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The effect of prenatal yoga on maintaining the childbirth process in a physiological state in Indonesian mothers

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Abstract

Background: Yoga is a non-pharmacological intervention that enhances maternal strength and flexibility while improving the mother's capacity to adapt to physiological changes and labor responses. This study aimed to evaluate the effect of prenatal yoga on the duration of the first, second, and third stages of labor, as well as blood volume during the fourth stage of labor.

Methods: A quasi-experimental study was conducted involving 92 pregnant women in their third trimester who presented no complications and exhibited low-risk factors. The participants were assigned to either the yoga intervention group or the control group using a simple random sampling method. The intervention group engaged in yoga sessions lasting 30 min, conducted over eight weeks, beginning at 30 weeks of gestation. In contrast, the control group received routine standard care without any yoga intervention. The durations of the first, second, and third stages of labor as well as blood volume during the fourth stage, were analyzed between the intervention and control groups using independent t-test and Mann-Whitney U test, with a significance level of p <0.05.

Results: The study revealed a significant difference in the duration of the first (p=0.004) and second stages (p=0.0001) of labor, as well as in the bleeding volume during the fourth stage of labor (p=0.0001) between the yoga intervention group and the control group. However, no significant difference was observed in the duration of the third stage of labor (p=0.234).

Conclusion: Prenatal yoga during the third trimester of pregnancy may help maintain physiological conditions during the first and second stages of labor and reduce the risk of bleeding.

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Highlights

What is current knowledge?

Practicing prenatal yoga weekly during the last trimester of pregnancy may reduce the risk of bleeding and promote physical well-being during labor.

What is new here?

Consistent yoga practice that incorporates breathing techniques, meditation, and relaxation throughout pregnancy may provide physical and psychological benefits during the perinatal period, particularly during labor.

Introduction

Labor is a physiological process in a woman in which the fetus is expelled from the uterus into the outside world. Uncontrolled labor pain can cause damage to the mother and fetus. Not only medical treatments such as epidural analgesia but also complementary or alternative methods like relaxation have been reported to reduce pain during labor (1). Traditional complementary and alternative medicine (TCAM) encompasses a wide range of health practices and products that are not normally included in the 'mainstream medicine' system, and it is widely used by the public (2). TCAM products and therapies can be used in conjunction with or instead of traditional medical approaches, and some have been linked to adverse responses or other problems (3). Prenatal yoga, as a complementary and alternative therapy, affects improving birth outcomes (4). Yoga involves taking deep breaths (Pranayama), stretches and postures (Asanas), and meditation that unites the mind, body, and spirit (5). According to a study, yoga is effective in reducing stress, anxiety, depression, and chronic pain syndromes, such as arthritis, chronic low back, migraine headaches, as well as chronic conditions in adults (6).

Besides, yoga is one of the non-pharmacological methods that increase the mother's strength and flexibility while increasing the mother's ability to adjust to her body and labor response (7,8). During childbirth, there is a physiological increase in catecholamine production, which decreases the strength, length, and coordination of uterine contractions (9). Yoga can help reduce pain during labor and fear, increase self-confidence, and develop coping skills (10). There were no adverse effects for the mother and baby in doing yoga asana practice in pregnant women (11). Yoga during pregnancy can provide physical, spiritual, and mental readiness for childbirth (12). In addition, pregnancy yoga has positive effects on anxiety, depression, perceived stress, delivery method, and duration of labor (13). Yoga has gained popularity as a workout regimen among adults, especially pregnant ones, as it is believed to promote and preserve physical and mental well-being. A previous study in Germany found that 88% of participants rated their health as improved since starting yoga. Furthermore, the perceived health benefits of yoga were the driving forces behind yoga practice in the US and Australia, where it was found to be an effective multi-component health intervention (14).

Yoga is a common prenatal exercise that has positive health effects on pregnancy (15). In addition, yoga can develop and maintain a healthy mind during pregnancy, labor, postpartum, and breastfeeding (16). According to the evidence, yoga has beneficial effects on pregnant women, including decreasing stress, anxiety, discomfort, sleep disturbances, pain during labor, and sympathetic tone, as well as improving sympathovagal balance and quality of life in pregnancy (16-21). We hypothesize that practicing yoga during the third trimester of pregnancy may reduce the duration of labor, with the labor process typically concluding without the need for operative intervention or hemorrhage. Therefore, the objective of this study was to examine the effects of prenatal yoga on the duration of phases I, II, and III of the childbirth process, as well as the incidence of hemorrhage in phase IV of labor.

Methods

This was a quasi-experimental study conducted in five Midwife Practice Clinics in Palembang City, Indonesia from March to November 2022. In this study, 92 pregnant women in the third trimester who visited an independent obstetric clinic in Palembang were recruited as participants and subsequently divided into two groups: the yoga intervention group (46 women) and the control group (46 women). Yakefallah et al. (2021) reported the mean of labor duration in the yoga and control groups was 3.1±0.96 and 4.91±1.53, respectively (22). Therefore, by taking into account the confidence interval (CI) of 95% (α=0.05) and the study power of 90% ($Z1\text{-}\beta = 1.28$); ($Z1\text{-}\alpha = 1.96$); $\mu2 - \mu1 = 1.68$; $\mu2 - \mu1 =$ *the desired average difference detected was* 1.68. The following formula was used to calculate the sample size:

$$n = \frac{\sigma^2 (Z_{1-\alpha} + Z_{1-\beta})^2 \cdot n}{(\mu_2 - \mu_1)^2}$$

$$n = \frac{(2{,}49^2)(1{,}96 + 1{,}28)^2}{(1{,}68)^2} = 40.62$$

To avoid the dropout, we added 10% to the sample size (n= 46).

The randomization ratio was considered 1:1 at first, then due to high sample dropout, in two groups, the sampling process continued until the final sample size in each group was obtained. The participants were divided into the yoga intervention group and the control group using a simple random sampling method. The inclusion criteria were the absence of pregnancy complications, no multiple gestations (Twins), being multigravida, and no history of preterm labor, as well as willingness to sign informed consent. Additionally, the participants were required to be pregnant at a gestational age of at least 30 weeks. In addition, women who did not attend a certain number of yoga sessions or who experienced complications during the intervention were excluded from the study. Finally, women who labored before 32 weeks of gestation were excluded.

Prenatal yoga intervention was given for at least eight weeks, i.e., from the mother's gestational age of 30 weeks to birth. Before the intervention, all participants underwent anamnesis, obstetric examinations, and vital signs check. Furthermore, all intervention group participants took yoga for 30 min every week in the morning in the independent midwives' practice clinic or office. The yoga intervention consisted of breathing techniques, meditation, and relaxation (17,18). Competent yoga instructors were assigned to guide the intervention. In addition, before doing yoga, each participant was given training in yoga techniques so that the risk of injury or complications due to the intervention was controlled. After completing the yoga practice intervention, we observed each participant's delivery process.

The partograph sheet was an instrument used to collect data for this research. All participants who were part and had signs of labor were observed during the first phase of the active phase or the opening of 4 cm until complete. Furthermore, the duration of phase II was assessed from the appearance of symptoms of stage II, such as the urge to push, spontaneous rupture of membranes, complete cervical dilation, and when the head was visible at the vulva with a diameter of 3-5 cm. The duration of phase III is calculated from the birth of the baby's entire body until the complete release of the placenta. Furthermore, IV bleeding was measured by storing blood in a Nierbeken device with a capacity of 500 ml. A Nierbeken was placed directly in front of the vulva for two hours.

The assessment included observations made during stages I, II, and III and measuring the status of bleeding in stage IV of labor. The categories in the first period were assessed for a duration in hours, in min for stages II and III, and then the bleeding volume of stage IV in ml.

The data were then entered into SPSS version 21 (SPSS Inc., Chicago, IL, USA). Descriptive parameters such as mean and standard deviation (SD) were used, and the Shapiro-Wilk test was applied to assess the normality of the data. The Mann-Whitney U test and independent t-test were used due to the data. The significance level of all statistical tests was set at 0.05.

Results

The intervention group exercised yoga weekly during the third trimester until before delivery. Furthermore, in both intervention and control groups, we made observations during the delivery process by a midwife (Table 1). Table 1 shows that the first phase of labor in the intervention group had a mean±SD of 4.91±1.24 hours and a CI of 95% ranging from 4.54 to 5.28 hours. In addition, the control group's first phase of labor duration was determined at 3.98±1.76 hours on mean±SD, with a CI of 95% from 3.45 to 4.50 hours. Furthermore, it was discovered that the yoga intervention and control groups had significantly different first labor periods (p=0.004).

Table 1. Differences in the duration of phase I, II, and III of labor between yoga intervention and control groups (n=92)

Variables	Group	Mean	SD	CI 95%		P-value Mann-Whitney U test
				Lower	Upper	
Phase I	Yoga	4.91	1.24	4.54	5.28	0.004*
	Control	3.98	1.76	3.45	4.50	
Phase II	Yoga	36.00	24.50	28.74	43.29	0.0001*
	Control	60.87	30.79	51.73	70.01	
Phase III	Yoga	32.67	6.43	30.76	32.72	0.234
	Control	37.95	6.61	35.92	37.86	

*Significance level at p < 0.05

In the second stage of labor, it was found that the mean±SD between the yoga intervention and the control groups was 36±24.50 and 60.87±30.79 min, as well as the 95% CI, was 28.74 to 43.29 min and 51.73 to 70.01, respectively. In addition, there was a significant difference in the duration of the second stage of labor between the yoga intervention and the control groups (p <0.001). However, there was no significant difference in the duration of the third stage of labor between the yoga intervention and the control groups (p >0.05).

Moreover, the mean±SD duration of phase III labor in the yoga intervention group was 32.67±6.43 min, and the difference in CI of 95% was 30.76 to 32.72 min. In addition, in the control group, the mean±SD duration of stage III was 37.95±6.61 min, with a 95% CI ranging from 35.92 to 37.86 min (Table 1). The bleeding volume in phase IV was significantly lower in the intervention group compared to the control group (p=0.0001), with a mean difference of -52.826 ml and a 95% CI ranging from -79.851 to -25.800 ml (Table 2).

Table 2. Differences in bleeding volume in phase IV of labor between yoga intervention and control groups (N=46)

Variable	Mean difference	CI 95%		P-value Independent t-test
		Lower	Upper	
Bleeding volume	-52.826	-79.851	-25.800	0.0001*

*Significance level at p < 0.05

Discussion

The study found a notable difference in the lengths of the first and second stages of labor, as well as in the amount of bleeding during the fourth stage, between the yoga intervention and the control groups. However, there was no significant difference in the duration of the third stage of labor. Childbirth is a challenging experience for many women, especially for nulliparous women who give birth to their first child without preparation for childbirth or attending practicing techniques to reduce pain during labor (23).

Yoga is emerging as an alternative approach for managing labor pain, besides alternative therapies such as acupuncture, hypnosis, exercise during pregnancy, hydrotherapy, transcutaneous electrical nerve stimulation, massage, and relaxation techniques (24). Among various types of yoga, 'energy yoga' can be applied to pregnancy and childbirth. Special training in breathing changes consciousness, relaxation, acceptance of the world, and inner peace. The study showed that women who practiced yoga during mid- and late-pregnancy experienced less labor pain and a significantly shorter duration of labor (22). In addition, among the various types of yoga, 'energy yoga' can be applied to pregnancy and childbirth (25). Special training in breathing changes consciousness, relaxation, acceptance of the world, and inner peace (26).

A previous study on yoga practice during pregnancy aligns with our research that found a higher level of maternal comfort during labor, shorter duration of stages I and II of the total labor time, and increased comfort two hours after delivery (27). Besides, yoga during pregnancy can help reduce pain during labor and improve the adequacy of labor (28). Yoga provides an opportunity to enhance the mother's posture and strengthen important muscle groups in the labor process, such as the back, abdomen, and pelvic floor (29). It can strengthen women during labor and support their ability to maintain appropriate levels of function (25). Prenatal yoga effectively reduces pain and duration of labor for the first, second, and third stages of mothers with appropriate application standards (30).

Childbirth is a very stressful time for many women, especially for those who have given birth to their first child without preparation for childbirth (31). Adequate techniques are needed to improve maternal comfort and reduce pain in childbirth. Practicing yoga during pregnancy can reduce women's anxiety during labor, shorten the stages of labor, and lower labor pain. The duration of the first phase of labor and the total duration of the first, second, and third stages of labor were significantly reduced in the yoga group (28).

Doing yoga during pregnancy can reduce maternal anxiety during labor, shorten the stages of labor, and reduce labor pain. The duration of the first phase of labor and the total duration of the first and second phases of labor were significantly reduced in the yoga group. This is in line with a previous study that stated the duration of the second and third stages was considerably shorter in the intervention group (32). Yoga effectively reduces pain and labor duration in stages I, II, III, and total labor time. In line with the results of our study on the duration of the first and second phases of labor. However, there was no difference in the duration of the stage.

Practicing yoga during pregnancy can reduce women's anxiety during labor, shorten the stages of labor, and lower labor pain. The duration of the first phase of labor and the total duration of the first and second phases of labor were significantly reduced in the yoga group, similar to the results of Chantarapat's study who showed the duration of the second and third stages was considerably shorter in the intervention group (32). In addition, yoga effectively reduces pain and labor length in stages I, II, and III of labor and the total delivery time (33), which is in line with the results of our study on the duration of the first and second phases of labor. However, there was no difference in the duration of the stage (34).

In this study, it was demonstrated that in the yoga intervention group, the number of bleedings was less than in the control group, which may increase the comfort and readiness of the mother in facing the postpartum period and lactation. Previous studies have stated that practicing yoga during pregnancy can stimulate the release of endorphins that provide comfort to the body thereby stimulating the release of the hormone's prolactin and oxytocin for breast milk production (35). Yoga during pregnancy can contribute to the reduction of pain during childbirth and improve the adequacy of labor (22,36,37).

Yoga provides an opportunity to enhance the mother's posture and strengthen important muscle groups in the labor process, such as the back, abdomen, and pelvic floor (38,39). This can strengthen women during childbirth and support their ability to maintain appropriate levels of function (39). However, observation of maternal and infant welfare during pregnancy cannot be carried out due to the limited research time in conducting in-depth patient observations. Therefore, for further research, it is necessary to conduct a comprehensive study of the influence of yoga on the welfare of mothers and fetuses from pregnancy to childbirth. Moreover, the limitations of this study are the small sample size and study design. Therefore, it is recommended that further studies use clinical trial methodology, especially in homogeneous groups.

Conclusion

Prenatal yoga in the third trimester of pregnancy can maintain physiological conditions during labor in phases I and II and reduce the risk of bleeding. Furthermore, consistent yoga practice during pregnancy can positively impact both physically and psychologically duirng the perinatal phase. Our suggestion for further research is expected to consider adequate clinical trial research designs in groups of respondents who have homogeneous characteristics of parity, gestational age, maternal age, and obstetric history.

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Ethical statement

This study followed the rules of the World Medical Associations or the Helsinki Declaration, in addition to which participants signed informed consent forms. All ethical principles in human research were upheld, including the right to withdraw from the study, the protection of privacy, and the confidentiality of participants' personal information. This research has received approval from the ethics committee of the Palembang Health Polytechnic with approval number 0548/KEPK/Adm2/VI/2022.

Conflicts of interest

There was no conflict of interest in this study.

Author contributions

All authors were involved in research planning. All authors collected sample subjects, measured, and analyzed data, and prepared the original manuscript draft. Rohaya, Murdiningsih, and Ocktariyana supervised the work, helped collect samples, and gave suggestions and criticism. Rohaya and Ocktariyana provided ideas for the study, assisted in the interpretation of results, and revised and gave final approval of the manuscript. In addition, Yunetra Fancisca and Siti Hidun contributed to the collection of samples and data analysis. All authors read and approved the final manuscript.

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