



Yoga during pregnancy: a systematic review

Joga v nosečnosti: sistematični pregled literature

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Abstract

Background: Yoga is among the most recommended forms of physical activity during pregnancy. It is not clear, however, whether benefits of yoga outweigh the benefits of other forms of exercise during pregnancy. The aim of this article is to review randomized trials that have compared health effects of yoga to those of other forms of physical activity during pregnancy.

Methods: Medline database was searched using Medical Subject Headings (MESH) descriptors “yoga” AND “pregnancy”. We only included randomized trials published after 1996 that compared yoga to other forms of exercise during pregnancy.

Results: We identified 20 randomized trials on yoga during pregnancy. Only five of them included walking or standard prenatal exercise as a control intervention. There were less mental disorders, hypertensive diseases, gestational diabetes, intrauterine growth restrictions and preterm births in yoga groups compared to controls practising other forms of regular exercise.

Conclusion: Yoga is a safe form of physical activity during pregnancy with numerous positive effects to maternal and foetal health. The benefits of yoga practising may outweigh the benefits of other forms of prenatal exercise.

Izvleček

Izhodišče: Joga sodi med najbolj priporočljive oblike telesne dejavnosti nosečnic. Ni povsem jasno, ali so koristi vadbe joge v nosečnosti večje od koristi drugih oblik telesne dejavnosti. Namen članka je predstaviti sistematični pregled randomiziranih raziskav, ki so učinke vadbe joge primerjale z učinki drugih oblik telesne dejavnosti v nosečnosti.

Metode: Pregledali smo zbirko Medline. Uporabili smo deskriptorja iz tezavra Medical subject headings (Mesh) joga (»yoga«) in nosečnost (»pregnancy«). Vključili smo randomizirane raziskave, objavljene med letoma 1996 in 2019, ki so vadbo joge primerjale z drugo obliko telesne dejavnosti v nosečnosti.

Rezultati: Od leta 1996 je bilo objavljenih 20 randomiziranih raziskav, ki so preučevale učinke joge na perinatalne izide. Le pet raziskav je primerjalo učinke joge z učinki drugih, za nosečnice priporočenih oblik telesne dejavnosti. V primerjavi z vodeno telovadbo ali redno hojo je bila vadba joge v nosečnosti povezana z manjšim tveganjem za duševne motnje, bolezni zvišanega krvnega tlaka, nosečnostno sladkorno bolezen, zastoj plodove rasti in prezgodnji porod.

Zaključek: Joga je varna oblika telesne dejavnosti v nosečnosti, ki ugodno vpliva na zdravje nosečnice in ploda. Do danes objavljeni podatki kažejo, da so koristi vadbe joge v nosečnosti lahko večje od koristi drugih oblik telesne dejavnosti.

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1 Introduction

Regular and adequately measured physical activity during pregnancy has a positive effect on the health of the pregnant woman and the foetus (1). It has been proven to reduce the incidence of gestational diabetes, hypertensive disorders of pregnancy, urinary incontinence, pregnancy-related pelvic girdle pain and intrauterine growth restriction (IUGR) (2–6). It has a positive effect on the pregnant woman's well-being and reduces the risk for mental disorders, such as anxiety, depression and panic attacks (1,7,8). Physical activity is also good preparation for labour and delivery and contributes to faster postpartum recovery (1,7). In 2015, the Slovenian Recommendations for Physical Activity During Pregnancy were published (1). The Recommendations were adopted by the Extended Professional Committees for Physiotherapy and Gynaecology and Obstetrics. The Recommendations also list the most appropriate forms of physical activity for pregnant women: walking and running, swimming, dance, indoor exercise cycling, aerobics, fitness classes, cross-country skiing and practising Pilates and yoga (1).

Yoga is a psycho-physical exercise that includes physical postures (asanas) and breathing (pranajama), concentration (dharana) and meditation (dhyana) techniques (9). It is based on the ancient Indian heritage and philosophy, and since the early 20th century, it has also become

increasingly popular in the West. Some 6.6% of adults in the US and 20.5% of adults in the UK have practised or are practising yoga (10,11). Approximately 70% of them are women, with the majority of them being women of reproductive age (12). Consequently, a growing number of pregnant women are also practising yoga (12,13). Observation studies have shown that practising yoga during pregnancy is safe and can have numerous beneficial impacts on the pregnant woman and the foetus (14,15). It is not completely clear whether the benefits of yoga during pregnancy are greater than the benefits of other types of physical activity that are also recommended for pregnant women.

We reviewed randomized studies that compared the effects of yoga with the effects of other types of physical activity during pregnancy. We also wanted to assess the quality of the randomized studies in yoga during pregnancy published so far.

2 Methods

We reviewed the MEDLINE database using PubMed. We reviewed randomized controlled studies that researched the effects of yoga during pregnancy and compared them with the effects of other types of physical activity recommended for pregnant women. We included articles published in English between January 1996 and December 2019. Medical

Subject Headings (MESH) descriptors “yoga” AND “pregnancy” were used. By reviewing the lists of citations in the articles we obtained using these methods, we then found additional studies that would fit our inclusion criteria. The review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines for systematic inquiries (16). The Consolidated Standards of Reporting Trials (CONSORT) guidelines were used to assess the quality of the analysed randomized studies. The CONSORT guidelines assess 25 quality domains of randomized studies and were first published in 1996 (17). That was the reason we limited our search to randomized studies published after 1996. We report proportions of included studies with individual CONSORT quality criteria met.

3 Results

Figure 1 depicts the process of the systematic review of the literature. Our query returned 24 articles. We found two additional articles by reviewing the reference lists. We excluded five observation studies and one article in Korean. Of the remaining 20 randomized studies that researched the effects of yoga on perinatal outcomes, only five included a control group that participated in an organized physical activity programme. In two cases it was walking, and in three standard prenatal physical exercise (18-22). Table 1 depicts the characteristics of the five studies we included in our analysis.

All five studies were conducted in India. In all the studies, practising yoga included both physical exercises (asana) and breathing (pranayama), relaxation and

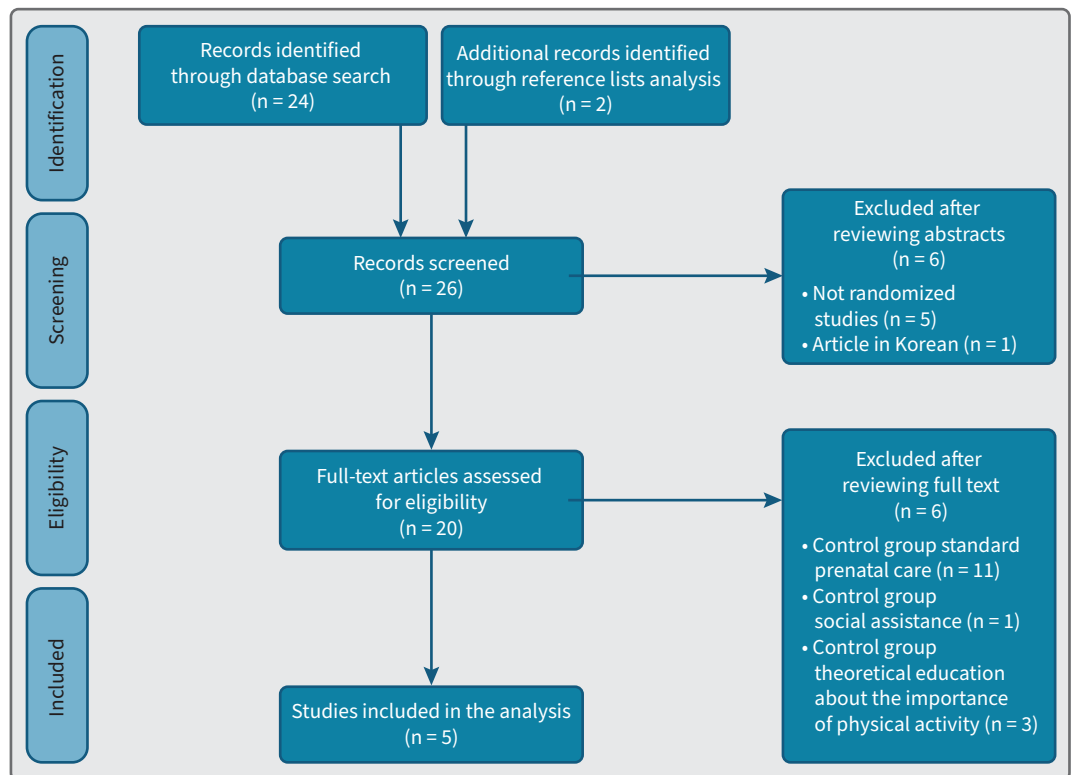


Figure 1: Diagram of the phases of the systematic literature review (the PRISMA diagram).

Table 1: Randomized studies that compared the effects of yoga with the effects of other types of physical activity during pregnancy.

First author, year	Number of included pregnant women and description of groups	Results
Satyapriya, 2009 (18)	122 low-risk pregnant women between the 18th and 20th week of pregnancy: <ul style="list-style-type: none"> • 59 yoga, 120 minutes, three times per week for the first month, then 60 minutes per day until delivery; • 63 guided exercise, 120 minutes, three times per week for the first month, then 60 minutes per day until delivery. 	Heart rate variability (HRV) measurements in the group practising yoga showed higher parasympathetic activity (lower values of low-frequency HRV domains). Stress assessment in the yoga-practising group decreased with the duration of pregnancy.
Rakhshani, 2010 (19)	102 low-risk pregnant women between the 18th and 20th week of pregnancy: <ul style="list-style-type: none"> • 51 yoga, 60 minutes, three times per week, 16 weeks; • 51 guided exercise, 60 minutes, three times per week, 16 weeks. 	In the yoga-practising group, the pregnant women assessed their physical, mental and social health aspects as better than in the control group.
Rakhshani, 2012 (20)	68 high-risk pregnant women, included in the 12th week of pregnancy: <ul style="list-style-type: none"> • 30 yoga, 45 minutes, three times per week, 16 weeks; • 38 walking, 30 minutes walking twice per day, 16 weeks. 	Fewer cases of pre-eclampsia, gestational diabetes, premature delivery (< 37 week of pregnancy), IUGR, SGA and low grades according to the Apgar score for the yoga-practising group.
Jayashree, 2013 (21)	93 high-risk pregnant women between the 18th and 20th week of pregnancy: <ul style="list-style-type: none"> • 46 yoga, 60 minutes, three times per week, 12 weeks; • 47 walking, 60 minutes walking twice per day, 12 weeks. 	Higher proportion of physiologically reduced thrombocytes concentrations during pregnancy and fewer high-blood pressure diseases in the yoga-practising group.
Satyapriya, 2013 (22)	105 low-risk pregnant women between the 18th and 20th week of pregnancy: <ul style="list-style-type: none"> • 53 yoga, 60 minutes, 60 minutes per day until delivery, • 52 guided exercise, 60 minutes per day, 16 weeks. 	Lower rates of anxiety and depression in the yoga-practising group.

Legend: IUGR: Intrauterine Growth Restriction, SGA: Small for Gestational Age.

meditation techniques. The total number of pregnant women included in the studies was 490. Two studies included pregnant women with elevated risk for perinatal complications, while the remaining three included healthy pregnant women at low risk. All five studies showed benefits of practising yoga during pregnancy, compared to other forms of physical activity. Table 2 details individual CONSORT quality indicators of the included studies. All the studies had well-defined measures for inclusion and exercise procedures (practising yoga and physical activity in the control group); however, because of other methodological weak points (e.g. poorly defined primary and secondary results), the bias risk remains high.

4 Discussion

Many observational studies point to yoga being a beneficial and safe form of physical activity during pregnancy (14,15). In the past two decades, there have been 20 randomized studies that have confirmed this (18-37). However, most of these studies compared practising yoga during pregnancy with standard prenatal care (23-37). Only five of the randomized studies published until today have compared the effects of practising yoga during pregnancy with the effects of other types of physical activity (18-22).

In none of the studies did the researchers notice any adverse side effects of practising yoga, while in all of them, the

Table 2: Analysis of the quality of randomized studies that compared the effects of yoga with the effects of other types of physical activity during pregnancy according to Consolidated Standards of Reporting Trials guidelines. Summarized from Babbar S, et al (17).

Section/Topic	Item no.	Checklist item	Proportion of included studies that met the quality indicator
Title and abstract			
	1a	Identification as a randomised trial in the title.	40%
	1b	Structured summary of trial design, methods, results, and conclusions.	80%
Introduction			
Background and objectives	2a	Scientific background and explanation of rationale.	100%
	2b	Specific objectives or hypotheses.	60%
Methods			
Trial design	3a	Description of trial design (such as parallel, factorial) including allocation ratio.	100%
	3b	Important changes to methods after trial commencement (such as eligibility criteria), with reasons.	/
Participants	4a	Eligibility criteria for participants.	100%
	4b	Settings and locations where the data were collected.	100%
Interventions	5	The interventions for each group with sufficient details to allow replication, including how and when they were actually administered.	100%
Outcomes	6a	Completely defined pre-specified primary and secondary outcome measures, including how and when they were assessed.	0%
	6b	Any changes to trial outcomes after the trial commenced, with reasons.	/
Sample size	7a	How sample size was determined.	80%
	7b	When applicable, explanation of any interim analyses and stopping guidelines.	/
Randomization			
Sequence generation	8a	Method used to generate the random allocation sequence.	80%
	8b	Type of randomization; details of any restriction (such as blocking and block size).	100%
Allocation concealment mechanism	9	Mechanism used to implement the random allocation sequence (such as sequentially numbered containers), describing any steps taken to conceal the sequence until interventions were assigned.	
Implementation	10	Who generated the random allocation sequence, who enrolled participants, and who assigned participants to interventions.	60%
Blinding	11a	If done, who was blinded after assignment to interventions (for example, participants, care providers, those assessing outcomes) and how.	60%
	11b	If relevant, description of the similarity of interventions.	60%
Statistical methods	12a	Description of statistical methods used.	100%
	12b	Methods for additional analyses, such as subgroup analyses and adjusted analyses.	/

Section/Topic	Item no.	Checklist item	Proportion of included studies that met the quality indicator
Results			
Participant flow	13a	For each group, the numbers of participants who were randomly assigned, received intended intervention, and were analyzed for the primary outcome (yoga or other type of physical activity).	80%
	13b	For each group, losses and exclusions after randomization, together with reasons.	80%
Recruitment	14a	Detailed description of the duration of the study.	100%
	14b	Described reasons for concluding the study early.	/
Baseline data	15	A table showing baseline demographic and clinical characteristics for each group.	100%
Numbers analysed	16	For each group, number of participants (denominator) included in each analysis and whether the analysis was by original assigned groups.	100%
Outcomes and estimation	17a	For each primary and secondary outcome, results for each group, and the estimated effect size and its precision (such as 95% confidence interval).	80%
	17b	For binary outcomes, presentation of both absolute and relative effect sizes is recommended.	80%
Additional analyses	18	Results of any other analyses performed, including subgroup analyses and adjusted analyses, distinguishing pre-specified from exploratory.	/
Harms	19	All important harms or unintended effects in each group.	0%
Discussion			
Limitations	20	Trial limitations, addressing sources of potential bias, imprecision, and, if relevant, multiplicity of analyses.	100%
Generalisability	21	Generalisability (external validity, applicability) of the trial findings.	100%
Interpretation	22	Interpretation consistent with results, balancing benefits and harms, and considering other relevant evidence.	100%
Other information			
Registration	23	Registration number and name of trial registry.	0%
Protocol	24	Where the full trial protocol can be accessed, if available.	0%
Funding	25	Sources of funding and other support (such as supply of drugs), role of funders.	20%

beneficial effects were higher than in other types of physical activity (18-22). Pregnant women who practised yoga stated that they felt better and had fewer mental disorders (18,19,22). They felt anxiety and depression less frequently and, in general, self-reported higher quality of life (18,19,22). Rakshani et al. and Jayashree et al. also

notice lower rates of perinatal complications in the yoga-practising group (20,21). Compared to the pregnant women who were included in the programme of regular walking, in the yoga group there have been fewer hypertensive diseases of pregnancy, fewer cases of gestational diabetes, IUGR and fewer premature births (20,21). It is

not completely understood through which mechanisms practising yoga during pregnancy could result in improved perinatal outcomes compared to other forms of physical activity. One of the potential advantageous effects of yoga is its beneficial effect on the autonomous nervous system. It significantly contributes to physiological cardiorespiratory and other changes in pregnancy. Consequently, the benefits of yoga on the activity of the autonomous nervous system could be key for reducing the onset of perinatal complications. This is also supported by the study by Satyapriya et al., who established increased parasympathetic activity after yoga practice (19). Increased parasympathetic activity after yoga practice was significantly higher than after guided exercise (19). Increased activity of the parasympathetic system has been proven to reduce excretion of proinflammatory cytokines, therefore inhibiting the neuroendocrine immunomodulatory pathways that can lead to various perinatal complications (38,39).

It is also important to emphasize a few weaknesses in the included studies. These were smaller studies with quite a few methodological shortcomings. These were also revealed in our analysis

of quality indicators, as defined in the CONSORT guidelines. Along with the methodological limitations, it also has to be taken into account that, so far, all the randomized studies that compared yoga practice during pregnancy with other types of physical activity were conducted in India. A different perspective on practising yoga in Indian society could have affected the above results. In order to be able to claim with greater certainty that practising yoga during pregnancy is more beneficial than other physical activities, bigger, well-designed randomized studies will be needed. However, based on the available references, we can already ascertain that yoga is justifiably among the most recommended physical activities for pregnant women.

5 Conclusion

Yoga is a safe form of physical activity during pregnancy with numerous positive effects on maternal and foetal health. Data from small randomized trials also suggest potential superiority of prenatal yoga compared to other forms of physical exercise currently recommended for pregnant women.

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