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A randomized parallel group trial to assess the impact of maternal birthing position on maternal and Fetal outcome

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Abstract
Objective: To compare mother and foetal outcomes in various delivery positions, as well as the duration of the second stage of labour.
Materials and Methods: A total of 75 primigravidae with vertex presentation and no co-morbidities were grouped into supine 25 (Group 1), lateral 25 (Group 2) and all fours 25 birthing positions (Group 3). The maternal and fetal outcomes were studied.
Study Design: Randomized Parallel Group Trial.
Results: The mean duration of second stage of labour was decreased in lateral position (32.08 minutes) relative risk of 6 (95% CI,2.52 to 14.24, P value of < 0.01). Pain intensity was assessed with Visual analogue scale the intensity of pain was less in all fours position RR 5.44 (95% CI 0.67 - 43.79, P value of < 0.01). The preference for the same position for the next delivery was greater with the Supine position, RR 6.09 (95% CI 1.75 - 21.18, P value of < 0.01). There was no significant difference in overall fetal outcome in three positions. The transient tachypnoea of the newborn was more in the supine position with (P Value 0.04) was statistically significant.
Conclusion: Upright and lateral birthing positions during the second stage of labour may be more beneficial for promoting good maternal outcomes than supine position.

Keywords: Maternal birthing position, second stage of labor, transient tachyopnea of newborn, NICU, pain intensity

Introduction
There is no perfect position for labour and delivery, thus conventional recommendation advises expectant mothers to give birth in whatever position they feel most comfortable in [1]. Most birthing clinics encourage women to give birth in supine despite recommendations from international standards against doing so for extended periods of time during labour. The biomechanical and physiological reactions during labor are influenced by the mother's posture. The focus of recent research has been on the biomechanical mechanisms of birth position, which are connected to pelvic measures, intrauterine pressure, the fetal head's form, and advancement of the fetal head tilt down the delivery canal [2].
Historically, women giving birth alone chosen to accomplish by aligning their bodies upright in sitting / squatting positions by holding onto rope, knotted cloth piece. They used to largely avoid lying flat on their backs throughout the ages and across the culture [3].
This study examined the effects of various delivery positions on mother and fetal outcomes during the second stage of labour. Adjustments can be made during labour to the mother's comfort and to promote the correct posture, provided that monitoring is not hampered and there are no problems. The RCOG advises utilizing upright positions to aid in labour and delivery progression. The WHO advises that women in labour should take whichever position they like as part of the appropriate maternity care, but ideally avoid lying supine for extended periods of time [4].
In this we compared the three birthing positions, supine, lateral, and all fours' positions. Lateral and all fours' positions - flexible sacral position. The advantages of flexible positions are reduced duration of the second stage of labour, reduced risk of perineal tears, reduced risk of low APGAR score due to reduction in duration of the second stage, reduced perineal pain, early interaction between mother and baby.

The disadvantages are that fast expulsion of the fetal head may lead to maternal and fetal trauma, cases where continuous electronic fetal monitoring is required these positions are challenging [5].

Supine position - Non flexible sacral position. In this position, electronic fetal monitoring is easily accessible. This position may be beneficial in some cases for the McRoberts maneuver to correct shoulder dystocia. It is also easily accessible for application of forceps, vacuum assisted vaginal delivery [6]. However, in this position, the disadvantages are: the coccyx can only move about 4 degrees. There is an increase in duration of the second stage of labour compared to flexible sacral positions. Due to aorto-caval compression there may be increase chances of birth asphyxia. There is increase in need of episiotomy and operative vaginal delivery and increase in intensity of pain [7].

The second stage of labour begins with complete dilation of the cervix to the birth of the baby. The 2nd stage is often divided into passive phase, an active phase. The upright position of birth benefits the mother and baby for several physiological reasons [8]. The duration is ~ 50 minutes for nulliparous women and is about 20 minutes for multiparous women. The prolonged second stage of labour increases the risk of maternal and fetal complications. Laying in different positions at the time of labour pain is one of the nonmedical methods and has been suggested as another way to reduce pain [9]. The aims are to study the effect of various maternal birthing positions on maternal and fetal outcome.

Materials and Methods

Study period and setting

The study was carried from December 2021 to April 2022 at a tertiary care hospital on women admitted in Department of Obstetrics & Gynaecology in BLDE (deemed to be university) Shri B.M. Patil Medical College Hospital and Research Centre, Vijayapura, Karnataka, India fulfilling the inclusion criteria. The patients will be informed about study and informed written consent was obtained. Before starting the study, clearance was obtained from the institutional ethics committee and was registered with the Clinical Trails Registry of India Trial REF/2021/08/046705. The women included in the trial were primigravida with a live singleton pregnancy with vertex presentation. Women with comorbidities such as pregnancy-induced hypertension, diabetes mellitus, anemia, cardiac diseases, epilepsy, teenage pregnancy, malposition's and malpresentations were excluded.

Study population, design, sampling size and procedure

A total of 75 primigravida women who were recruited into the study were divided into 3 groups, each group containing 25 women. The Groups were group 1 delivering in supine position, group 2 in lateral position and group 3 in all fours position based on a computer-generated randomization generated from www.randomization.com. The women were instructed to deliver in the following birthing positions as per randomization (Figure 1).

Operational definition

Supine position: In this position, the birthing woman lies horizontally on her back / with her trunk marginally elevated (< 45^0) and her lower extremities placed horizontally on her bed / in the leg rests / can also be pulled back towards her shoulder [10].

Lateral position: Lateral positions, often known as side-lying positions, such as the full Sims position and the exaggerated Sims position (semi prone) The woman lies on her side in the "pure side lying posture," either with her upper legs lifted and supported, a pillow between her legs, and both hips and knees flexed. The Sims position, a version of the lateral position, is referred to as the left lateral position [11]. Lateral position is comfortable, reproducible and easy [12].

All fours position: All-fours is also called as hands and knees position. With the help of either the palms / her fist of her hands, she will support herself to maintain this position. Kneeling position was used in some of the developed countries (like French) and midwives are appropriately trained. In this position [13]. Deliveries in the kneeling position are more feasible on the standard delivery tables [14].

Statistical analysis

The data obtained was entered in a Microsoft Excel sheet, and statistical analysis was performed using Statistical Package for the Social Sciences SPSS (Version 20). Results were presented as Mean ± SD, counts and percentages and diagrams. For normally distributed continuous variables between three groups, compared using ANOVA test. For not normally distributed variables, Kruskal-Walli's test used with post hoc test. Categorical variables between two groups compared using the Chi square test. The P value < 0.05 considered statistically significant. All statistical tests were performed with two tailed. All characteristics were summarized descriptively. For continuous variables, the summary statistics of N, mean, and standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries and the data was analyzed using the Chi square test for association, comparison of means using the T-test, ANOVA, and diagrammatic presentation.

The maternal outcomes studied were duration of the second stage of labour, intensity of pain, preference of position in subsequent delivery. The fetal outcomes studied were admission to neonatal intensive care unit or mother's side and APGAR score at 1 minute and 5 minutes.

Results and Discussion

A total of 75 primigravida were included in the study, the mean age distribution of the women among the three groups was 20 to 24 years (P value 0.28) which was statistically insignificant. The mean gestational age of the women in the primigravidae participated in the trial was 39.03 weeks (P value 0.06). The mean duration of 2nd stage of labour was decreased in lateral position which is 32.08 minutes with RR 6 (95% CI, 2.52 - 14.24) when compared to that of supine position which was 37.46 minutes with RR 0.17(95% CI, 0.04 - 0.6), and all fours position was 34.18 minutes with RR 1.85 (95% CI, 0.72 - 4.62, P value <0.01) (Table 1) which was statistically significant.

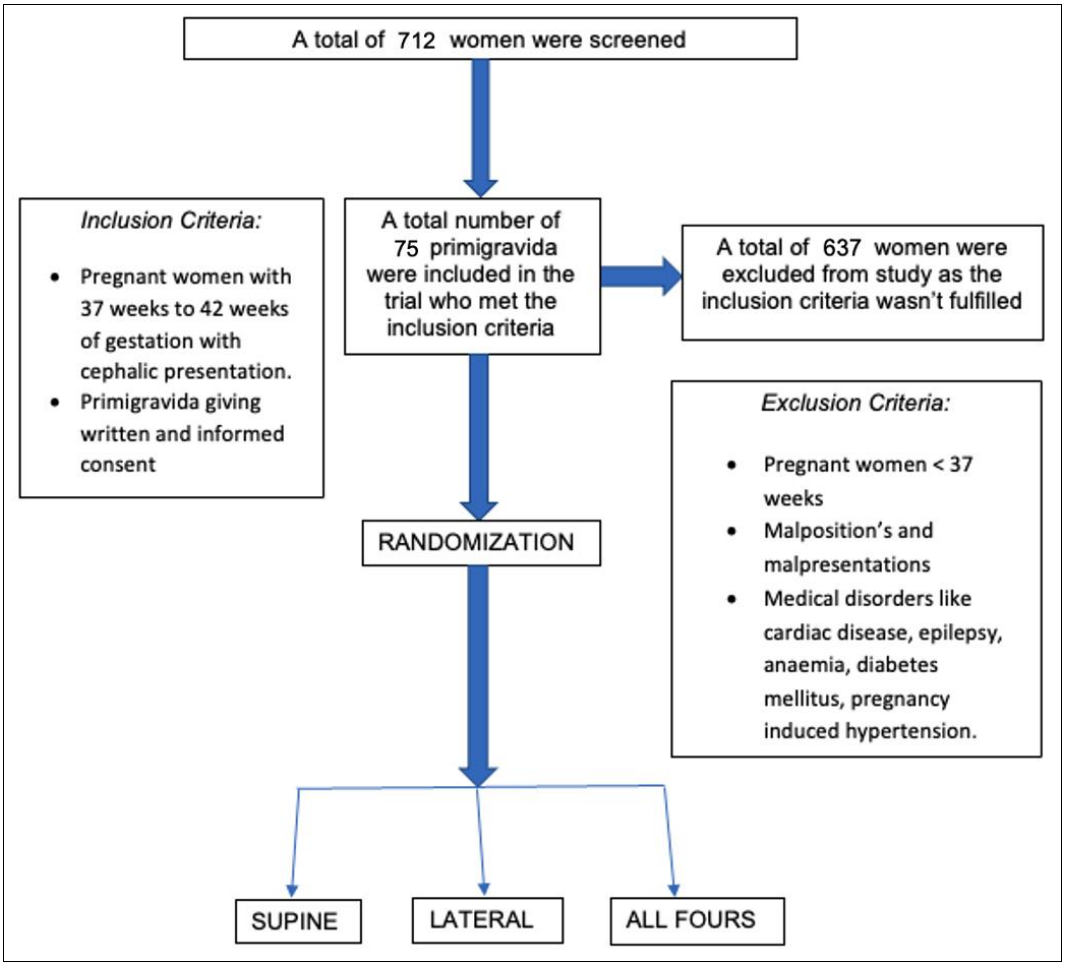

Fig 1: Consort flow chart representing the recruitment of woman

Table 1: Mean duration of second stage of labour in primigravida women in three positions.

Duration of 2nd Stage (Mins)	Supine		Lateral		All Fours		P-value
	Number	%	Number	%	Number	%	
15 - 30	2	8	10	40	4	14	< 0.01
30 - 45	23	92	15	60	21	86	
RR (95% CI)	0.17(0.04 - 0.6)		6(2.52 - 14.24)		1.85(0.72 - 4.62)		

* Note: If the P value is equal to or lesser than 0.05, then the result is considered statistically significant.

The intensity of pain was lower in all fours position with RR 5.44 (95% CI, 0.67 - 43.79) when compared to RR 3.78(95% CI, 1.05 - 13.62) in the supine position and the lateral position with RR 0.73 (95% CI, 0.18 - 2.89) (Table 2) and P <0.01, highly significant.

Table 2: Intensity of pain in three positions in primigravida

Intensity of pain	Supine		Lateral		All Fours		P-value
	Number	%	Number	%	Number	%	
Moderate	4	16	2	8	1	4	< 0.01
Severe	21	84	23	92	24	96	
RR (95% CI)	3.78(1.05 - 13.62)		0.73(0.18 - 2.89)		5.44(0.67 - 43.79)		

* Note: If the P value is equal to or lesser than 0.05, then the result is considered statistically significant.

The preference for the same position for the next delivery was more in the supine position with RR 6.09 (95% CI, 1.75 - 21.18) when compared to the lateral position with RR of 1.94 (95% CI, 0.77 - 4.87) and answered that they would prefer the same position for the next delivery with RR 6.51 (95% CI, 2.75 - 15.42, P value <0.01) (Table 3), highly significant. It suggests that women who delivered in supine position have preference to deliver in same position in the subsequent delivery.

Table 3: Preference of same position in subsequent delivery among primigravida

Preference of same position in subsequent delivery	Supine		Lateral		All Fours		P Value
	Number	%	Number	%	Number	%	
Yes	23	92	21	84	15	60	< 0.01
No	2	8	4	16	10	40	
RR (95% CI)	6.09(1.75 - 21.18)		1.94(0.77 - 4.87)		6.51(2.75 - 15.42)		

* Note: If the P value is equal to or lesser than 0.05, then the result is considered statistically significant.

The fetal outcomes studied were whether the baby was on the mother's side or admitted to the neonatal intensive care unit (NICU). A total 42% babies were admitted to NICU delivered in supine position with RR 0.71 (95% CI, 0.35 - 1.42), 26% of babies were admitted to NICU delivered in lateral position with RR 2.06 (95% CI, 0.97 - 4.34) and 42% of neonates were admitted to NICU delivered in all fours position with RR 0.71 (95% CI, 0.35 - 1.42, P value 0.15), statistically insignificant

inferring that there is no effect of maternal birthing position on overall fetal outcome.

Table 4: Mean apgar at 1 minute

Apgar at 1 Min	Mean	Standard Deviation	P Value
Supine	6.5	1.035	0.09
Lateral	6.86	0.606	
All fours	6.68	0.768	
Statistically Insignificant			

P values of mean APGAR at 1 minute in supine, lateral and all fours' positions obtained was 0.09 statistically insignificant.

Table 5: Mean Apgar at 5 minutes

Apgar AT 5min	Mean	Std.Deviation	P Value
Supine	8.46	0.973	0.24
Lateral	8.74	0.633	
All fours	8.62	0.855	
Statistically Insignifcant			

P value of mean APGAR at 5 minutes in supine, lateral and all fours' positions obtained was 0.24 respectively and was statistically insignificant.

Table 6: Transient tachyopnea in three positions in primigravida

Transient tachyopnea	Supine		Lateral		All Fours		P Value
	Number	%	Number	%	Number	%	
Yes	15	60	4	16	9	25	0.04
No	10	40	21	84	16	75	

* Note: If the P value is equal to or lesser than 0.05, then the result is considered statistically significant.

Transient tachypnea in newborns delivered in supine, lateral and all fours positions were 60%, 16% and 25% respectively (P value 0.04) was statistically significant (Table 6).

Conclusion

Unless indicated, supine position should be avoided due to the prolonged duration of labour. Women should be educated about alternate birthing positions, their advantages and disadvantages and should be given the choice to choose the birthing position in which she is comfortable as a part of respectful maternity care.

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Conflict of Interest

Not available

Financial Support

Not available

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