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Original Research Article

The effect of maternal birthing position on maternal and fetal outcome in multigravida women: A randomized parallel trial

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Abstract

Background: The mother's position during the second stage of labour (SSL) is called the birthing position. It is classified into two groups: 1. The positions like kneeling, squatting, standing, and sitting are called flexible sacrum positions 2. Lithotomy, semi-recumbent, dorsal, & supine positions are called as Non-flexible sacrum.

Materials and Methods: The study was conducted in a tertiary care hospital from 1/9/2023 to 30/4/2024. A total of 140 multigravidas in labour participated in this study. The type of study was a randomized parallel group. Participants were divided into two groups after randomization. Group A – the participants were given a squatting position, and Group B – were given a lateral position during SSL. The parameters noted were second-stage duration, perineal injury, preference of birthing position, blood loss, and the immediate effect on the neonate, which were noted in both groups and compared.

Results: The second stage mean duration for the squatting position was 25.93 minutes, while for the lateral position was 32.95 minutes ($p > 0.001$). In other parameters like perineal tears with or without episiotomy, intensity of pain, and blood loss, no significant difference were seen in both groups. Both groups had similar neonatal outcomes, including APGAR score, incidence of transient tachypnea of newborns and incidence of NICU admission. The preference rate for the same position in future deliveries was similar among both groups.

Conclusion: The duration of the SSL is less in the squatting position than in the lateral position among Multigravida. No significant difference was seen in other parturition parameters and neonatal outcomes between the squatting and the supine lateral position. Hence, the squatting position should be preferred over the lateral position in SSL.

Keywords: Second stage of labour (SSL), Squatting position, Lateral position, Birthing position, Neonatal outcome, Pain intensity, Randomized control trial (RCT).

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1. Introduction

Labor is a physiological process. The more crucial part of labour is the SSL. In ancient times, upright positions was adopted, which are more physiological for SSL. They enlarged the pelvic exit, allowing for easier passage for the infant, but with time, supine positions were adopted, which are more convenient for the persons monitoring and conducting labour. Horizontal position was standard for deliveries from the eighteenth to the twentieth centuries. The birthing position that a mother feels most comfortable is her choice, which improves the quality of the birth and her level of labour satisfaction

Birthing positions are often referred to as flexible sacrum positions that a pregnant woman can assume during childbirth. These positions include kneeling, standing, squatting, and sitting. They permit the coccyx to move. On the other hand, non-flexible sacrum postures include those in which the weight is on the sacrum, such as lithotomy, supine, dorsal and semi-recumbent position.[1]

Despite evidence to the contrary, the supine posture is the most prevalent one that mothers adopt globally during labour.[2]

In the lithotomy position, nerve compression is a drawback, especially in the femoral or common peroneal

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nerves. In the lower limbs, acute compartment syndrome may be brought on by inadequate perfusion. There was an increase in the incidence of episiotomies when people were given a supine position.[3]

There are several benefits of remaining upright. Gravity helps in the descent of the fetus. Flexion of the hip, strengthening of pelvic floor muscles, spontaneous vaginal birth, and positioning of fetal head angle via the pelvic axis is also possible by adopting a squatting position. Benefits of the lateral position include less tension in the perineal muscles, enhanced relaxation, and enhanced control over the fetal head during birth. Assist the mother in finding a dignified and comfortable resting position in between contractions, minimizes the risk of supine hypotensive syndrome, enhance fetal oxygenation, and facilitate easier vaginal examinations and perineal inspections. There are many adverse maternal outcomes, including the need for a caesarean section and instrumental assistance during delivery, are linked to a "prolonged second stage".[4]

Research on the effects of sitting position on mothers' and newborns' outcomes has recently gained more attention.[5,6]

2. Materials and Methods

This study was conducted in the Tertiary care center in Vijayapura, Karnataka, India. This is a parallel-group, randomized trial. Ethical clearance is obtained from the Institutional Ethics Committee to perform the study (reference no. BLDE [DU]/IEC/771/2022-23). The study is also registered with clinical trials of India (CTRI/2023/05/052799). All Multigravida with term gestation in labour (< 6cm cervical dilatation) were enrolled in the trial after considering the inclusion and exclusion criteria. Written consent was obtained after informing about the study.

The women, once enrolled, were randomized into two groups. A computer-generated randomization chart was used for the randomization process. Group A – was given a squatting position, and Group B -was given a lateral position during the SSL. Regular delivery tables will be used for the delivery process. The woman in the squatting group used her feet to support her weight, and she bent her knees to keep her balance. The lady in the lateral position lies on her side, elevating and supporting her upper leg while flexing her hips and knees. Episiotomies are given according to case requirements.

2.1. Inclusion criteria

All women with gestations between 37 and 42 weeks who are delivering vaginally.

2.2. Exclusion criteria

Multiple gestations, Malpresentation, PROM, Prenatally diagnosed fetal malformation, previous cesarean scar, Women having cardiac disorder.

2.3. Statistical analysis

The statistical analysis used for this study is (S.P.S.S.) (version 20). According to the G*Power 3.1.9.4 software, this study needs a total sample size of 140. (That is, 70 per group, assuming equal group sizes), So, two independent groups (unconditional) with a 5% level of significance need to have a power of 80% to detect a difference (exact proportions: inequality) p-value <0.005 is statistically significant.

The following parameters were noted and compared in both groups.

Parturition parameters

1. Post-partum blood loss,
2. Duration of the SSL,
3. Level of pain intensity,
4. The extent of the perineal tear with and without episiotomy,
5. Preference of position in the subsequent pregnancy,
6. Immediate neonatal outcome parameters,
7. Newborn’s transient tachypnea,
8. NICU admission,
9. APGAR score after one and five minutes.

3. Results

During the study period of one year, 1100 women delivered in the study center; of these, 140 women were eligible and enrolled in the study. They are randomized into group A & group B, squatting group and lateral position, respectively, as shown in **Figure 1**.

Maximum participants in the study belonged to the age group of 20-25 years. The mean gestational age of the participants in both groups was 38 weeks. Both groups were statistically comparable in all the demographic parameters.

The squatting group required an average of 23.86 minutes, while the lateral group took 32.27 minutes to finish the SSL.(**Table 1**) A difference was noted between the two groups in terms of duration of SSL, which was statistically significant.

There was no significant difference in preference of position among the groups (p-value- 0.310). (**Table 5**)

There was no significant difference in the immediate neonatal outcome parameters – transient tachypnea of the newborn (p-value -1.000), mean APGAR score at 1 minute (P value 0.507), mean APGAR at 5 minutes.

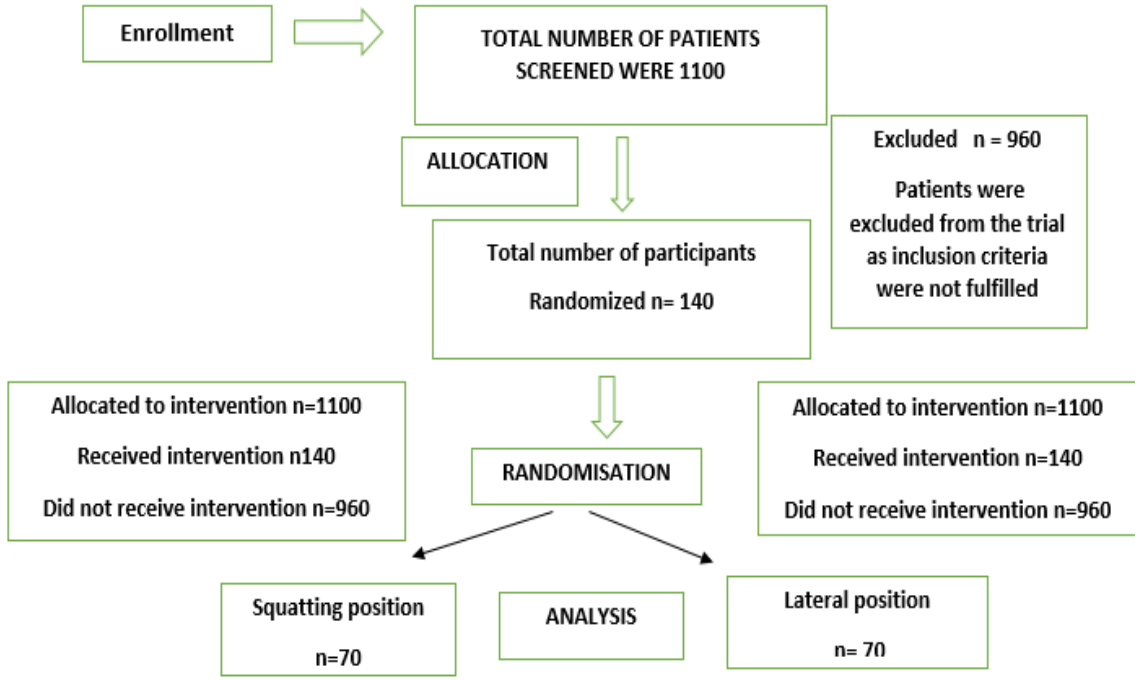

Figure 1: Consort flow diagram

Table 1: Duration of SSL is compared between two positions

Duration of SSL (minutes)	Squatting n=70	Lateral n=70	p-value
Mean (SD)	23.86 minutes	32.27 minutes	<0.001
Min - Max	10 - 39	20 - 45	

Table 2: Degrees of the perineal tear with episiotomy among both groups.

Degree of perineal tear with episiotomy	Squatting n=70	Lateral n=70	Total	p-value
No Tear	19 (27.1%)	36 (51.4%)	55 (41.4%)	0.108
First	15 (21.4%)	14 (20.0%)	29 (20.7%)	
Second	8 (14.3%)	3 (4.3%)	13 (9.3%)	

Table 3: Comparison between two positions with degrees of perineal tear without episiotomy

Degree of perineal tear without episiotomy	Squatting n=70	Lateral n=70	Total	p-value
No Tear	17 (24.2 %)	10 (14.2 %)	26 (18.56 %)	0.590
First	7 (10.0%)	5 (7.1%)	12 (8.6%)	
Second	2 (2.9%)	2 (2.9%)	4 (2.9%)	
Third	2 (2.9%)	0 (0.0%)	2 (1.4%)	

Table 4: Intensity of pain among both the groups

Parameter	Squatting n=70	Lateral n=70	Total	p-value
Moderate	15 (21.4%)	10 (14.3%)	25 (17.9%)	0.270
Severe	55 (78.6%)	60 (85.7%)	115 (82.1%)	

Table 5: Preference of position in the subsequent pregnancy in both groups

Preference of position in the subsequent pregnancy	Squatting n=70	Lateral n=70	Total	p-value
Yes	38 (54.3%)	32 (45.7%)	70 (50.0%)	0.310

(p-value 0.628) and NICU admission (p-value- 1.000) among both the groups. (**Table 6**)

Table 6: Immediate neonatal outcome

Neonatal parameter	Squatting n=70	Lateral n=70	Total	p-value
Transient tachypnea of the newborn	4 (5.7%)	3 (4.3%)	7 (5.0%)	1.000
Mean APGAR score (SD)	-	-	-	-
1 Minute	7.71 (0.68)	7.77 (0.64)	-	0.507
5 minutes	8.71 (0.70)	8.77 (0.64)	-	0.628
Mother side	66 (94.3%)	66 (94.3%)	132 (94.3%)	1.000
NICU	4 (5.7%)	4 (5.7%)	8 (5.7%)	

We observed that the mean blood loss in the squatting group is 267.43ml; in the lateral group, it is 277ml. No significant difference was noted between the groups in terms of blood loss statistically. ($p < 0.079$).

Table 7: Comparison of mean blood loss (ml) in Primi gravida between squatting group and lateral group

Blood loss	Squatting position	Lateral position	p-value
Mean (SD)	267.43 (55.26)	277.00 (40.41)	0.079
Min - Max	200 - 410	210 - 360	

4. Discussion

Many factors can affect the birth position, such as the environment, the mother's desire, the preference of the caregiver, or medical intervention.[7] The position during the second stage brings many physiological alterations which impact the feto-maternal outcome. There isn't much research out there right now comparing childbirth experience using credible scales between upright and supine positions during the SSL.[8]

In our study, the squatting position takes 23.5 minutes, the lateral position takes 32.27 minutes for the SSL ($p<0.001$), and the average variation in SSL was nine minutes. In Nanded, Maharashtra, a similar study was carried out over 18 months in a tertiary care center. A comparison was made between squatting positions and lateral positions in a prospective study conducted on 212 pregnant women. In their study, participants who adopted squatting positions had a shorter duration of SSL compared to lateral positions, which was statistically significant ($p< 0.05$).[9]

Another observational trial with 200 patients was conducted between squatting and dorsal recumbent positions, dividing 100 participants in each group. It was carried out among multigravida women in a tertiary care center in Navi Mumbai. According to their study, the average SSL duration in the squatting posture is 12.6 minutes, while the average SSL duration in the dorsal recumbent position is 21.7 minutes. This difference is statistically significant.[10] In a Cochrane review with 32 trials, it is noted that during the SSL, upright posture had minimal reduction in the duration of SSL with a mean difference of 6 minutes when compared with supine positions.[7] These studies co-relate with our study.

Our study showed that in the subsequent pregnancy, 45.7% of participants preferred the lateral position, whereas 54.3% of patients preferred the squatting posture ($p=0.310$). A randomized control trial (RCT) with a prospective design was carried out on nulliparous women, who were split into two groups: squatting and supine. When women who had chosen to be upright or supine during the first stage of labour were asked which position they preferred after delivery, most of them said that being upright was the most comfortable option. Still, there was no significant difference between the two groups.[11] This is related to our study, where the majority of women chose upright positions.

Our study compared the mean pain intensity using VAS between two positions, the squatting position and the lateral position. It did not show any significant difference between the two positions. 5.7% and 11.4% of the patients had moderate-intensity pain in the squatting and lateral groups, respectively. In comparison, 94.3% and 88.6% of the patients had severe pain intensity in squatting and lateral groups, respectively. Another hospital-based prospective RCT was conducted in a tertiary care center in Nanded, Maharashtra, with over 212 female labouring patients assigned to squatting and lying down positions over 18 months at a tertiary care

center. The VAS score was used to measure the patient's pain intensity. The VAS score in the squatting position during SSL was considerably lower than that of the lateral position.[9] This study did not support our findings in the pain intensity parameter.

A prospective RCT conducted in Nanded, Maharashtra, noted that in the squatting position, the mean APGAR score was lower compared to the supine at 1 minute. At 5 minutes, the mean APGAR score in squatting and supine were statistically comparable.[9] Another observational study was conducted at a tertiary care center in Navi Mumbai on 200 patients, divided into squatting and dorsal recumbent position groups comprising 100 participants. Each group recorded the fetal outcome in terms of APGAR score at 1 minute and 5 minutes. A significant difference was observed in the one-minute APGAR score for the women compared to the squatting and dorsal recumbent positions. There was no significant difference in the 5-minute APGAR score in the multigravida women between the two groups.[10] This did not support our findings, as there was no significant variation in the newborn APGAR score.

The University Hospital Vienna conducted a case-control study between upright and supine positions. The study found no differences in the neonatal APGAR score at 1 or 5 minutes.[12]

Similarly, no significant difference was noted for APGAR score, abnormal Fetal heart rate pattern, or NICU admission of neonates in other studies. This co-relates to our study.

Our study compared the degree of perineal tear associated with two positions after giving episiotomy, which showed that out of 70 participants who adopted the squatting position, 42 participants required episiotomy in the squatting position, and 36 participants required episiotomy in the lateral group. In a hospital-based RCT, it was observed that the incidence of episiotomy extension in the squatting position was higher compared to the lithotomy position ($p < 0.05$).[9] In another observational study conducted among 200 patients in which 100 participants adopted squatting position and another 100 patients adopted dorsal recumbent position, episiotomy was given to 54% in the squatting group compared to 66% in dorsal recumbent group.[10] However, there was no significant difference between the two positions regarding the requirement of episiotomy, which correlates with our study. A case-control study was carried out at the University Hospital, Vienna, where they compared between upright and supine positions. Significantly lower rate of episiotomy was given in women who delivered in an upright position compared with a supine position.[12]

In our study, 21.4% in the squatting group and 20% in the lateral group had first-degree perineal tear with episiotomy. 14.3% and 4.3% in the squatting and the lateral groups had second-degree perineal tears, respectively, with episiotomy. None of the participants had a third-degree perineal tear. A similar observational study was conducted in a tertiary care center in Mumbai among a total of 200 patients, and the squatting position and dorsal recumbent position were compared. In this study, there was no significant difference in the first and second-degree perineal tear between the squatting and dorsal recumbent position.[10] Another case-control study was carried out, and a comparison between an upright position and a supine position was made, which showed that there was no statistically significant difference in the degree of perineal tear between the two groups.[12] Another study, which involved 200 patients at a tertiary care center in Karachi, revealed that para urethral tear was seen in 5% of the patients who adopted squatting positions. In the non-squatting group, 9% of patients experienced second- and third-degree perineal tears.[13] This did not correlate with our study because the squatting position had higher rates of perineal tear than the lateral position, though there was no statistical significance. A randomized control trial was carried out in a teaching hospital in Quetta between squatting and lithotomy positions. There were no second or third-degree perineal tears in the squatting group, whereas perineal tears occurred in 9% of patients in the lithotomy position. This does not co-relate to our study, as there were more perineal tears in the supine position than in the upright position.[14]

The mean blood loss in our study in the squatting position is 267.43ml, and in the lateral position is 277ml. There was no significant difference between both positions regarding blood loss ($p < 0.079$). A hospital-based prospective randomized controlled study conducted among 212 female patients in Maharashtra showed that the mean amount of blood loss in the squatting position was (335.89 ml) compared to lying down position (323.84 ml), and no significant difference was seen.[9] This did not co-relate with our study. In Cochrane Pregnancy and Childbirth's Trials Register, RCT was used, and supine and upright positions were compared, which showed an increased blood loss in the upright position compared to the supine position.[7] Another systematic review and meta-analysis were done, which compared the squatting position and supine position during SSL. The two positions showed no statistically significant difference in blood loss.[15] This correlates with our study.

5. Conclusion

There are a variety of birthing positions that are used to help the delivering woman feel comfortable during the SSL. One such position is squatting. Our study revealed that upright birthing positions, like squatting positions, shorten the duration of SSL. This reduction in second-stage duration has more significant benefits for the mother and her child because it reduces the need for unnecessary interventions and lowers abnormalities in the fetal heart rate. Neonatal outcomes were not affected by the choice between horizontal and vertical birthing positions.

6. Source of Funding

None.

7. Conflict of Interest

None.

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