one's mental relaxation during labor and, therefore, it helps to better control pain [14]. Reflexology and yoga functioning during prenatal period on labor pain control and shortening labor duration is still unclear, but some theories have tried to explain it [15]. Particularly, previous studies have not considered at each stage of the labor process. Therefore, this systematic review and meta-analysis is needed to assess the effect of prenatal yoga and reflexology in reducing labor duration and perceived pain at each stage of labor.

Materials and methods

Protocol

Following the Preferred Reporting Items of Systematic Reviews and Meta-Analysis (PRISMA) checklist [16] and it was registered to International Prospective Register of Systematic Reviews (PROSPERO registry ID: CRD 42022362769).

Search strategy

In this review, PubMed, Medline, Scopus, PsycINFO, Cinahl and Google scholar databases were searched. The search strategy was built using the search terms "yoga", "reflexology" and "pregnancy" and it was modified as needed for each database. We used only English language and the Boolean operators to search for terms associated with each concept, and to merge the two concepts. The framework known as PICO (population or problem, intervention, comparator, outcomes) was developed and used as a guide for the selection procedure. The search parameters and approach for PubMed are contained in. There was also a search of Google Scholar, the grey literature, dissertations and theses supplements. We used only published, peer-reviewed research in English language. The initial search was run on 22nd January 2016 to 22nd April 2024.

Eligibility criteria

Participants Every prenatal mother during pregnancy and labor, regardless of gestation, age, ethnicity, or nation of residency.

Intervention yoga and reflexology intervention delivered to pregnant and laboring women. Multimodal interventions providing yoga and reflexology in conjunction with other treatments (pharmacological pain killers) were excluded.

Comparison Prenatal women receiving usual care other than yoga and reflexology.

Outcomes The primary maternal outcome was the intensity of labor pain and labor duration.

Screening and reviewing of studies

We used only primary studies that studied a pregnancy yoga and reflexology intervention using a Randomized Control Trial (RCT). Other studies like case control studies and cross-sectional studies were excluded. After the databases were initially searched, duplicates were eliminated using Mendeley software 1.19. Next, two reviewers (DB, AD) independently screened study titles and abstracts using the inclusion/exclusion criteria. The review authors then screened study full text reports to determine whether the studies meet the eligibility criteria. Lastly, any disagreements were settled through negotiation by third authors who did not take part in the first step to determine whether to include or exclude the article (Fig. 1).

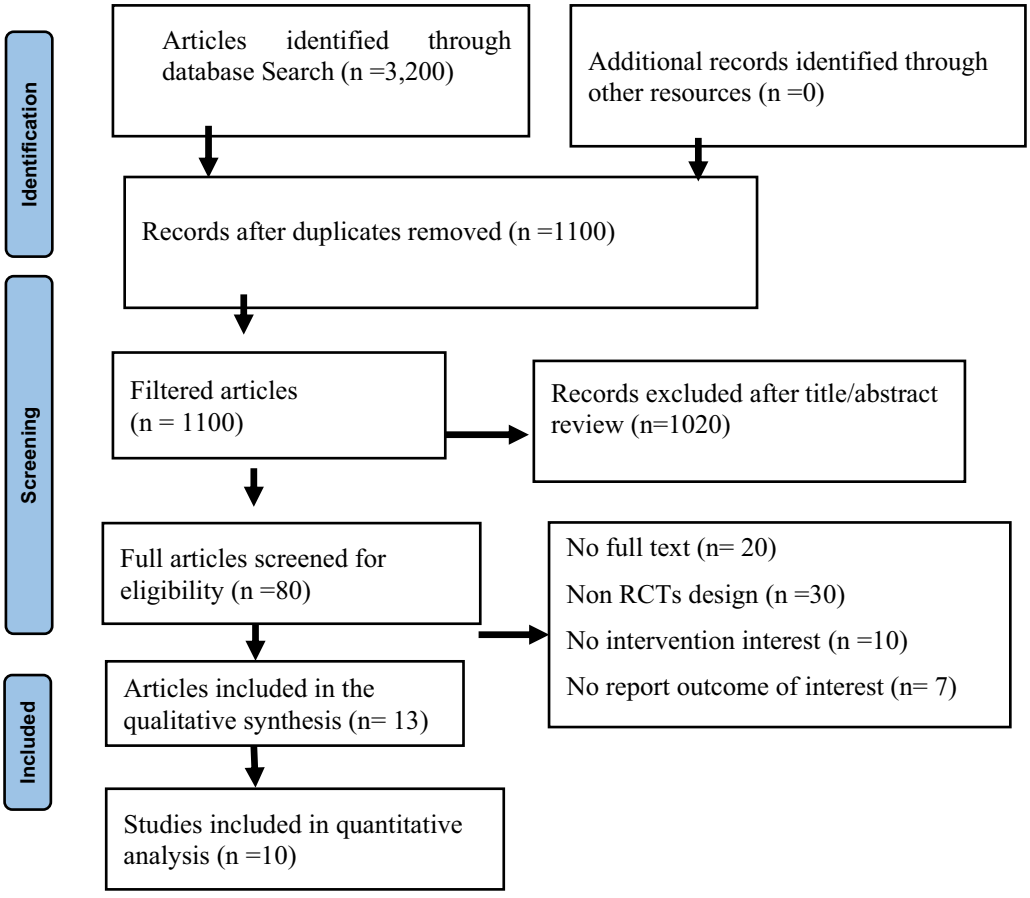


Fig. 1 Flow of included studies diagram

Data extraction

The following data was separately retrieved from the included studies by reviewers. As described in the following information: the name and year of the first author, the country, the study design, the sample size, and the equipment used to measure the outcome, and the conclusions. Every study's applicability was examined in light of its goals, methods, and subject matter. Two impartial evaluators finished and confirmed the data extraction utilizing a uniform form that included clear inclusion and exclusion criteria. In the event that the issue could not be settled by the reviewers' discussion, the third or fourth author was consulted.

Risk of bias individual study's

The risk of bias of the included studies was evaluated using the Cochrane risk of bias instrument for randomized trials (RoB 2.0) [17]. Blinding of personnel and participant reporting, blinding of result assessment, random sequence creation, allocation concealment, incomplete outcome, data selected outcome, and other sources of bias were evaluated. Accordingly, each study's overall risk of bias was divided into three categories: "low risk, high risk, and unclear [17].

Synthesis and analysis of data

The pain intensity score and labor length score are continuous variables, so the authors computed the pooled standardized mean difference between pregnant women who received yoga and those who did not. The authors used the I^2 statistic and visual inspection of forest plots to determine how heterogeneous the studies were [18]. Heterogeneity was graded as low, moderate, and high for I^2 values of 25%, 50%, and 75% respectively [18]. In case of heterogeneity, random effect model was used. The authors explored the sources of the heterogeneity by sensitivity analysis according to the risk of bias of included studies. Furthermore, subgroup analysis was used to investigate potential sources of heterogeneity. Overall, the software RevMan 5.4 was used to create forest plots and conduct statistical analysis. With the exception of the subgroup analysis and heterogeneity test, where a p-value of 0.10 was seen as significant, a two-sided p-value < 0.05 was deemed statistically significant.

Results

Search results

First, from the original literature search, we found 3200 possible publications. 3120 articles were eliminated

by three separate authors after they had reviewed the abstract and title and eliminated any duplication. Out of those, 80 possible articles were found. Last but not least, following a thorough examination of the whole text, types of design (RCTs), intervention interest, and result interest report, 15 publications were selected for qualitative assessment and 10 for quantitative analysis.

Overall features of the studies

Amongst 10 RCTs studies with 1,253 pregnant women were included for meta-analysis of outcome variables (labor duration and pain). Majority studies were done in Iran [11, 14, 19–22] and the rest in India [3], Spain [23], Indonesia [24]and in Australia [25]. The age of the participants ranges from 14 to 40 years. The study group receiving the intervention was in the range of 26 to 39 weeks of gestational age. Maximum sample size was 143 in both study and control group, while the minimum sample size was 11 in both groups. Maximum duration of yoga exercise intervention was 1 h and the minimum was 30 min. Most commonly used parameters for assessment of labor pain intensity was visual analogue scale (VAS) where only one study used by numerical pain intensity scale(NPIS) and pain behavior observational scale(PBOS) out of 10 studies (Table 1).

Risk of bias assessment

Following, an evaluation of RCT bias risk assessment using the Cochrane Collaboration tool (RoB 2.0). Both the summary graph and the risk of bias graph display the risk of bias assessment for each included study [17]. In this manner the review shows that the risk of bias in random sequence generation was low for all studies and allocation concealment selection of participants into the study was low for nine studies with one unclear. The risk of blinding outcome assessment (detection bias) is high in five studies, unclear in three and low in two studies. The risk of bias due to performance bias is high in two studies, low in six and unclear in one study. The bias due to attrition bias is low in seven studies and unclear in three whereas due to reporting of results low in eight and unclear in two studies (Figs. 2 and 3).

Effect of prenatal yoga and reflexology on each stage of labor duration

Among the ten studies included in the analysis, five studies in first the stage, six in second stage and two in third stage of labor showed a significant reduction in labor duration. Accordingly, there was a reduction in labor duration of pregnant women receiving yoga and reflexology during prenatal period compared to routine care [SMD: −0.48 (95% CI: −0.68, −0.28)] with (I2 = 73%, $p < 0.0001$). Also, significant reduction of labor duration was found at first stage [SMD: −0.43 (95% CI: −0.74, −0.13)] with (I2 = 77%, $p < 0.0001$), at second stage [SMD: −0.34(95% CI: −0.53, −0.15)] with (I2 = 21%, $p < 0.0004$), and in third stage of labor [SMD: −1.05 (95% CI: −1.34, −0.76)] with (I2 = 0%, $p < 0.0001$). Due to the small number of studies (< 10), we could not execute the initially planned sensitivity analysis (Fig. 4).

Publication bias

The symmetrical distribution of the right and left plots, with six plots on the right and seven on the left, suggests that there is no publication bias, according to (Fig. 5) of the funnel plot of the examined publications. The graph shows that the standard error for the plot on the left is between 0.1 and 0.3, while the standard error for the plot on the right is between 0.1 and 0.5.

Effect of yoga and reflexology in reducing labor pain

In this case eight RCTs study with 448 pregnant women involved for labor pain assessment. Overall, there was a significant labor pain reduction found among women receiving yoga and reflexology compared to non user [SMD:−1.13 (95% CI:−1.99,−0.27)]. For heterogeneity test, we were unable to carry out the sensitivity analysis that was originally planned because of the limited number of studies. Nonetheless, results from the symmetry of the funnel plots showed that this study does not exhibit any detectable publication bias (Fig. 6).

Publication bias

Because the right and left plots of the leaflets are symmetrical, with four plots on the right and four on the left, the funnel plot does not exhibit any publication bias, as seen in (Fig. 7).

0.2 to 0.06 appears to be the standard error for the plot on the left of the graph, and 0.0 to 0.3 looks to be the standard error for the figure on the right.

Discussion

In a current Systematic review and Meta-analysis the effects of prenatal yoga and reflexology is significant in reducing labor pain perceived by mothers during labor (SMD − 1.56 (−2.78,−0.34; $P = 0.01$). This finding is comparable to previous a systematic review and meta-analysis [13, 26]. However, the study found for only yoga during pregnancy during labor in the first, second and third stage of labor. Another systematic review and meta-analysis reporting the trials from Iran has shown significant evidence of the effect of reflexology (massage) therapy on laboring women [27]. The study showed a significant effect of massage therapy in latent, active and transitional phase of the labor pain reduction. The study by Ranjbaran M et al., included studies from Iran only, whereas the present review and meta-analysis included studies all over the world [27]. Our findings also inline with the

Table 1 Characteristics of the included studies

Author/Year	Country	Study Design	Sample size/Age	Yoga exercises frequency/week	Outcome measures	Findings
Bolanthakodi et al., 2018 [3]	India	RCT	*n* = 150 IG = 75 CG = 75 Age = 20–35 years	30',3s/wk From 30th – 39th wks of gestation	Labor pain by numerical pain intensity scale(NPIS), pain behavior observational scale(PBOS)	Yoga decreases pain intensity and labor duration at all stages of labor
Jahdi.F et al., 2017 [21]	Iran	RCT	*n* = 60 IG = 30 CG = 30 Age = 18–35 years	60'; 3s/wk From 26–37 wks of gestation.	Pain intensity assessed by Visual Analogue Scale (VAS)	Yoga during pregnancy reduce pain of labor and duration
Mohyadin.E et al. 2020 [11]	Iran	RCT	*n* = 84 IG = 42 CG = 42 Age ≥ 14 years	60'; 2s/wk From 26–37 wks of gestation	VAS	Yoga reduce women's anxiety, pain and duration of labor
Karnasih 2018 [24]	Indonesia	RCT	*n* = 22 IG = 11 CG = 11 Aged = 20–40 years	yoga nidra and breathing awareness	VAS at 2–4 cm of cervical dilatation	Yoga decreased, labor pain score
Carrascosa.C, et al. 2021 [23]	Spain	RCT	*n* = 286 IG = 145 CG = 141 Age = 14–20 years	45'; 3s/wk of water aer-obics for 5 months	VSA/Hours	In yoga group labor pain and duration reduced
Ghandali NY et al. 2021 [20]	Iran	RCT	*n* = 110 IG = 55 C = 55 Aged = 18–35	From26-28 for 8 weeks	Hours	Exercise during pregnancy improved labor process
Yekefallah L et al. 2021 [22]	Iran	RCT	*n* = 70 IG = 35 CG = 35 Age = 20–45	75'; 2s/wk From26-37 wks of gestation	VAS/Hours	yoga reduced the induction of labor, episiotomy and duration of labor process
Kamjoo et al. 2018 [14]	Iran	RCT	*n* = 240 IG = 120 CG = 120 Age = 18–35	Reflexology consisting mild massage was done duration- 20 min	VAS/Hours	reflexology reduces pain and length of labor
Sadat Z, 2016 [19]	Iran	RCT	*n* = 60 IG = 30 CG = 30 Age = 20–45	Manual effleurage (superficial and deep) massage for 15 min	Labour pain and discomfort level measured using a Visual Analogue Scale(VSA)	Yoga decreases intensity and duration of labor pain
LevettMK, 2016 [25]	Australia	RCT	*n* = 171 IG = 86 CG = 83 Age = 18–45	2-day, yoga, breathing techniques, massage,	VAS/Hour	

S/wk: sessions per week; IG: intervention group, CG: control group, VAS: Visual Analogue Scale

other study stated that pregnant women who practice yoga for 30 min and do it 3 times a week can reduce pain during labor and shorten the duration of labor [26].it is suggested that prenatal yoga practice is focused as an educational program and will be offered to every pregnant woman to reduce labor pain [28]. Regarding effect of prenatal yoga and reflexology on the lengths of labor, the recent meta analysis found a significant effects on labor lengths reduction in the active phase SMD – 0.43 (–0.74, –0.13; $P = 0.0001$) and Second phase SMD – 0.34(–0.53, –0.15; $P = 0.0004$) and in third phase – 1.05 (–1.34,–0.76 with $I^2 = 0\%$, $P = 0.0001$). This study supports the findings of another study [14] which shows that labor took noticeably less time in the yoga group than it did in the control group [29]. This finding is similar to a systematic review [26]. However, the study reported without considering the first, second and third stage of labor. We suggest that yoga could be a useful non-pharmacological strategy for

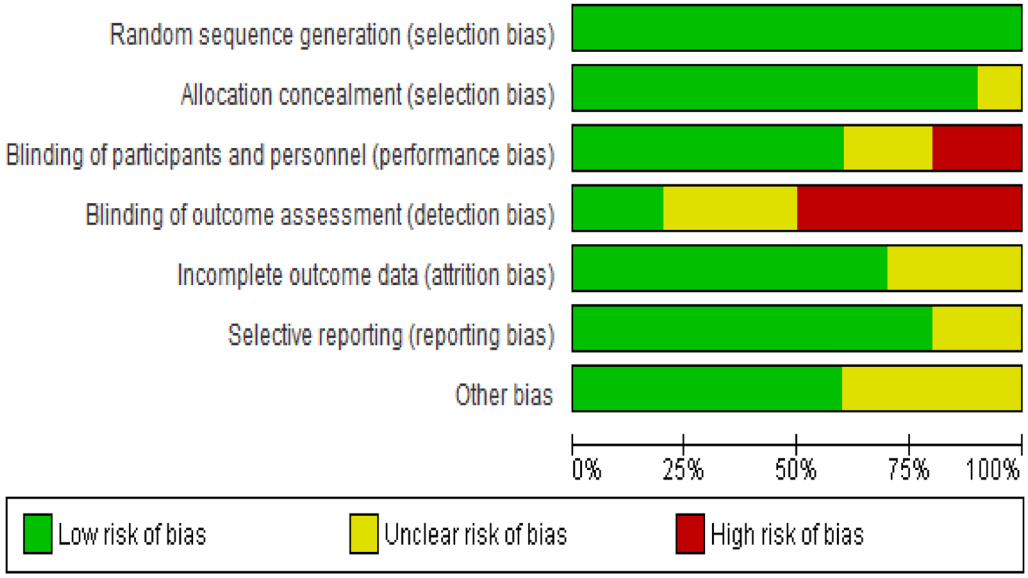


Fig. 2 Risk of bias graph of the analysis

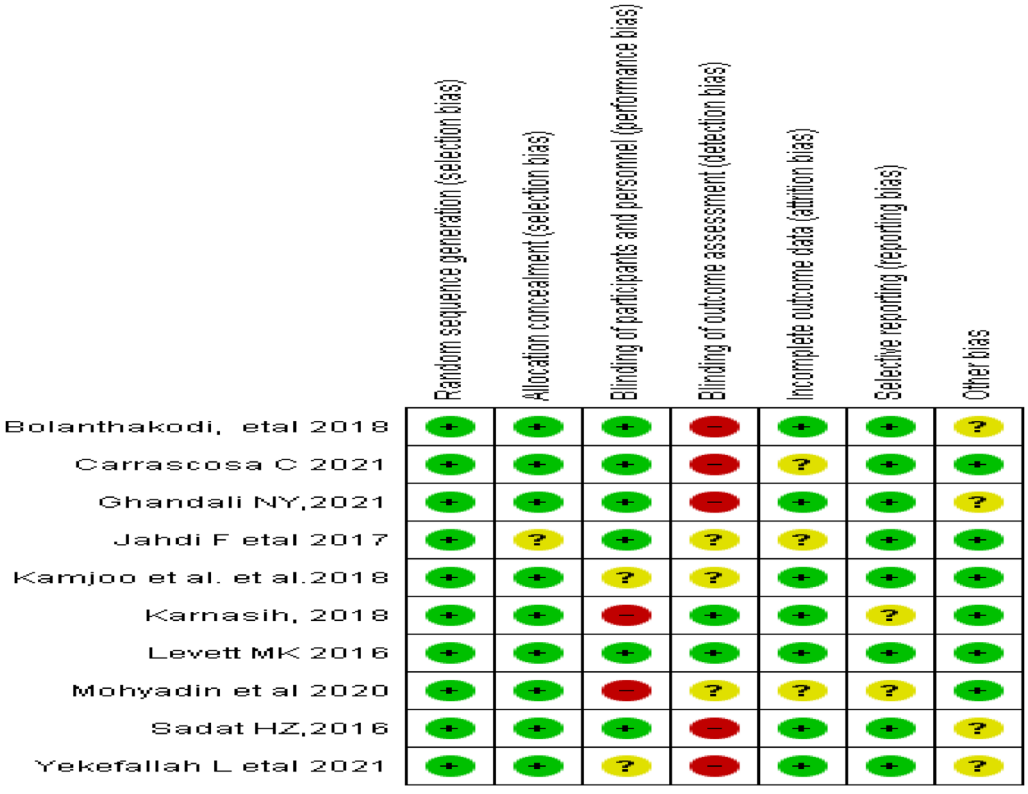


Fig. 3 Risk of bias summary of the analysis

the reduction of labor duration and pain based on this meta-analysis.

According to previous studies, doing yoga during pregnancy and reflexology during labor shortens the duration of the labor, lessens the need for cesarean sections, reduces the need for intravenous analgesics, increases the likelihood of vaginal births, and improves pain tolerance of women in childbirth [10, 15]. Furthermore, yoga and reflexology practice results in a happy birth experience and increased satisfaction with pain relief. Likewise it is believed that helps in lowering stress, depression, and psychologically prepares the women for

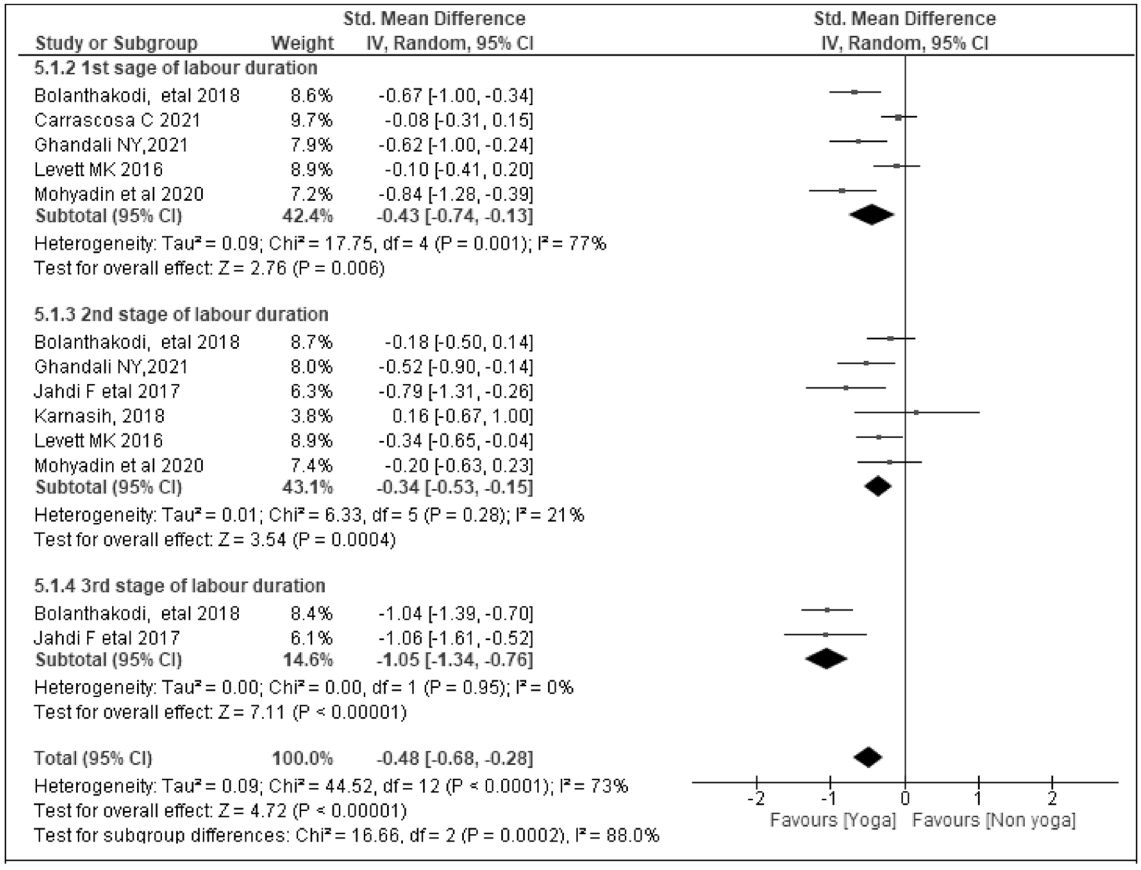


Fig. 4 Effect of prenatal yoga on labor duration

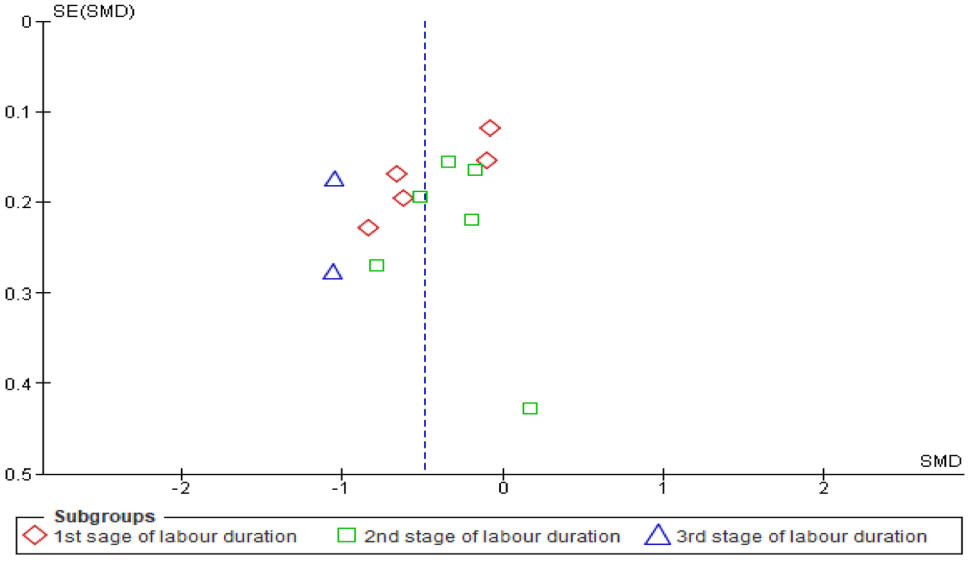


Fig. 5 Funnel plot of the meta-analysis

labor [13]. Evidence has shown that prenatal yoga exercises and reflexology in labor is important to strengthen and increase the flexibility of the perineum, vagina and sphincter muscles so as to facilitate proper labor and delivery. It can also contribute to lower labor induction rates, shorter labor durations and lower pain perception [28, 30].Yoga can effectively manage pain by alleviating stress, fear and tension associated with labor and childbirth. In all the studies, there were no documented adverse effects. However, no firm recommendations

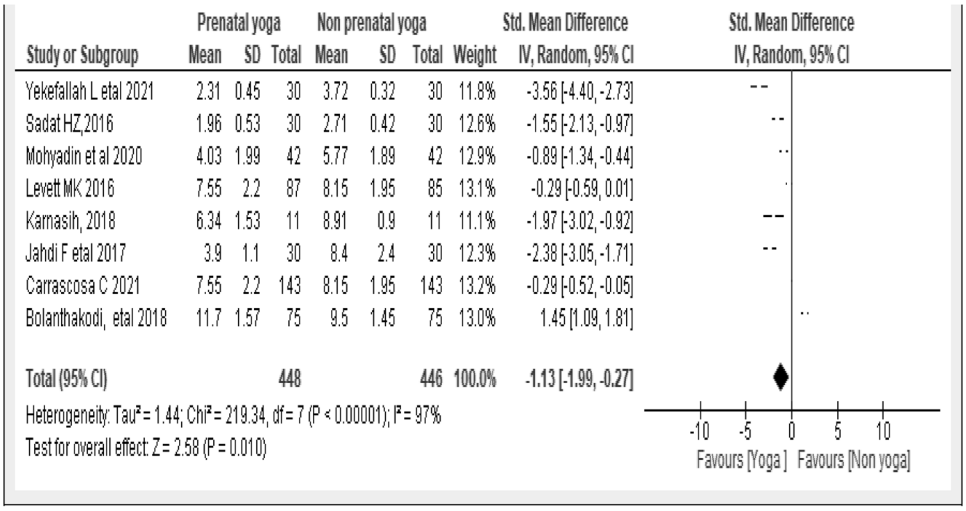


Fig. 6 Effect of antenatal yoga on labor pain reduction

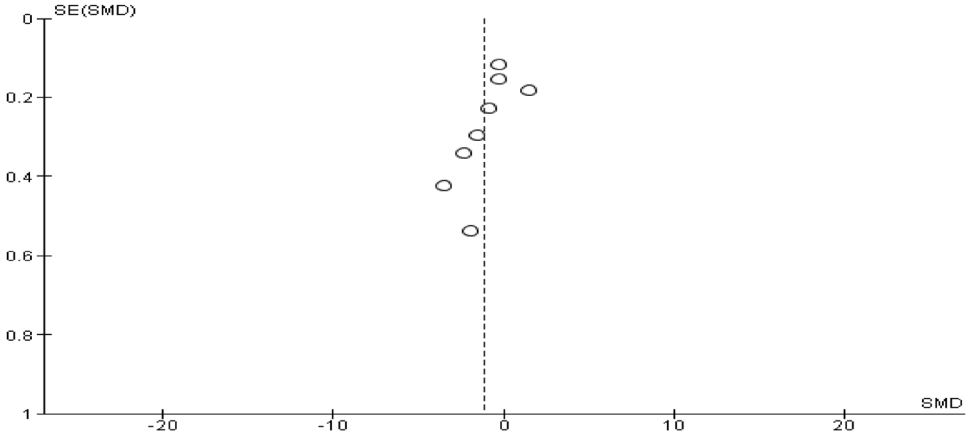


Fig. 7 Funnel plot of the studies

regarding the safety of the intervention can be given due to the small number of included studies.

Limitations

Although yoga and reflexology showed beneficial results in this review, there are a number of drawbacks. Very few studies could blind for intervention given and outcome assessors. There was plenty of heterogeneity because different yoga interventions were utilized in each study. The use of VAS, a subjective pain marker, as the outcome measure has one more drawback. It is impossible to rule out the possibility that yoga helps to lessen labor duration and pain, despite these drawbacks.

Conclusion

This review found that prenatal yoga and reflexology would be an encouraging non pharmacological pain killer intervention that can be used effectively to shorten the duration of labor at first, second and third stage of labor. The findings conclusions indicate that reflexology and yoga are a simple technique to reduce the high rate of caesarian sections, which are typically chosen due to mothers' fear of the pain associated with natural births.

Abbreviations

NPIS	Numerical Pain Intensity Scale
PBOS	Pain Behavior Observational Scale
RCT	Randomized Controlled Trials
SMD	Standardized Mean Differences
VAS	Visual Analogue Scale

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Not applicable.

Author contributions

DB, AD, WA and KB conceptualized the review. DB and AD designed the search strategy and performed the searches. All performed the data extraction, risk of bias and GRADE assessments. DB performed the meta-analysis and wrote the first draft of the manuscript. DB, WA and KB provided critical feedback and edits to the draft. All authors approved the final manuscript.

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Data availability
Additional data may be available on request byemailing to the corresponding author.

Declarations

Ethics approval and consent to participate
Not applicable.

Consent for publication
Not applicable.

Competing interests
The authors declare no competing interests.

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