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Hatha Yoga vs Prenatal gymnastic: The Perfect Choice to Reduce Stress and Improve Health for Primigravid

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ABSTRACT

Abstract: Pregnancy is a critical period involving significant physiological and psychological changes, particularly in primigravida women who are more susceptible to anxiety and stress. Elevated stress levels during pregnancy may increase the risk of complications like high blood pressure, preeclampsia, and premature delivery. Non-pharmacological interventions like Hatha Yoga and gymnastic prenatalhave been widely recommended to improve maternal well-being. The purpose of this research was to evaluate and compare the impacts of two different interventions on maternal psychological and physiological health through a Systematic Literature Review (SLR) conducted in accordance with PRISMA guidelines. Relevant literature was retrieved from databases including Pubmed, Scopus, ScinceDirect, Google Scholar, focusing on research published between 2014 and 2024. The findings indicate that Hatha Yoga is more effective in reducing anxiety, cortisol levels, and systolic blood pressure, while prenatal gymnastic better supported diastolic blood pressure regulation and physical endurance for labor. Both interventions contribute to better cardiovascular function, increased oxygen saturation, and a smoother labor process. Additionally, yoga is associated with improved neonatal outcomes, while studies on prenatal exercise's effects on newborn health remain limited. Future research should explore the long-term effects and key differences between these interventions to determine the most effective approach for maternal and neonatal health. These findings support integrating yoga and gymnastic prenatalinto antenatal care programs to enhance pregnancy outcomes.

Keywords: Hatha Yoga; Prenatal Gymnastic; Pregnancy; Stress Reduction; Maternal Health.

Introduction

Pregnancy is a crucial phase in a womans's life that involves significant physical, psychological, and social changes. The substantial hormonal shifts during pregnancy often lead to emotional instability, particularly in primigravida women experiencing their first pregnancy. Studies indicate that up to 68% of primigravida women experience anxiety, commonly associated with fears about childbirth, concerns for the baby's health, and changes in body image [1]. This instability is further compounded by the high prevalence of antenatal stress, reported to reach 75% among primigravida women in Indonesia [2]. When not properly managed, these conditions may heighten the likelihood of pregnancy-related complications, such as high blood pressure, preeclampsia, premature birth, and the potential need for interventions like cesarean delivery[3], [4].

To assist pregnant women in overcoming these challenges, non-pharmacological approaches such as yoga and gymnastic prenatalhave been widely developed. Yoga, particularly Hatha yoga, is recognized as a holistic therapy combining breathing exercises, meditation, and body postures that help pregnant women achieve physical and mental balance. Studies have shown that yoga significantly reduces cortisol levels, the primary stress hormone, while improving systolic blood pressure and oxygen saturation in pregnant women [5]. Meanwhile, prenatal exercise, which is part of antenatal care programs in Indonesia, has also proven effective in reducing stress, increasing muscle flexibility, and teaching breathing techniques beneficial for childbirth [6].

Although the benefits of these interventions have been extensively studied, direct comparisons of the effectiveness of Hatha yoga and gymnastic prenatal are still limited. This study is particularly significant as both interventions hold the potential to help pregnant women navigate their pregnancies effectively, enabling them to approach labor with greater confidence and optimal preparedness. The primary goal of this study is to evaluate and compare the effects of Hatha yoga and prenatal gymnastics on critical outcomes, including labor duration, the probability of a vaginal delivery without cesarean intervention, and the overall health of both the mother and the newborn.

The urgency of this research is further supported by data showing that high stress levels during pregnancy significantly affect the health of both mother and fetus, potentially leading to a higher likelihood of medical interventions during childbirth and other complications [7]. Therefore, this study is expected to provide practical contributions in the form of evidence-based recommendations for more effective physical activity interventions, as well as theoretical contributions to support the growth of evidence-based midwifery science.

Methods

This study utilizes a Systematic Literature Review (SLR) method guided by the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework. Relevant literature was gathered from databases including PubMed, Scopus, ScienceDirect, and Google Scholar through the use of specific keyword combinations, including "Hatha yoga," "prenatal gymnastics," "maternal psychological health," and "maternal physiological health." The included articles were primary studies published within the last ten years (2014–2024), in English or Indonesian, and discussed the impact of Hatha yoga or prenatal gymnastics on the mental and physical well-being of first-time pregnant women. Articles deemed irrelevant, incomplete, or categorized as reviews or editorials were excluded from the analysis. The article selection process was conducted in two stages: first, title and abstract screening to determine relevance, followed by a full-text review for an in-depth evaluation of the content. Extracted data included study characteristics (authors, year, location), type of intervention (Hatha yoga or prenatal gymnastics), measurement methods, and main outcomes related to psychological and physiological health to support a healthy pregnancy and facilitate a normal and smooth delivery process, ensuring the health of both mother and baby. The quality of the articles was evaluated using the Joanna Briggs Institute (JBI) Critical Appraisal Tools to guarantee the credibility and consistency of the research results. Descriptive analysis was employed to explore prevailing patterns, highlight research gaps, and compare study outcomes. Where feasible, a meta-analysis was performed to quantify the effectiveness of the interventions using statistical software. The findings are presented in narrative form, accompanied by by summary tables and a PRISMA diagram to transparently illustrate the article selection phase.

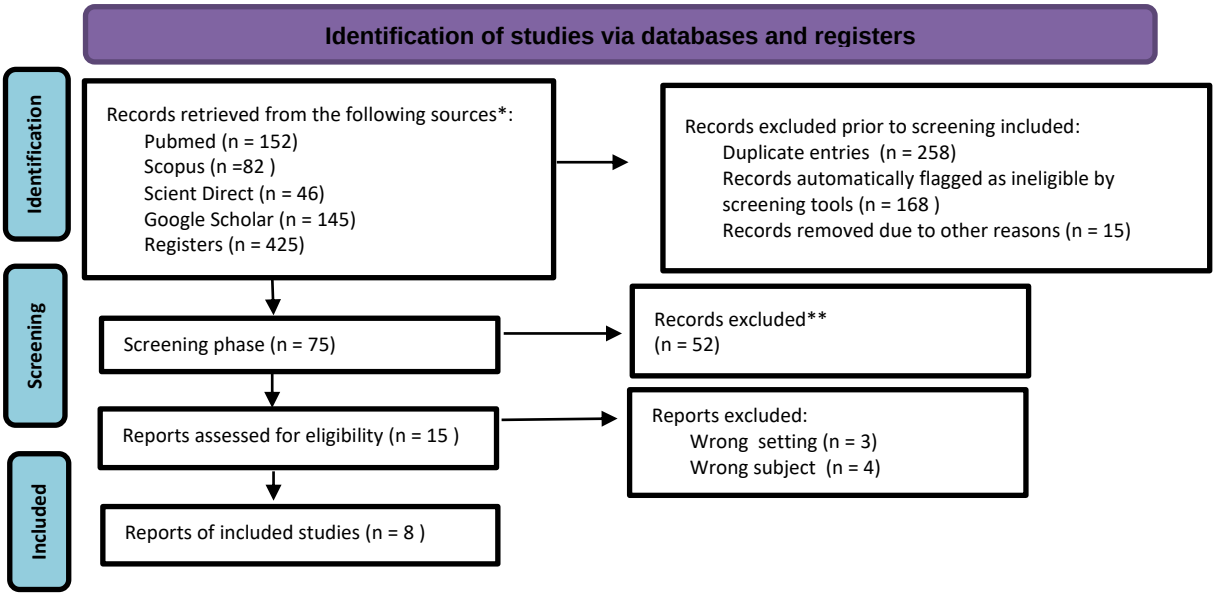

Figure 1 **Prisma Flow Chart**

Results and Discussion

Table 1 The characteristic of the article

Author, year, and country	Sample size	Design study	Intervention/ duration	Outcome measures	result
Bershadsky et al (2014), USA	38 primipara Gestational age 12-19 weeks	mixed design involving within-subject and between-subject approaches.	Prenatal hatha yoga / 90 minute yoga session	Cortisol levels, Affects Balance Scale (DABS), The CES-D short form consisting of 9 items for measuring depressive symptoms	Decreased salivary cortisol levels and depression
Newham et al (2015), English	51 primiparas (yoga group 29, control group 22). Gestational age 20-24 weeks.	2 (group) × 2 (time point) factorial design with a 1:1 random allocation ratio	Hatha yoga/1x per week, duration 60 minutes for 8 weeks	WDEQ (Womb Fear Questionnaire), The Trait and State subscales of the State-Trait Anxiety Inventory (STAI-T and STAI-S), along with the Edinburgh Postnatal Depression Scale (EPDS)	Reduction of anxiety and depression
Dewi et al (2016), Indonesia	26 Primigravida trimester III	Quasy-experimental	Combination of yoga and gymnastic prenatal/ 60 minutes per session for 3 weeks	Cortisol levels declined more in the intervention group (−209.67 ng/ml) than in the control group (−129.96 ng/ml), with a shorter first stage of labor observed in the intervention group	Decreased plasma cortisol levels
Hamdiah et al, (2017)	39 Primigravida	Quasy-experimental	Hatha yoga	Hamilton Anxiety Rating Scale (HARS),	Decreased anxiety and

Author, year, and country	Sample size	Design study	Intervention/ duration	Outcome measures	result
				Blood pressure, Fetal Heart Rate (FHR)	systolic blood pressure, DJJ
Mohyadin et al (2020), Iran	84 nulliparous women (42 interventions, 42 control women). Intervention began at 26 weeks – 37 weeks of gestation.	Randomized Control Trial (RCT)	Hatha Yoga / 60 minutes each session per 2 weeks for 12 weeks	Anxiety was measured using the STAI, pain with the VAS, and labor duration was recorded by stage	Decreased anxiety, labor pain, and labor duration
Yekefallah et al (2021), Iran	70 nulliparas, regular yoga from 26 weeks to 37 weeks of pregnancy	Clinical trials	Hatha yoga / 75 minutes each yoga session done 2 times per week for 12 weeks	Maternal outcomes and neonatal outcomes	Labor process and birth outcomes
Susanti et al (2024), Indonesia	15 pregnant women	Quasy-experimental	Prenatal gymnastic/ 2x/ week for 4 weeks	Hamilton Anxiety Rating Scale (HARS)	Anxiety reduction
Maya (2017), Indonesia	30 Primigravida from 24-30 weeks	Quasy-experimental	Pregnancy gymnastic/2 times per month for 2 months	Maternal and neonatal outcome	Labor process

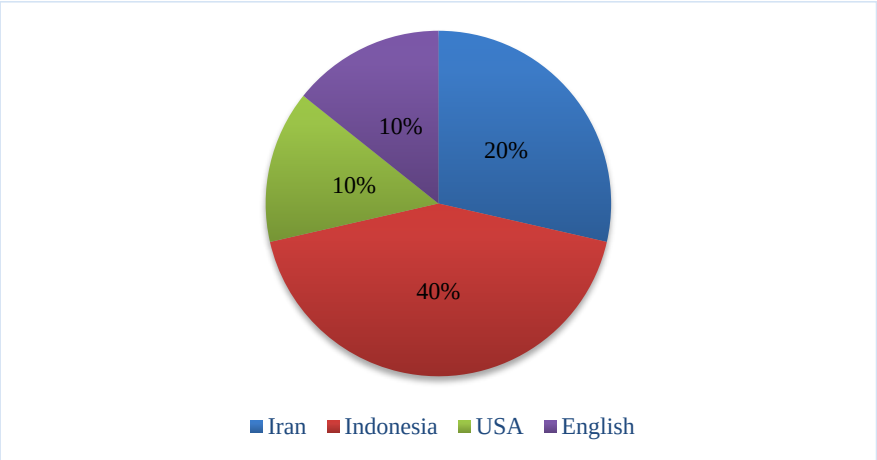

Figure 2 **Demography of the article**

After a comprehensive search using the identified keywords, seven relevant studies were included in this literature review. Among them, four used quasi-experimental designs, one was a clinical trial, and three were Randomized Controlled Trials (RCTs). The studies included in this review, published from 2014 to 2024, were carried out in several countries such as the United States, the United Kingdom, Indonesia, and Iran. Table 1 outlines a summary of these studies, highlighting their designs, sample sizes, interventions, measured outcomes, and main results. These studies primarily examined the impact of hatha yoga and prenatal gymnastics practice on physiological and psychological factors such as cortisol levels, anxiety, depression, blood pressure, fetal heart rate, labor pain, and labor duration.

The results suggest that Hatha yoga and prenatal gymnastic are both beneficial for pregnant women but have different effects. Hamdiah et al. (2017) found that yoga led to a significant reduction in anxiety levels ($p = 0.005$) and systolic blood pressure ($p = 0.045$), along with a notable improvement in fetal heart rate ($p = 0.010$)[8]. In contrast, Hernawati et al. (2017) reported that prenatal gymnasticmainly lowers diastolic blood pressure ($p=0.014$) without affecting systolic blood pressure [9].

Regarding stress regulation, Bershadsky et al. (2014) and Dewi et al. (2016) found that yoga, especially when combined with prenatal gymnastic, significantly reduces cortisol levels [10], [11]. Psychologically, Newham et al. (2015) and Mohyadin et al. (2020) found that hatha yoga lowers anxiety and depression, reduces labor pain, and shortens labor duration [12], [13]. Similarly, Susanti et al. (2024) reported that prenatal gymnastic reduces anxiety, but yoga appears to provide more consistent emotional benefits [14]. For labor outcomes, Yekefallah et al. (2021) and Mohyadin et al. (2020) highlighted yoga's role in improving the labor process and neonatal outcomes [12], [15]. Aminah Maya (2019) found that prenatal gymnasticshortened labor duration (10.73 ± 1.1 hours vs. 11.93 ± 1.3 hours, $p=0.014$), but its effects on neonatal outcomes were not studied [16].

Overall, hatha yoga is more holistic, incorporating physical, emotional, and hormonal benefits, while prenatal gymnasticfocuses on physical fitness and blood pressure regulation. Research suggests yoga has broader impacts, making it a more effective option for maternal and fetal well-being.

Cardiovacular

The Ministry of Health recommends that pregnant women regularly practice gymnastic prenataland yoga, with a total training duration of 150 minutes per week, which can be divided into 30-minute sessions five times a week or 20-30 minutes daily [17]. This recommendation aligns with evidence highlighting the cardiovascular benefits of prenatal physical activity. It has positive effects on the maternal cardiovascular system, particularly in regulating blood pressure, improving blood circulation, and optimizing oxygen saturation [18]. Hatha yoga and prenatal gymnastichave different effects on blood pressure.

Hatha Yoga has been shown to reduce systolic blood pressure ($p=0.045$) but does not significantly affect diastolic blood pressure ($p=0.586$) [8]. In contrast, prenatal gymnasticis more effective in lowering diastolic blood pressure ($p=0.014$), indicating that it helps improve blood vessel elasticity and reduce vascular resistance [9]. This effect is crucial in preventing pregnancy-induced hypertension, which poses a substantial risk to maternal and fetal health. Additionally, regular physical activity supports better blood circulation, ensuring a more efficient distribution of oxygen and nutrients to vital organs, including the uterus and placenta [19]. The movements in prenatal gymnasticenhance venous return, which improves blood flow back to the heart and reduces the risk of edema or swelling in pregnant women [20]. Meanwhile, hatha yoga focuses on breathing techniques, allowing for better oxygenation, which helps prevent hypoxia or oxygen deficiency that may affect fetal development[21].

In relation to oxygen saturation, Hatha yoga appears to be more effective in improving blood oxygen levels compared to other interventions, as its breathing techniques optimize oxygen exchange in the lungs. Prenatal gymnastic can also improve oxygen levels, but its effects are more related to enhancing heart and lung capacity rather than the direct breathing mechanisms emphasized in yoga. Thus, both exercise methods play a crucial role in maintaining maternal cardiovascular health, ultimately supporting a healthier pregnancy and a smoother labor process [22], [23].

Physiological Health in Pregnant Women

Research reports that pregnant women experiencing stress are more vulnerable to gestational diabetes (GD) and childbirth complications, including assisted delivery and cesarean section (SC)[24]–[26]. Psychological stress is correlated with an elevated risk of gestational hypertension and preeclampsia, which can be harmful to both the mother and the fetus [27]. If left untreated, these conditions may progress to severe complications such as eclampsia, potentially leading to maternal and fetal mortality .

One of the main mechanisms linking stress to physiological changes in pregnant women is through the activation of the stress system, involving various neuroendocrine and cardiovascular pathways. Stress can affect the psychobiological response through the neuroendocrine, immunological, and cardiovascular systems [28], [29]. During pregnancy, the placenta produces CRH, which is released into the maternal and fetal bloodstream. Unlike cortisol's inhibitory effect on CRH in the brain, maternal cortisol plays a role in stimulating the production of corticotropin-releasing hormone (CRH) in the placenta, forming a positive feedback mechanism that significantly increases placental CRH levels throughout

pregnancy. While maternal cortisol can cross the placenta and reach the fetus, this process is partially limited by the placental enzyme 11β-HSD-2, which converts active cortisol into its inactive form, cortisone. However, as labor nears, the activity of this enzyme declines, enabling more maternal cortisol to pass through to the fetus, thereby contributing to the maturation of essential fetal organs such as the lungs. Meanwhile, the fetal HPA axis begins to develop early in pregnancy and becomes increasingly active as birth approaches [7].

Hatha Yoga is a form of yoga that emphasizes physical postures (asanas), controlled breathing (pranayama), and relaxation techniques. Its primary goals are to alleviate stress, enhance physical flexibility, and promote harmony between the body and mind. Hatha Yoga can provide a deeper relaxation effect compared to regular physical exercises, making it an excellent choice for enhancing psychological well-being during pregnancy. Prenatal gymnastic is a physical workout specifically designed for pregnant women to improve fitness and prepare the body for childbirth. This exercise emphasizes gentle movements, stretching, and breathing techniques that support the birthing process. The primary focus of prenatal exercise is to improve posture, reduce back pain, and increase the stamina of pregnant women throughout pregnancy. It is more closely related to physical fitness and preparing the body to face the challenges of labor. Research highlights that yoga, which focuses on deep breathing and relaxation, can reduce allostatic load—the body's effort to maintain internal homeostatic stability under stress [30]. This process involves three major stress-reactive systems:

a. Autonomic Nervous System (ANS)
   Involuntary functions like heartbeat and breathing are managed by the autonomic nervous system (ANS). During stress, the sympathetic nervous system (SNS) becomes overactive, triggering a "fight or flight" response. Yoga helps balance the ANS by enhancing the parasympathetic nervous system (PNS), which calms the body and restores it to a relaxed state.
b. Hippocampus-Pituitary-Adrenal (HPA) Axis
   The Hypothalamic-Pituitary-Adrenal (HPA) axis, which consists of the hypothalamus, pituitary gland, and adrenal glands, is essential in managing the body's response to stress by controlling the secretion of stress-related hormones, including cortisol. Chronic stress can lead to excessive HPA axis activation, which negatively impacts health. Practicing yoga helps reduce this stress response and promotes hormonal balance.
c. GABAergic System
   Gamma-aminobutyric acid (GABA) serves as the main inhibitory neurotransmitter in the brain, functioning to suppress neuronal excitability and help alleviate anxiety. Stress can suppress GABAergic activity, leading to increased anxiety and mood disorders. Yoga affects brain areas associated with emotional regulation, including the prefrontal cortex, hippocampus, and amygdala, helping to restore GABA function and improve overall emotional well-being.

Maternal and neonatal outcome

This study not only explored the impact of physical exercise on maternal health, but also examined neonatal outcomes, such as APGAR scores and birth weight, which are important indicators in the assessment of newborn health.

The labor process and neonatal outcomes are influenced by the physiological and psychological conditions of the mother during pregnancy [31]. Physical exercises such as hatha yoga and prenatal gymnasticplay a role in accelerating labor by improving pelvic muscle elasticity, body flexibility, and breathing coordination, which helps mothers push more effectively [9], [15].. Hatha yoga has been shown to enhance parasympathetic activity, which helps reduce anxiety and increase the release of oxytocin, a hormone that stimulates uterine contractions [14]. Meanwhile, prenatal gymnastic supports better blood circulation, strengthens muscles involved in labor, and improves uterine muscle coordination, thereby shortening the active phase of labor and reducing the likelihood of medical interventions such as assisted delivery [22], [32].

In addition to facilitating labor, physical exercise also contributes to better neonatal outcomes [33]. Mothers who engage in regular physical activity during pregnancy tend to have better lung capacity, which enhances oxygen saturation for the fetus and reduces the risk of hypoxia during labor. Furthermore, physical exercise helps maintain optimal birth weight, lowering the risk of low birth weight (LBW) [34], which can increase the likelihood of postnatal complications. Additionally, babies born to mothers who exercised regularly during pregnancy tend to have higher APGAR scores, indicating better physiological adaptation after birth, including stable breathing, muscle tone, and heart rate [35].

Thus, physical exercise during pregnancy, whether in the form of hatha yoga or prenatal gymnastic, provides significant benefits in promoting smoother

labor and better neonatal outcomes [36]. By improving relaxation, respiratory function, and blood circulation, these exercises can shorten labor duration, enhance maternal well-being, and support the overall health of newborns [37].

Conclusion

This review shows that Hatha Yoga is more effective in reducing anxiety, cortisol levels, and systolic blood pressure, while gymnastic prenatalplays a greater role in regulating diastolic blood pressure and enhancing physical endurance for labor. Both interventions improve maternal well-being, cardiovascular function, and oxygen saturation, contributing to a smoother labor process. These findings support the integration of yoga and gymnastic prenatalinto antenatal care programs for improved pregnancy outcomes.

Hatha yoga helps shorten labor duration and enhance uterine contractions, while gymnastic prenatalstrengthens muscles for childbirth, potentially reducing medical interventions. However, yoga is more closely associated with better neonatal outcomes, while research on the effects of gymnastic prenatalon newborn health remains limited.

Future research should explore the long-term effects and key differences between these two interventions to determine the most effective approach for supporting maternal and neonatal health. These findings support the integration of yoga and gymnastic prenatalinto antenatal care programs for improved pregnancy outcomes.

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