RESEARCH
O&G Forum 2024; 34 – 3s: 1453-1457

IMPACT OF YOGA ON DURATION AND MODE OF DELIVERY, AND BIRTH WEIGHT OF NEWBORN

G.Sathiyabama.G[1*], Dr. S.Kalabarathi [2], Dr. Nidhi Sharma[3]
[1] Associate professor, Saveetha college of Nursing, SIMATS, Tamil Nadu, India. sathiyabama315@gmail.com, http//orchid.Org/0000-0002-7507-9919
[2] Principal, Saveetha College of Nursing, SIMATS, Tamil Nadu, India. principalnursing@saveetha.com
[3] Professor, Department of Obstetrics, Saveetha Medical College, SIMATS, Tamil Nadu. nidhisharma.smc@saveetha.com

Abstract
Background: Yoga during pregnancy has gained recognition for its potential benefits in enhancing maternal well-being, offering physical Health and mental relaxation through gentle postions, breathing Exercises, and meditation practices.
Objective: This study aimed to investigate the impact of yoga interventions on childbirth outcomes, focusing on labor duration, mode of delivery, and newborn birth weight.
Methods: This study was conducted at Saveetha Medical college and Hospital, (SMCH).Chennai, India, with 132 pregnant women meeting selection criteria from a pool of 212 antenatal care recipients. Participants were allocated to four groups: conventional management, yoga intervention, antenatal exercises, and a combination of yoga and exercises. The interventions were administered for 2 days a week over 16 continous weeks. Data on demographic characteristics, mode of delivery, duration of labor, and newborn birth weight were collected and analyzed using SPSS software. Statistical significance was determined at $p < 0.001$.
Results: Emphasize the most important distinctions in order to emphasize their significance and relevance to this discussion were observed among the groups in terms of mode of delivery ($\chi 2 = 23.1391$, $p = 0.000038$), with higher rates of natural childbirth observed in the yoga intervention groups. Primigravida women across all groups experienced significantly longer labor durations compared to multigravida ($F = 11.304$, $p < 0.001$). The combined yoga and exercise group showed the shortest labor durations, with post hoc analysis revealing significant differences in labor durations between groups. There were no appreciable variations in the newborn birth weight between the groups ($F = 1.414$, $p = 0.147$).The combined yoga and exercise group showed the shortest labor durations, with post hoc analysis revealing significant differences in labor durations between groups. There were no appreciable variations in the newborn birth weight between the groups ($F = 1.414$, $p = 0.147$).
Conclusion: Combined yoga and exercise intervention resulted in more vaginal deliveries and prolonged labor durations compared to yoga or exercise alone. Birth weight was not influenced by the interventions. Future studies should focus on high-risk populations to further strengthen evidence-based protocols integrating modern and ancient yoga techniques.
Keyword: Yoga, Pregnancy, Childbirth Outcomes, Labor Duration, Mode of Delivery, Neonatal Health.

INTRODUCTION

Yoga during pregnancy is increasingly recognized for its potential benefits in promoting maternal well-being. (1,2) its proved that the gentle postures, breathing techniques, and meditation practices offer physical and mental relaxation. (2) This ancient art or practice has gained popularity among expectant mothers worldwide as a holistic approach to support their journey through pregnancy. (3) However, while anecdotal evidence suggests positive outcomes, rigorous scientific inquiry into the specific effects of yoga on childbirth outcomes is warranted. The health of expectant mothers directly influences the mode of delivery and the well-being of newborns. Various factors, including Elderly primigravida and adolescent pregnancy , pre-existing health conditions, and lifestyle choices, place of delivery and medical support can impact childbirth outcomes. (4) These factors underscore the importance of comprehensive maternal care throughout pregnancy. Understanding the interplay between maternal health and delivery outcomes is essential for optimizing perinatal care and ensuring the best possible outcomes for both mothers and babies. Cultural beliefs and practices surrounding childbirth may influence birth outcomes. Understanding the complex interplay of these factors is essential for identifying opportunities to improve perinatal care and optimize outcomes for both mothers and babies. (5) Going by this, the Yogic practices are believed to enhance physical strength, flexibility, and mental well-being. (6,7) However, the specific mechanisms through which yoga influences maternal health and childbirth outcomes remain unclear. Investigating these mechanisms requires a nuanced understanding of the physiological, psychological, and social

factors involved in pregnancy and childbirth. (8) Understanding the rationale behind investigating the effects of yoga on childbirth outcomes is imperative. Given the rising interest in complementary and alternative medicine approaches during pregnancy, exploring the potential benefits of yoga becomes crucial. Moreover, with childbirth being a significant event in a woman's life, interventions that can positively influence delivery outcomes are of immense importance. (9) Investigating the impact of yoga on factors such as labor duration, mode of delivery, and newborn birth weight not only contributes to scientific knowledge but also holds promise for enhancing maternal and neonatal health care practices. Despite the increasing popularity of yoga during pregnancy, there remains a notable gap in scientific literature regarding its specific effects on childbirth outcomes. (2) While anecdotal evidence suggests positive impacts, rigorous scientific inquiry is essential to validate these claims. Addressing this research gap holds significance for both clinical practice and public health policy. By elucidating the potential benefits or limitations of incorporating yoga into prenatal care. The scope of this research encompasses investigating the effects of yoga on childbirth outcomes, specifically focusing on labor duration, mode of delivery, and newborn birth weight. The primary objectives include assessing the impact of yoga practices on these outcomes and elucidating any associations or correlations. Additionally, the study aims to explore potential mechanisms underlying these effects, providing valuable insights into the physiological and psychological pathways through which yoga may influence childbirth. By addressing these objectives, the we seek to contribute to a better understanding of the role of yoga in promoting maternal and neonatal health during the perinatal period.

MATERIALS AND METHODS

This study was conducted at Saveetha Medical College Hospital, (SMCH) Chennai, India.. The Saveetha Institute of Medical and Technical Sciences' institutional ethical committee gave its approval for the project. According to their familiarity, each participant signed an informed consent form in both their native Tamil and English. This study was a continuation of a clinical experiment that examined the effects of pranayama, dhyana, asana, and blood pressure on prenatal women' blood pressure, hemoglobin, blood glucose, and fetal heart rate.

2.1 Selection criteria

The samples who were part of the first phases were the samples selected for this phase. The samples were all antenatal mothers aged between 20 to 35 years who attended the study center and presented with 20 weeks of gestation currently with singleton fetus in the antenatal clinic and willing to undergo yoga practice and those who are planning to give birth at Saveetha Medical College and Hospital (SMCH). Antenatal mothers who are attending antenatal clinic for consultation and mothers who are seeking treatment during antenatal period at antenatal clinic, SMCH. Mothers with chances of high-risk pregnancy, history of psychiatric disturbances which may affect the interventional compliances, subjects with different religious thoughts and perceived Yoga from a religious background, pregnancy from in vitro fertilization, intrauterine growth restriction in any of the previous pregnancy, fetal abnormality on ultrasound scanning; and previous exposure to yoga or subjects with previous history of trauma while attempting to performing Yoga and other bad experiences were excluded from the study.

2.2 Sample size and sampling technique

Using the effect size gained from the previous comparable study (10) and the g-power program, version 3.1, the sample size was first estimated during phase 1. A total of 118 samples needed to be collected for the investigation. Ten percent more was included to the sample size to account for dropouts. 132 was the final number of samples obtained as a result.

The samples were conveniently selected through consecutive sampling and allotted randomly using random number table into four groups namely group A, B, C and D with 33 samples in each group.

2.3 Procedure

After consulting with the obstetrician, each participant underwent screening by the primary researcher to ensure they met the selection criteria. Subsequently, participants were randomly assigned to one of four groups using numbered concealed envelopes containing computer-generated random numbers. Due to the nature of the physical interventions involved in the study, complete blinding of participants and intervention providers was not possible. However, the team of nurses conducting assessments and the statistician remained blinded to the study's objectives and group allocations.

2.4. Group Interventions

Group B received prenatal exercises and yoga intervention, while Group C received conventional management. Group D was given prenatal exercises in addition to yoga. For 16 weeks in a row, each group received their prescribed therapies two days a week. Group A received standard prenatal care that includes general counseling, health education, dietary recommendations, and guidance on changing one's lifestyle and behavior. During the intervention phase, participants were free to come to the researcher with any questions or concerns they had about their health. Group B received a yoga intervention consisting of asanas, pranayama, and dhyana approaches that have been demonstrated in the literature to be efficacious. (10,11) After a 10-minute introduction to safety precautions and the advantages of exercise, Group C engaged in stretching exercises targeted at different muscle groups.

2.5 Procedure:

The group allocation and intervention procedures were thoroughly explained in phases 1 and 2, maintaining consistency. After completing the intervention period, participants were instructed to practice only pranayama until the onset of labor pain, while receiving constant monitoring and counseling. Samples were assessed once at the time of delivery.

2.6 Outcomes Measures:

The duration and mode of delivery, as well as the birth weight of newborns, were assessed and documented for all samples.

Duration of labor was defined as the time from the onset of regular contractions until the delivery of the baby and placenta. This was recorded by the primary researcher and two rotating staff nurses in the labor ward. Mode of delivery was documented as described in table 2. Birth weight was measured using a specialized infant scale, designed to accurately and sensitively measure even small weight differences. The baby was weighed on a flat surface after being undressed to remove any clothing, diapers, or blankets, ensuring an accurate measurement. Birth weight was measured within two hours of birth.

2.7 .Statistical Analysis:
Data were analyzed using SPSS software version 26, with a significance level of $p < 0.001$ and a 95% confidence interval. Chi-square analysis was employed to analyze differences between categorical variables such as type of delivery. Parametric outcomes were assessed for between-group differences using analysis of variance (ANOVA).

RESULTS
A total of 132 pregnant women meeting the selection criteria participated in the study, selected from a pool of 212 women receiving antenatal care at our hospital. Demographic data, including age, education, monthly income, religion, type of marriage, duration of marital life, and dietary pattern, were collected. The demographic distribution across each group is detailed in table 3, with analysis revealing no significant differences between groups. Chi-square analysis was employed to analyze the mode of delivery, indicating a significant difference among the four groups. Subjects in the yoga group and yoga with exercise group had a higher rate of natural childbirth compared to the other groups, with the GROUP D showing the highest rate. For the duration of labor, ANOVA was utilized for between-group analysis, with post hoc analysis conducted to identify pairwise differences. This analysis focused solely on mothers who underwent vaginal delivery, as those opting for C-sections exhibited differing labor durations and were excluded. Primigravida women in all groups experienced significantly longer labor compared to multigravida. Table 4 displays the number of vaginal deliveries and their corresponding average labor durations for both primigravida and multigravida. Post hoc analysis revealed significant differences between the GROUP D and all other groups for both primigravida and multigravida ($p < 0.001$). Additionally, the control group exhibited significantly prolonged labor durations compared to all other groups ($p < 0.001$). Analysis of birth weight indicated no significant differences between groups, as presented in table 5. Birth weight distributions within groups are further detailed in tables 6 and 7.

Table 1 – Modes of delivery

1. Vaginal Delivery (Normal Delivery):
   - Spontaneous Vaginal Delivery: The baby is born through the birth canal (vagina) without the need for medical interventions or assistance.
   - Assisted Vaginal Delivery: Involves the use of medical instruments, such as forceps or vacuum extractors, to help guide the baby through the birth canal when there are difficulties or the need for a quicker delivery.
2. Cesarean Section (C-section):
   - Elective C-section: A planned surgical procedure in which the baby is delivered through an incision made in the mother's abdomen and uterus.
   - Emergency C-section: Performed as an urgent response to unforeseen complications during labor or concerns about the baby's well-being.

Table 2 – type of delivery in each group

Demographic data	CON	GROUP B	GROUP C	GROUP D
Vaginal delivery	**5**	**17**	13	24
• Spontaneous	3	13	11	19
• Assisted	2	4	2	5
C-section	**28**	**16**	20	09
• Scheduled	23	10	11	4
• emergency	5	6	9	5

Table 3 – chi square analysis of type of delivery

	Control	GROUP B	GROUP C	GROUP D	***Row Totals***
Vaginal delivery	5 (14.75) [6.44]	17 (14.75) [0.34]	13 (14.75) [0.21]	24 (14.75) [5.80]	59
C-section	28 (18.25) [5.21]	16 (18.25) [0.28]	20 (18.25) [0.17]	9 (18.25) [4.69]	73
Column Totals	33	33	33	33	**132 (Grand Total)**
The chi-square statistic is 23.1391. The p-value is .000038. The result is significant at $p < 0.05$.					

Table 4 – Duration of delivery in each group

Demographic data	GROUP A	Duration	GROUP B	Duration	GROUP C	Duration	GROUP D	Duration
Vaginal delivery	**5**		**17**		**13**		**24**	
Primigravida	3	17.5 (2.1)	12	12.4(1.6)	11	12.9(1.7)	18	09 (0.75)
Multigravida	2	10.4 (0.98)	5	8.5(1.1)	2	8.6(1.2)	6	6.2 (0.84)

Table 5 – ANOVA analysis of duration of labor

	Source	*SS*	*Df*	*MS*	F	P
Primigravida	**Between-treatments**	0.122	3	0.014		
	Within-treatments	7.13	128			
	Total	7.252	131	0.129	*11.304*	*0.001**
Multigravida	**Between-treatments**	1.54	3	1.149		
	Within-treatments	10.45	128			
	Total	11.99	131	0.201	*9.346*	*0.001**

*significant difference

Table 6 – Birth weight distribution in groups.

	GROUP A	GROUP B	GROUP C	GROUP D
Birth weight (Kgs)	2.88 (2.45)	2.81 (2.31)	2.84 (1.98)	2.92 (2.39)

Table 7 – ANOVA analysis of birth weight

	Source	*SS*	*Df*	*MS*	F	P
Birth weight	**Between-treatments**	0.71	3	0.274		
	Within-treatments	4.13	128			
	Total	4.84	131	0.649	*1.414*	*0.147*

DISCUSSION

The results of this study is very significant as it pertains to the new born health. There are various health benefits for the maternal participants in this study which are proved in phase 1 and 2 but this phase of the study clearly proves that there is a holistic benefit in practicing Yoga. There are previous literature that support positive results similar to our study (3,12) in a recent systematic review on the effects of Yoga on maternal health it was very obvious with high levels of evidence that the yogic interventions resulted in a better improvement in both psychological and physical components of the mother and also the new born (8) However all the studies that had found such results are mostly in the past 5 years. This clearly states that there are new protocols emerging in Yoga for treating special population like the pregnant women. There are many integrated yogic techniques being tested in recent times which combines yoga, mindfulness, exercises and other traditional methods and proved work well for a diversified problems faced by the mothers. (13–16)

The significance of this phase is that even the mothers who landed in C-section attempted to go for natural delivery. According to National Family Health Survey (NFHS) reports, there is a great inclination towards scheduled C-section even before the need arise. This rate was 8.5% in the year 2005-06, but grew to 17.2% in 2015-16, and proportionally inflated in 2019-21, to 21.5% and in 2021-2023 its been even worse with 27.4%. there are many studies that stated that the government should interfere to stop this trend by promoting more health education and management strategies to AM. (17). In this scenario this study have found significant evidence in declaring Yoga as one such instrument in promoting vaginal delivery.

The study also proved that the duration of labor which was always an issue in pregnant women and reason for choosing C-section had been reduced significantly with a combination of Yoga and structured exercises. The results of our study were consistent with previous results. (18). This study did not fond any difference in the birth weight of the new born with all the groups showing similar birth weight. How ever the success of this phase of the study was in proving that subjects who performed yoga and exercises were delivering naturally much better than who preferred yoga alone or exercise alone. (19)

CONCLUSION

This study concludes that combined Yoga and exercise intervention results in more vaginal deliver and mothers were able to sustain the labor pain for a longer time compared to performing Yoga and exercise alone. The study also observed that the birth weight was not influenced by any intervention of the study. Future studies should focus more on high risk mothers and find out and strengthen the evidences for a better protocol with modern and ancient Yoga techniques. (20)

Funding Source: Nil

Declaration of Conflict of Interest: No authors declared conflict of interest.

Ethical Statement: Ethical clearance was obtained from the Saveetha Institute of Medical and Technical Sciences.

(SIMATS) Deemed University (Approval No 004/02/2023/IEC/SMCH.) All the participants read the written consent in Tamil and English and signed. All Participants were prescreened with Dr Nidhi Sharma, Obstetrician, in Saveetha Medical College Hospital and alloted the samples for Intervention. All Study participants accepted and signed consent for withdrawing a blood sample of 2ml at 16 weeks of gestation period as a pretest. At the 36th week of gestation, a 2ml intravenous sample was drawn again for the same posttest proposed.

References

1. *Shidhaye R, Bangal V, Bhargav H, Tilekar S, Thanage C, Suradkar R, et al. Yoga to improve maternal mental health and immune function during the COVID-19 crisis (Yoga-M 2 trial): study protocol for a pilot randomized controlled trial. Wellcome Open Res. 2022;7:109.*
2. *Curtis K, Weinrib A, Katz J. Systematic review of yoga for pregnant women: current status and future directions. Evid Based Complement Alternat Med. 2012;2012:715942.*
3. *Yekefallah L, Namdar P, Dehghankar L, Golestaneh F, Taheri S, Mohammadkhaniha F. The effect of yoga on the delivery and neonatal outcomes in nulliparous pregnant women in Iran: a clinical trial study. BMC Pregnancy Childbirth. 2021 May 3;21(1):351.*
4. *Dhakal P, Shrestha M, Baral D, Pathak S. Factors Affecting the Place of Delivery among Mothers Residing in Jhorahat VDC, Morang, Nepal. Int J Community Based Nurs Midwifery. 2018 Jan;6(1):2–11.*
5. *Felisian S, Mushy SE, Tarimo EAM, Kibusi SM. Sociocultural practices and beliefs during pregnancy, childbirth, and postpartum among indigenous pastoralist women of reproductive age in Manyara, Tanzania: a descriptive qualitative study. BMC Womens Health. 2023 Mar 23;23(1):123.*
6. *Woodyard C. Exploring the therapeutic effects of yoga and its ability to increase quality of life. Int J Yoga. 2011 Jul;4(2):49–54.*
7. *Büssing A, Michalsen A, Khalsa SBS, Telles S, Sherman KJ. Effects of yoga on mental and physical health: a short summary of reviews. Evid Based Complement Alternat Med. 2012;2012:165410.*
8. *Corrigan L, Moran P, McGrath N, Eustace-Cook J, Daly D. The characteristics and effectiveness of pregnancy yoga interventions: a systematic review and meta-analysis. BMC Pregnancy Childbirth. 2022 Mar 25;22(1):250.*
9. *Boopalan D, Vijayakumar V, Ravi P, Shanmugam P, Kunjumon B, Kuppusamy M. Effectiveness of antenatal yoga in reducing intensity of labour pain: A systematic review and meta-analysis. Eur J Obstet Gynecol Reprod Biol X. 2023 Sep;19:100214.*
10. *Chuntharapat S, Petpichetchian W, Hatthakit U. Yoga during pregnancy: Effects on maternal comfort, labor pain and birth outcomes. Complementary Therapies in Clinical Practice. 2008 May;14(2):105–15.*
11. *Narendran S, Nagarathna R, Narendran V, Gunasheela S, Nagendra HRR. Efficacy of yoga on pregnancy outcome. J Altern Complement Med. 2005 Apr;11(2):237–44.*
12. *Rong L, Dai LJ, Ouyang YQ. The effectiveness of prenatal yoga on delivery outcomes: A meta-analysis. Complement Ther Clin Pract. 2020 May;39:101157.*
13. *Satyapriya M, Nagendra HR, Nagarathna R, Padmalatha V. Effect of integrated yoga on stress and heart rate variability in pregnant women. International Journal of Gynecology & Obstetrics. 2009 Mar;104(3):218–22.*
14. *Ng QX, Venkatanarayanan N, Loke W, Yeo WS, Lim DY, Chan HW, et al. A meta-analysis of the effectiveness of yoga-based interventions for maternal depression during pregnancy. Complement Ther Clin Pract. 2019 Feb;34:8–12.*
15. *Martins RF, Pinto e Silva JL. Treatment of pregnancy-related lumbar and pelvic girdle pain by the yoga method: a randomized controlled study. J Altern Complement Med. 2014 Jan;20(1):24–31.*
16. *Battle CL, Uebelacker LA, Magee SR, Sutton KA, Miller IW. Potential for prenatal yoga to serve as an intervention to treat depression during pregnancy. Womens Health Issues. 2015;25(2):134–41.*
17. *Fernández-Rodríguez R, Alvarez-Bueno C, Reina-Gutiérrez S, Torres-Costoso A, Nuñez de Arenas-Arroyo S, Martínez-Vizcaíno V. Effectiveness of Pilates and Yoga to improve bone density in adult women: A systematic review and meta-analysis. PLoS One. 2021;16(5):e0251391.*
18. *Jahdi F, Sheikhan F, Haghani H, Sharifi B, Ghaseminejad A, Khodarahmian M, et al. Yoga during pregnancy: The effects on labor pain and delivery outcomes (A randomized controlled trial). Complement Ther Clin Pract. 2017 May;27:1–4.*
19. *Kwon YJ, Park SJ, Jefferson J, Kim K. The effect of open and closed kinetic chain exercises on dynamic balance ability of normal healthy adults. J Phys Ther Sci. 2013 Jun;25(6):671–4.*
20. *Mooventhan A. A comprehensive review on scientific evidence-based effects (including adverse effects) of yoga for normal and high-risk pregnancy-related health problems. J Bodyw Mov Ther. 2019 Oct;23(4):721–7.*