



Comparison of Perambulation and Birthing Ball Exercise on Pain and Maternal Satisfaction During the First Stage of Labour: A Pilot Study

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Abstract: Background: Labour pain is a physiological process that can significantly affect maternal comfort, labour progress, and childbirth satisfaction. **Objective:** To compare the effectiveness of perambulation and birthing ball exercises on the progress of the first stage of labour in terms of pain and maternal satisfaction among primi parturient mothers. **Methods:** This study selected a quasi-experimental design. A pilot study was conducted among 20 primi parturient mothers at ACS Medical College and Hospital. Participants were selected using purposive sampling and allocated non-randomly into two groups: the perambulation group (n = 10) and the birthing ball group (n = 10). The interventions were administered during the first stage of labour, and post-test assessments were carried out to compare the outcomes between the two groups. **Results:** The pilot study showed preliminary evidence of differences between the two groups. The birthing ball group had a significantly lower mean pain score (6.10 ± 1.44) than the perambulation group (9.50 ± 0.84), while maternal satisfaction was higher in the birthing ball group (74.00 ± 1.05) compared with the perambulation group (63.50 ± 1.71). An independent t-test demonstrated statistically significant differences between the groups ($p < 0.001$). **Conclusion:** This pilot study provides preliminary evidence that birthing ball exercises may reduce labour pain and improve maternal satisfaction, supporting the feasibility of a larger study.

Key Words: Primi Parturient Mothers, Labour Pain, Perambulation, Maternal Satisfaction, Non-Pharmacological Intervention

INTRODUCTION

Labour is a normal physiological process that culminates in the birth of a baby. Although childbirth is a natural event, labour is commonly associated with varying degrees of pain and discomfort, particularly among primi parturient mothers experiencing childbirth for the first time. Labour pain is influenced by uterine contractions, cervical dilatation, fetal descent, pelvic pressure, maternal position, emotional status, and environmental factors. Effective management of labour pain is an major component of quality maternity care because poorly controlled pain may contribute to maternal anxiety, exhaustion, fear, and dissatisfaction with the childbirth experience [1-2]. The physiological changes occurring during labour require continuous maternal adaptation, and appropriate supportive measures can help

women cope with pain while facilitating normal labour and promoting a positive childbirth experience [3-5].

Alternative methods of labour pain management have received increasing attention because they are generally simple, inexpensive, safe, and can be incorporated into routine maternity care without significant adverse effects. These approaches include mobility, upright positioning, relaxation techniques, breathing exercises, massage, heat application, perambulation, and the use of birthing balls. Such interventions aim not only to reduce the perception of pain but also to improve maternal comfort, encourage effective coping, facilitate fetal descent, and support physiological progression of labour [3,6-7].

Perambulation is one of the simplest forms of non-pharmacological intervention during labour. Ambulation

allows the mother to maintain an upright position and promotes mobility of the pelvis. Flynn *et al.* [8] studied ambulation during labour and demonstrated the clinical importance of allowing women to remain mobile during the labour process [9]. Similarly, Regaya *et al.* [9], in a prospective randomized study, evaluated the role of deambulation during labour and supported maternal mobility as an important component of labour management [9]. Thus, perambulation may provide a practical means of improving maternal comfort and supporting physiological labour progress.

Birthing ball exercises have also emerged as an effective non-pharmacological approach to labour management. It allows the women to adopt different sitting, rocking, pelvic tilting, and circular movements during labour. These movements may promote pelvic mobility, improve maternal posture, encourage fetal positioning and descent, and reduce pressure and musculoskeletal discomfort. Sheishaa [10] reported that birthing ball exercises could contribute to the progress of the first stage of labour [3]. The use of birth balls has also been investigated in clinical trials and systematic reviews, with evidence suggesting beneficial effects on labour pain and maternal comfort [11-12].

Taavoni *et al.* [12] compared birth ball use with sacrum-perineal heat therapy and reported the usefulness of birth ball intervention for managing labour pain [12]. Aktaş *et al.* [13] examined birth ball exercises among Turkish women and found beneficial effects in the management of childbirth pain [13]. More recently, Aslantaş and Çankaya [14] evaluated birth ball exercise in relation to labour pain, duration of delivery, birth comfort, and birth satisfaction, providing further evidence regarding its potential role in improving the childbirth experience [15]. Dönmez and Yılmaz [15] also investigated the use of a birth ball combined with squatting during labour and assessed outcomes including pain, duration of labour, and maternal satisfaction [15].

Maternal satisfaction is an important outcome because childbirth is not determined solely by clinical outcomes; the mother's perception of comfort, control, participation, pain management, and support can substantially influence her overall birth experience [3,6-7]. Therefore, interventions that reduce pain while allowing women to actively participate in labour may contribute to improved maternal satisfaction.

Although both perambulation and birthing ball exercises are commonly used to support women during labour, they differ in the nature of movement and maternal positioning. Perambulation primarily involves walking and maintaining upright mobility, whereas birthing ball exercises provide opportunities for sitting, rocking, pelvic tilting, and circular pelvic movements. Both interventions may promote mobility and facilitate labour, but their relative effectiveness in reducing pain and improving maternal satisfaction may differ. Existing literature has predominantly examined birth ball interventions independently or compared them with other non-pharmacological methods, while comparatively limited

evidence is available directly comparing perambulation with birthing ball exercises among primi parturient mothers.

The World Health Organization emphasizes respectful maternity care and recommends approaches that support a positive childbirth experience, including appropriate mobility and supportive care during labour [3]. Evidence-based maternity nursing practice therefore requires the identification of safe, acceptable, and effective interventions that can be incorporated into routine labour management. Comparing simple non-pharmacological interventions may assist nurses and midwives in selecting appropriate strategies according to the needs and preferences of labouring women. Although evidence supports the use of individual non-pharmacological interventions for labour pain management, direct comparative evidence between perambulation and birthing ball exercises remains limited. It is therefore unclear which of these commonly used interventions may provide greater benefits in reducing labour pain and improving maternal satisfaction. This pilot study was conducted to address this knowledge gap and assess the preliminary comparative effects and feasibility of these interventions.

Aim and Objectives

The study aimed to assess and compare the effectiveness of perambulation and birthing ball exercises on the level of pain and maternal satisfaction among primi parturient mothers.

METHODS

A quasi-experimental design was used. The pilot study was conducted at ACS Medical College and Hospital after obtaining ethical and administrative approval. Participants were selected using purposive sampling and allocated non-randomly into two groups: the perambulation group ($n = 10$) and the birthing ball group ($n = 10$).

During the active phase of labour, each group received its respective intervention for 15 minutes, followed by one hour of rest, with the intervention repeated once. Labour progress was assessed using the Modified WHO Partograph, pain using the Visual Analogue Scale, and maternal satisfaction using a researcher-developed rating scale.

Inclusion and Exclusion Criteria

The study enrolled primiparturient mothers aged 19–34 years with a singleton, cephalic pregnancy at 37–40 weeks of gestation, intact membranes, normal fetal heart rate, and cervical dilatation up to 4 cm in true labour. Participants were required to understand Tamil or English and provide written informed consent. Mothers with high-risk or multiple pregnancies, malpresentation, post-term pregnancy, ruptured membranes, assisted conception, planned caesarean section, previous birthing ball experience, or unwillingness to participate were excluded.

Data Collection Procedure

Following approval from the Institutional Ethics Committee and administrative authorities, the pilot study was conducted at ACS Medical College and Hospital from 3 August to 15

August 2024. Eligible primi parturient mothers were identified according to the inclusion criteria, and written informed consent was obtained before enrolment. Twenty participants were selected using purposive sampling and allocated non-randomly into two groups: The Perambulation group (n = 10) and the Birthing Ball group (n = 10).

For the Birthing Ball group, a 65-cm birthing ball was provided by the researcher during the active phase of the first stage of labour (cervical dilatation >4 cm). The mothers were encouraged to perform four exercises in two different positions: pelvic rocking forward and backward, ball bouncing, and hip circles in a sitting position, and hugging the ball in a kneeling position. Each exercise session lasted 15 minutes and was repeated once after a one-hour interval. Mothers were allowed to change their position between exercises as needed. The intervention was administered in the labour room.

For the Perambulation group, mothers were encouraged to walk with support during the active phase of the first stage of labour (cervical dilatation >4 cm). Each perambulation session lasted 15 minutes and was repeated once after a one-hour interval. Following completion of the intervention sessions, labour pain was assessed in both groups using the Visual Analogue Scale when cervical dilatation reached 8–10 cm. Labour progress and outcomes were assessed using the Modified WHO Partograph. Maternal satisfaction was assessed after the intervention using the researcher-developed maternal satisfaction rating scale.

RESULTS

Table 1 presents the demographic characteristics of the primiparturient mothers. Most mothers in both groups were aged 26–30 years, homemakers, Hindu, urban residents,

Table 1: Demographic Variables of the Primi Parturient Mothers

Demographic Variables	Ambulation		Birthing Ball	
	Frequency	Percentage	Frequency	Percentage
Age in years				
21 – 25	1	10.0	2	20.0
26 – 30	7	70.0	5	50.0
31 – 35	2	20.0	3	30.0
Educational status				
No formal education	-	-	-	-
Primary education	3	30.0	5	50.0
Secondary education	4	40.0	3	30.0
Graduate	3	30.0	2	20.0
Occupation				
Self employee	2	20.0	0	0
Government employee	-	-	-	-
Private employee	2	20.0	3	30.0
Homemaker	8	80.0	7	70.0
Work pattern				
Profession	-	-	-	-
Semi profession	0	0	2	20.0
Clerical, shop owner	2	20.0	2	20.0
Skilled worker	1	10.0	0	0
Semi skilled worker	1	10.0	0	0
Unskilled worker	-	-	-	-
Unemployed	6	60.0	6	60.0
Others	-	-	-	-
Religion				
Hindu	7	70.0	7	70.0
Christian	2	20.0	2	20.0
Muslim	1	10.0	1	10.0
Others	-	-	-	-
Residential area				
Slum	-	-	-	-
Rural	4	40.0	2	20.0
Semi urban	0	0	1	10.0
Urban	6	60.0	7	70.0
Others	-	-	-	-
Family type				
Nuclear	7	70.0	6	60.0
Joint	3	30.0	4	40.0
Any other	-	-	-	-
Food pattern				
Vegetarian	1	10.0	0	0
Non-vegetarian	9	90.0	10	100.0
Eggetarian /Ova vegetarian	-	-	-	-
Others	-	-	-	-
Duration between the marriage and conception				

Table 1: Demographic Variables of the Primi Parturient Mothers (Continue)

Demographic Variables	Ambulation		Birthing Ball	
	Frequency	Percentage	Frequency	Percentage
1 year	8	80.0	8	80.0
2 years	2	20.0	2	20.0
3 years	-	-	-	-
More than 3 years	-	-	-	-
Habit of doing regular exercises				
Yes	5	50.0	4	40.0
No	5	50.0	6	60.0
If yes, The Type of exercise				
Walking	5	50.0	4	40.0
others	5	50.0	6	60.0
Duration of exercise (Per day)				
<30 minutes	5	50.0	4	40.0
30 – 60 minutes	-	-	-	-
60 – 90 minutes	-	-	-	-
>90 minutes	-	-	-	-
Nil	5	50.0	6	60.0
Family income per month in Rupees				
≤ Rs.5000	7	70.0	6	60.0
Rs.5001-7000	2	20.0	2	20.0
Rs.7001-9000	1	10.0	2	20.0
≥ Rs.9001	-	-	-	-
Source of information				
Media	0	0	2	20.0
Neighbours	9	90.0	0	0
Health professionals	1	10.0	8	80.0
Family members	-	-	-	-
Gestational age in weeks				
37 – 38 weeks	1	10.0	1	10.0
39 – 40 weeks	9	90.0	9	90.0
41 – 42 weeks	-	-	-	-
Number of antenatal visits till date				
1 – 4 visits	6	60.0	7	70.0
4 – 8 visits	4	40.0	3	30.0
More than 8 visits	-	-	-	-

Table 2: Distribution of Pain and Satisfaction Levels Among Primi Parturient Mothers

Outcome	Category	Ambulation F (%)	Birthing Ball F (%)
Level of Pain	No pain	0 (0.0)	0 (0.0)
	Mild pain	0 (0.0)	0 (0.0)
	Moderate pain	0 (0.0)	8 (80.0)
	Severe pain	0 (0.0)	2 (20.0)
	Worst possible pain	10 (100.0)	0 (0.0)
Level of Satisfaction	Very dissatisfied	0 (0.0)	0 (0.0)
	Dissatisfied	0 (0.0)	0 (0.0)
	Just satisfied	0 (0.0)	0 (0.0)
	Moderately satisfied	9 (90.0)	0 (0.0)
	Highly satisfied	1 (10.0)	10 (100.0)

*p<0.001, S – Significant, N = 20

Table 3: Assessment of Partograph During Progress of the First Stage of Labour

Partograph	Ambulation		Birthing Ball	
	Frequency	Percentage	Frequency	Percentage
Duration of labour				
6 – 8 hours	0	0	7	70.0
8 – 12 hours	8	80.0	3	30.0
>12 hours	2	20.0	0	0
Rate of cervical dilatation				
<1 cm/hour	7	70.0	8	80.0
1 cm/hour	3	30.0	2	20.0
>1 cm/hour	-	-	-	-
Rupture of membrane				
Spontaneous	9	90.0	10	100.0
Artificial	-	-	-	-
Premature rupture of membrane	1	10.0	0	0

Table 3: Assessment of Partograph During Progress of the First Stage of Labour (Continue)

Partograph	Ambulation		Birthing Ball	
	Frequency	Percentage	Frequency	Percentage
Augmentation/induction of labor				
Not done	7	70.0	8	80.0
Done with oxygen	3	30.0	2	20.0
If any special medication	-	-	-	-
Analgesics during labour				
given	4	40.0	6	60.0
Not given	6	60.0	4	40.0
vitals				
Stable	10	100.0	10	100.0
Not stable	-	-	-	-
Mode of delivery				
Vaginal with episiotomy	10	100.0	10	100.0
Forceps vaginal	-	-	-	-
Vacuum vaginal	-	-	-	-
Caesarean section	-	-	-	-

Table 4: Comparison of Pain Scores During Progress of First Stage of Labour Between Ambulation and Birthing Ball Groups

Variable	Ambulation Mean±SD	Birthing Ball Mean±SD	Mean Difference	Independent <i>t</i> value	P-value
Pain score	9.50±0.84	6.10±1.44	3.40	6.400	0.0001*

p<0.001, S – Significant, N=20

Table 5: Comparison of Satisfaction Scores During Progress of First Stage of Labour Between Ambulation and Birthing Ball Groups

Variable	Ambulation Mean±SD	Birthing Ball Mean±SD	Mean Difference	Independent <i>t</i> value	P-value
Satisfaction score	63.50±1.71	74.00±1.05	10.50	16.488	0.0001*

p<0.001, S – Significant, N = 20

from nuclear families, and non-vegetarians. The majority had a one-year interval between marriage and conception and a monthly family income of ≤Rs. 5,000.

Table 2 presents the categorical distribution of labour pain and maternal satisfaction between the Ambulation and Birthing Ball groups. Pain was assessed using the Visual Analogue Scale (VAS) and categorized as no pain (0), mild pain (1–3), moderate pain (4–6), severe pain (7–9), and worst possible pain (10). The Birthing Ball group showed lower levels of pain and higher maternal satisfaction compared with the Ambulation group. Table 3 presents the partograph outcomes among primiparturient mothers. The Birthing Ball group had a shorter labour duration compared with the Ambulation group. Other outcomes, including cervical dilatation, membrane rupture, maternal vital signs, and mode of delivery, were comparable between the groups.

Table 4 compares the mean VAS pain scores between the Ambulation and Birthing Ball groups. The mean difference was 3.40. The independent *t*-test showed a statistically significant changes between the groups ($t = 6.400$, $p = 0.0001$, $p < 0.001$). Table 5 compares the mean maternal satisfaction scores between the Ambulation and Birthing Ball groups. The independent *t*-test showed a statistically significant difference in maternal satisfaction between the two groups ($t = 16.488$, $p = 0.0001$; $p < 0.001$).

DISCUSSION

The present study assessed the effect of perambulation and birthing ball exercises on pain and maternal satisfaction during the first stage of labour among primiparturient mothers. Findings showed that mothers in the Birthing Ball

group experienced significantly reduced the pain and greater maternal satisfaction than those in the Ambulation group.

All mothers in the Ambulation group reported possible pain, whereas 80% of the Birthing Ball group had moderate pain and 20% had severe pain ($\chi^2 = 20.0$, $p = 0.0001$). Similarly, the mean pain score was significantly lower in the Birthing Ball group (6.10±1.44) than in the Ambulation group (9.50±0.84; $t = 6.400$, $p = 0.0001$).

Maternal satisfaction was also significantly more among mothers using the birthing ball, with all participants reporting high satisfaction compared with only 10% in the Ambulation group. The mean satisfaction score was significantly higher in the Birthing Ball group (74.00±1.05) than in the Ambulation group (63.50±1.71; $t = 16.488$, $p = 0.0001$). Overall, birthing ball exercises were more effective than perambulation in reducing labour pain and improving maternal satisfaction. However, analgesics were administered to 40% of mothers in the Perambulation group and 60% of mothers in the Birthing Ball group. This difference represents a potential confounding factor, as analgesic use may have influenced the reported pain outcomes.

The assessment of the partograph showed differences in the duration of labour between the two groups. In the Birthing Ball group, 70% of mothers had a duration of labour of 6–8 hours, while 30% had a duration of 8–12 hours. In comparison, 80% of mothers in the Ambulation group had a duration of 8–12 hours and 20% had a duration exceeding 12 hours. The distribution of labour duration was significantly different between the Ambulation and Birthing Ball groups ($p < 0.05$). A greater proportion of mothers in the Birthing Ball group had a labour duration of 6–8 hours, whereas most

mothers in the Ambulation group had a duration of 8–12 hours. The study also showed that maternal vital signs remained stable among all mothers in both groups and that all mothers had vaginal delivery with episiotomy. This indicates that both interventions were associated with stable maternal outcomes within the study sample.

The association analysis showed that selected demographic variables were associated with pain and satisfaction in the Birthing Ball group. Pain level showed statistically significant associations with age and gestational age, while satisfaction showed significant associations with occupation and duration between marriage and conception according to the supplied statistical analysis. Most of the remaining demographic variables did not demonstrate statistically significant associations. Overall, the findings of the present study suggest that the birthing ball was more effective than ambulation in reducing pain and improving maternal satisfaction during the first stage of labour. The statistically significant differences in both pain and satisfaction scores support the potential usefulness of birthing ball exercises as a non-pharmacological method of supporting women during labour.

CONCLUSIONS

The present study concluded that the birthing ball intervention was more effective than ambulation in reducing pain and improving maternal satisfaction among primi parturient mothers during the first stage of labour. Both differences were statistically significant with $p = 0.0001$. The findings also demonstrated a favourable distribution of labour duration among mothers who used the birthing ball, with 70% completing labour within 6–8 hours compared with none in the Ambulation group. Therefore, the birthing ball can be considered a useful non-pharmacological nursing intervention for supporting primi parturient mothers during the first stage of labour, particularly for reducing perceived pain and enhancing maternal satisfaction.

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