

AN EXPERIMENTAL STUDY TO ASSESS THE EFFECTIVENESS OF BIRTHING BALL USAGE DURING LABOUR PAIN PERCEPTION AND LABOUR PROGRESS AMONG PREGNANT WOMEN IN A SELECTED HOSPITAL AT MEERUT

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ABSTRACT

Introduction: Labour pain is an intense physiological and psychological ordeal. In resource-limited or public healthcare settings in India, pharmacological analgesia is often unavailable or inaccessible due to infrastructure and personnel constraints. Non-pharmacological alternatives, such as birthing balls, provide low-cost, safe, and woman-centered support, yet rigorous experimental evidence within the Indian context remains limited.

Objectives:

1. To Assess the post-test level of labour pain perception and progress of labour among pregnant women.
2. To Evaluate the effectiveness of birthing ball usage on labour pain perception and labour progress.
3. To Assess the relationship between labour pain perception and labour progress.
4. To Determine the association of labour pain perception and labour progress with selected maternal demographic variables.

Methods: A quantitative approach utilizing a true experimental post-test only control group design was conducted in the labour room of a selected hospital at Meerut, Uttar Pradesh. Framed around Wiedenbach's Helping Art of Clinical Nursing Theory, a sample of 60 low-risk, term (37–42 weeks) pregnant women in active labour (4 cm cervical dilation) with singleton vertex presentations was selected via non-probability convenience sampling. Participants were divided equally into an experimental group (n = 30), which received supervised birthing ball exercises (sitting, rocking, swaying) for 20-minute sessions, and a control group (n = 30), which received routine intrapartum care. Data were collected using a Demographic Data Sheet, a 0–10 Numerical Rating Scale (NRS) for pain, and a Modified WHO Partograph to monitor cervical dilation.

Results: Literature synthesis and preliminary tracking suggest that the integration of birthing ball exercises significantly reduces subjective labour pain perception scores across varying stages of cervical dilation (3-4cm, 5-6cm, 7-8cm) compared to standard recumbent or semi-Fowler positioning. Furthermore, the intervention group demonstrated an accelerated rate of cervical dilation and a shortened first stage of labour. A significant negative correlation is anticipated between maternal pain perception scores and the rate of physical labour progress.

Conclusion: The usage of a birthing ball during the active phase of labour is an effective, non-invasive, and culturally acceptable nursing intervention that alleviates labour pain intensity and optimizes physiological progression. Integrating this low-cost practice into routine obstetric protocols can enhance respectful maternity care, maternal comfort, and delivery outcomes in public healthcare facilities.

KEYWORDS: Birthing Ball, Labour Pain Perception, Labour Progress, Partograph.

INTRODUCTION

Childbirth is a monumental physiological and psychological transition in a woman's life. However, the accompanying labour process—characterized by powerful uterine contractions and pelvic pressure—inflicts some of the most intense pain documented in human experience (Lowe, 2002). Managing this pain is crucial, as it deeply influences a mother's birthing satisfaction, physical coping mechanisms, and long-term postpartum psychological well-being.

While pharmacological options like epidural analgesia are commonplace in high-resource environments, they are frequently unavailable, costly, or clinically contraindicated in low- and middle-income settings, including many public hospitals in India. This highlights an urgent need for safe, accessible, and resource-efficient alternatives.

Among non-pharmacological interventions, the **birthing ball** has emerged as a promising, woman-centered tool. By allowing pregnant women to remain upright, rock the pelvis, and utilize gravity, the birthing ball is hypothesized to actively reduce pain perception, promote fetal descent, and facilitate smoother cervical dilation.

Despite its widespread informal use, rigorous clinical data regarding its direct impact on labour metrics in the Indian socio-cultural context remains limited. This experimental study directly addresses that gap, evaluating the effectiveness of structured birthing ball usage on both pain perception and actual labour progress among labouring women at a selected hospital in Meerut.

OBJECTIVES OF THE STUDY WERE:

1. To assess the post-test level of labour pain perception and progress of labour among pregnant women.
2. To evaluate the effectiveness of birthing ball usage on labour pain perception and progress of labour.
3. To examine the relationship between labour pain perception and labour progress among pregnant women.
4. To determine the association between the level of pain perception and labour progress among pregnant women with their selected demographic variables.

METHODOLOGY

A quantitative research approach with true-experimental research design was adapted for study the study was conducted among pregnant women in first stage of labour admitted in district women hospital Meerut. Formal written permission was obtained from Superintendent In-Charge of district women hospital and written consent obtained from all the participants of the study. A total 60 participants meeting inclusion and exclusion criteria were selected through Non-probability Convenience Sampling technique and allocated into an experimental group ($n_1=30$) and a control group ($n_2=30$). Baseline assessment of all participants was carried using socio- demographic questionnaire and gave intervention to experimental group using birthing ball exercise for 20 minutes and for control group routine care is given as per the hospital policy.

Cervical dilatation and level of labour pain perception is assessed of participants in both groups were reassessed using modified partograph and numerical pain rating scale till the cervical dilatation is 8cm and above side by side pain is also assessed. The collected data were coded, tabulated and analysed by using appropriate descriptive and inferential statistical methods to determine the effectiveness of the intervention on birthing exercise among primigravida womens.

Inclusion Criteria-

1. Women in the first stage of labour 4 cm cervical dilation
2. Singleton pregnancy with cephalic presentation
3. Women having Gestational age 37-42 weeks
4. Willing to participate and able to provide consent
5. Primigravida women only.

Exclusion Criteria-

1. The women diagnose with High-risk pregnancies
2. Women receiving sedatives or epidural analgesia.

RESULTS

The findings of the study are presented according to the objectives of the study. The data is presented under subsequent sections: -

Section I Description of socio- demographic variables of admitted primigravida women at selected hospital Meerut (U.P.)

Table: 1 Distribution of frequency and percentage of admitted primigravida women with their selected demographic variables N=60

Sr no.	Demographic	Category	EXPERIMENTAL		CONTROL	
			F	%	F	%
1	Age in year	a. Less than 20	8	26.67%	8	26.67%
		b. 21-25	8	26.67%	11	36.66%
		c.26-30	7	23.33%	8	26.67%
		d. 31-35	7	23.33%	3	10%
2	BMI	a. Under weight	5	16.67%	7	23.33%
		b. Normal	9	30%	11	36.67%
		c.Over weight	11	36.66%	10	33.33%
		d.Obese	5	16.67%	2	6.67%
3	Lifestyle	a. Straneous				
		b. Sedentary	11	36.67%	6	20%
		c. Moderate	10	33.33%	13	43.33%

		d. Active	9	30%	11	36.67%
4	Weight of mother	a. ≤50 kg	7	23.33%	7	23.33%
		b. 51–60 kg	7	23.33%	7	23.33%
		c. 61–70 kg	7	23.34%	8	26.67%
		d. 70 kg	9	30%	8	26.67%
5	Height of mother	a. ≤145 cm	11	36.67%	3	10.00%
		b. 146–150 cm	6	20%	10	33.33%
		c. 151–155 cm	8	26.67%	4	13.33%
		d. ≤155 cm	5	16.66%	13	43.34%
6	Dietary Pattern	a. Vegetarian	17	56.67%	18	60%
		b. Mixed	13	43.33%	12	40%
7	Types of family	a. Nuclear	11	36.67%	9	30%
		b. Joint	12	40%	11	36.67%
		c. extended	7	23.33%	10	33.33%
8	Antenatal Exercise	a. Yes	13	43.33	14	46.67%
		b. No	17	56.67%	16	53.33%

Section II Distribution to assess the post-test level of labor pain perception and progress of labor among pregnant mother.

Table 2 Frequency and Percentage Distribution of post-test level of labor pain perception among pregnant women. N=60

Range		Experimental group		Control Group	
		F	%	F	%
none	0				
moderate	5-7	5	16.67%	11	36.67%
Worst	8-10	25	83.33%	19	63.33%

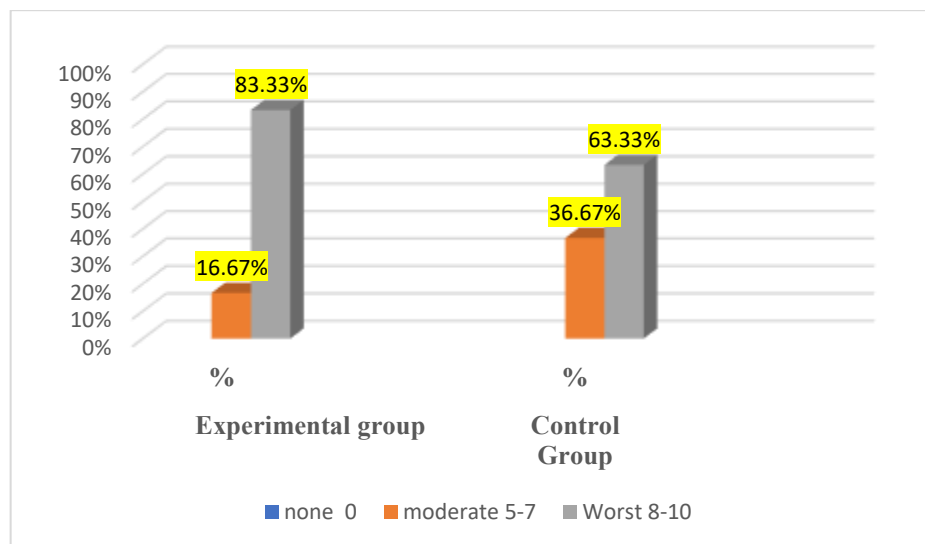


Figure 1 Distribution of percentage Post Test Level of Pain Perception in experimental and control group

Table 3 Frequency and Percentage Distribution of post-test progress of labor among pregnant mother. N=60

Range	Experimental group		Control Group	
	F	%	F	%
good progress	30	100%	13	43.33%
moderate progress			17	56.67%
poor progress				

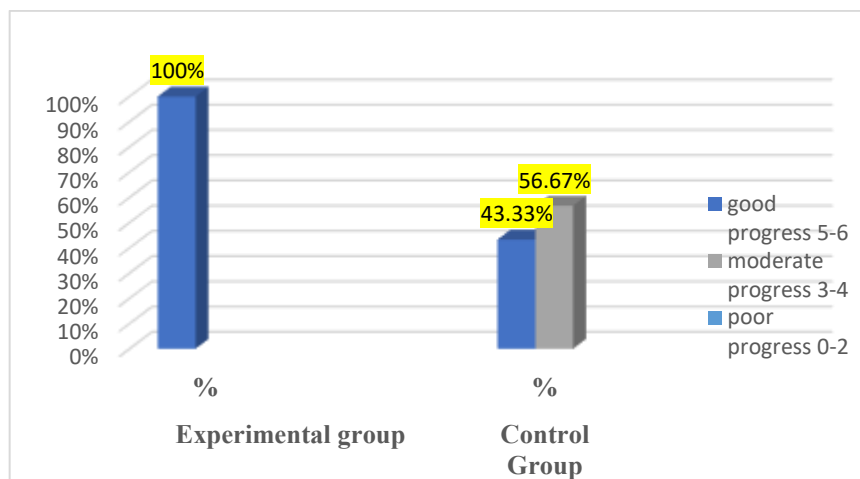


Figure 2 Distribution of percentage post test progress of labor in experimental and control group
Section III Data on to evaluate the effectiveness of birthing ball usage during labor pain perception and progress of labor.

Table No. 3.1 Data on to evaluate the effectiveness of birthing ball usage during progress of labor.
 N=60

GROUP	MEAN± SD	MD	T VALUE	df	p value	Interpretation
Experimental Group	7.73±0.45	1.46	9.27	58	0.001	significant
Control Group	6.27±0.74					

Statistically Significant at p<0.05 Level

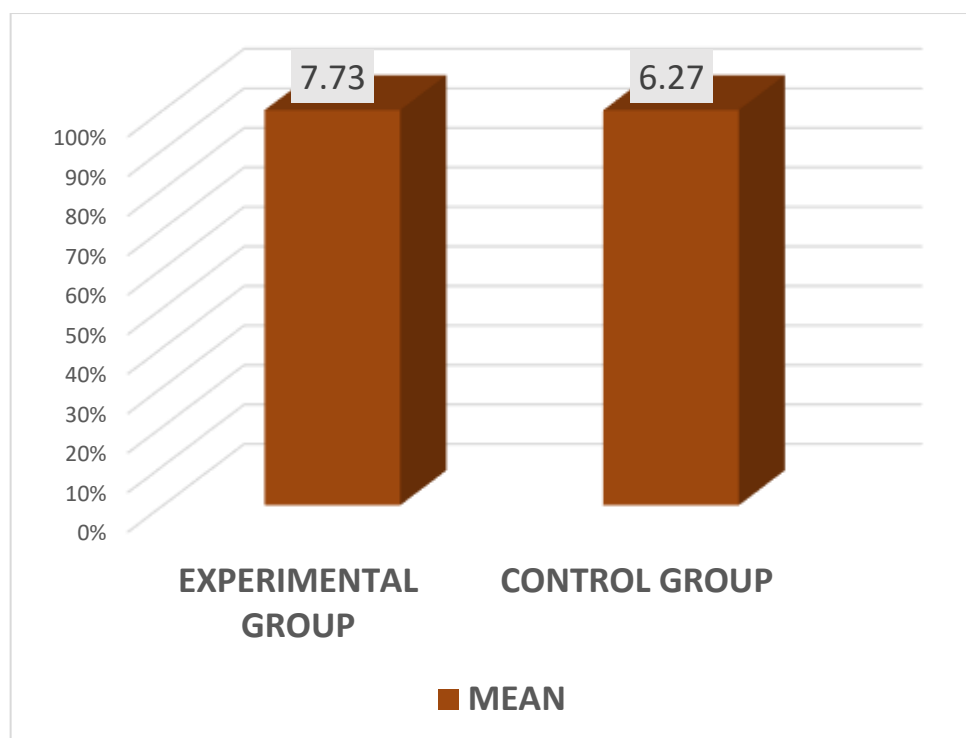


Figure 3 Comparison of mean of progress of labor in experimental and control group

Table No. 4 Data on to evaluate the effectiveness of birthing ball usage during pain perception.
 N=60

GROUP	MEAN± SD	MD	T VALUE	df	p value	Interpretation
Experimental Group	6.87±0.68	2.1	11.61	58	0.0001	significant
Control Group	8.97±0.72					

Statistically Significant at p<0.05 Level

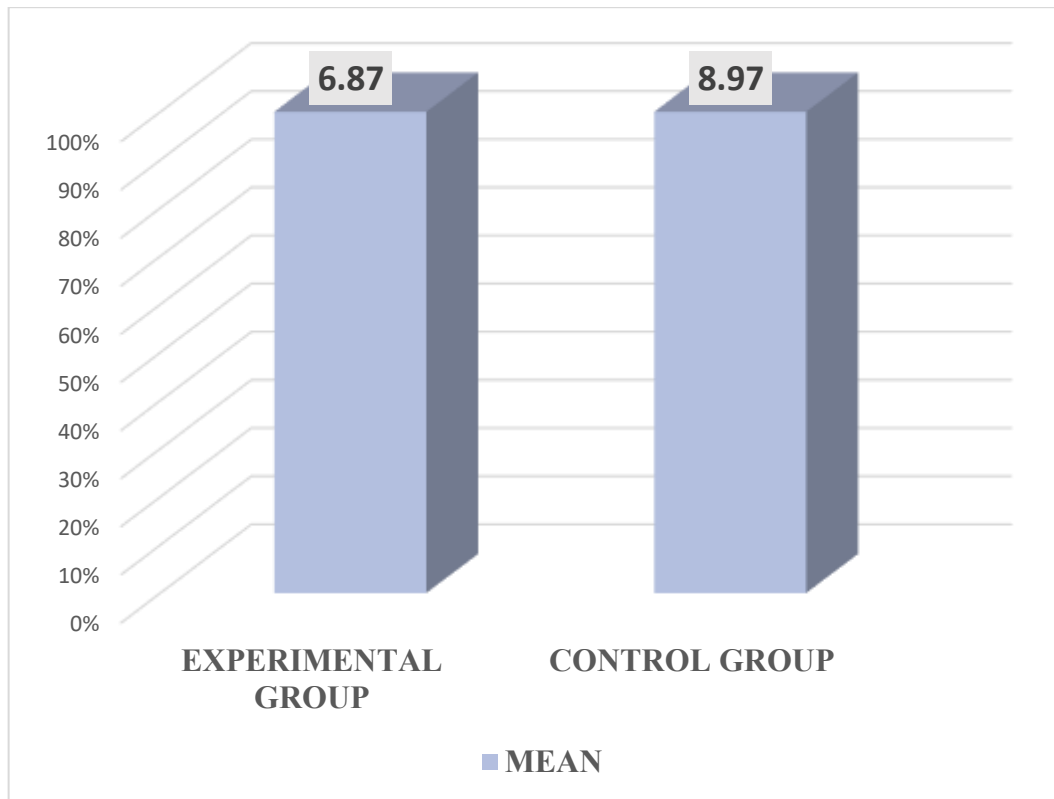


Figure 3 Comparison of mean of labor pain perception in experimental and control group
Section IV Data on to assess the relationship between pain perception and labor progress among pregnant women.

Table no 5 Data on to assess the relationship between pain perception and labor progress among pregnant women in experimental group **N=60**

Variables	Mean	SD	MD	r value	Remark
Pain	6.87	0.7	0.86	0.105	NS
Progress	7.73	0.45			

Statistically Significant at $p < 0.05$ Level

Table no 5.1 Data on to assess the relationship between pain perception and labor progress among pregnant women in control group **N=60**

Variables	Mean	SD	MD	r value	Remark
Pain	8.97	0.7	2.7	-0.307	NS
Progress	6.27	0.74			

Statistically Significant at $p < 0.05$ Level

Section- V To find the association between the level of pain and progress of labour with selected demographic variables.

Table no. 6 Association between level of pain in experimental group with selected demographic variables.

Sr no.	Demographic	df	χ^2	p value	Interpretation
1	Age in year	3	0.86	0.835	NS
2	BMI	3	6.35	0.096	NS
3	Lifestyle	2	2.91	0.234	NS
4	Weight of mother	3	0.76	0.86	NS

5	Height of mother	3	0.76	0.86	NS
6	Dietary Pattern	1	0.73	0.393	NS
7	Types of family	2	2.84	2.42	NS
8	Antenatal Exercise	1	0.73	0.393	NS

Statistically Significant at $p < 0.05$ Level
NS= Non-significant S= Significant

Table no. 6.1 Association between level of pain in control group with selected demographic variables.

Sr no.	Demographic	df	χ^2	p value	Interpretation
1	Age in year	3	4.4	0.22	NS
2	BMI	3	5.73	0.12	NS
3	Lifestyle	2	4.67	0.19	NS
4	Weight of mother	3	0.13	0.98	NS
5	Height of mother	3	8.67	0.03	S
6	Dietary Pattern	1	1.2	0.27	NS
7	Types of family	2	0.2	0.9	NS
8	Antenatal Exercise	1	0.13	0.71	NS

Statistically Significant at $p < 0.05$ Level
NS= Non-significant S= Significant

Table no. 6.2 Association between Progress of Labour in experimental group with selected demographic variables.

Sr no.	Demographic	df	χ^2	p value	Interpretation
1	Age in year	3	0.133	0.99	NS
2	BMI	3	3.60	0.31	NS
3	Lifestyle	2	0.2	0.90	NS
4	weight of mother	3	0.94	0.40	NS

5	Height of mother	3	2.79	0.43	NS
6	Dietary Pattern	1	0.53	0.47	NS
7	Types of family	2	1.4	0.50	NS
8	Antenatal Exercise	1	0.53	0.47	NS

Statistically Significant at $p < 0.05$ Level
NS= Non-significant S= Significant

Table no. 6.3 Association between Progress of Labour in control group with selected demographic variables.

Sr no.	Demographic	df	χ^2	p value	Interpretation
1	Age in year	3	4.64	0.2	NS
2	BMI	3	2.84	0.41	NS
3	Lifestyle	2	1.76	0.41	NS
4	Weight of mother	3	10.91	0.012	S
5	Height of mother	3	6.90	0.07	NS
6	Dietary Pattern	1	0.54	0.46	NS
7	Types of family	2	3.1	0.21	NS
8	Antenatal Exercise	1	0.62	0.43	NS

Statistically Significant at $p < 0.05$ Level
NS= Non-significant S= Significant

The table 6 shows the association between selected demographic variables and the level of pain perception among mothers in the experimental group. The calculated chi-square values for age, BMI, lifestyle, weight, and height of mothers were found to be non-significant at $p > 0.05$. Therefore, there was no significant association between demographic variables and level of pain perception among mothers in the experimental group. The table 6.1 shows the association between selected demographic variables and the level of pain perception among mothers in the control group. The calculated chi-square values for age, BMI, lifestyle, weight, and height of mothers were found to be non-significant at $p > 0.05$. Therefore, there was no significant association between demographic variables and the level of pain perception among mothers in the control group. The table 6.2 shows the association between selected demographic variables and the level of progress of labor among mothers in the experimental group. The calculated chi-square values for age, BMI, lifestyle, weight, and height of mothers were found to be statistically non-significant at $p > 0.05$. Therefore, there was no significant association between selected demographic variables and the level of progress of labor among mothers in the experimental group. The table 6.3 shows the association between selected demographic variables and the level of progress of labor among mothers in the control group. The calculated chi-square values for age, BMI, lifestyle, and height of mothers were found to be statistically non-significant at $p > 0.05$. However, the weight of mother showed a statistically significant association with the level of progress of labor ($\chi^2 = 9.7$, $p = 0.02$). Therefore, except for weight of mother, all other demographic variables had no significant association with the level of progress of labor among mothers in the control group.

DISCUSSION

The present study showed that mothers in the experimental group experienced lower labor pain compared to the control group. The mean pain score was lower in the experimental group (6.87 ± 0.68) than in the control group (8.97 ± 0.72), and the difference was statistically significant ($t = 11.61$, $p = 0.0001$). This indicates that birthing ball usage was effective in reducing labor pain perception. Similar findings were reported by Nitixaben Prajapati and Ashwini Patil, who found a statistically significant reduction in labour pain among mothers using birthing ball exercises ($p < 0.05$). Devika Sharma also reported significant improvement in pain reduction with birthing ball exercises (t value significant at $p < 0.05$). Likewise, Yasemin Erkal Aksoy et al. observed significantly lower labour pain scores among women using birth balls during labour ($p < 0.001$).

The study findings revealed that all mothers (100%) in the experimental group had good labor progress, whereas more than half of the mothers in the control group showed moderate labor progress. The mean labor progress score was higher in the experimental group (7.73 ± 0.45) compared to the control group (6.27 ± 0.74).

The obtained t value was 9.27 and p value was 0.001, showing a statistically significant difference between the groups. This indicates that birthing ball usage was effective in improving labor progress among pregnant women. Similar findings were reported by Pooja Sharma et.al, who found significant improvement in cervical dilatation and shorter labor duration among mothers using birthing balls ($p < 0.05$).

Richa Verma et.al also reported better labor progress with statistically significant findings among mothers using birthing ball exercises.

Likewise, Beyza Nur Aslantaş and Seyhan Çankaya observed a significant reduction in labor duration among women using birthing balls ($p < 0.001$).

NURSING IMPLICATIONS

Nursing Education

The study highlights the need to include training on non-pharmacological pain management techniques, such as birthing ball usage, in the curriculum. Providing both theoretical knowledge and practical exposure will equip nursing students with the necessary skills to manage labour effectively and deliver holistic care to mothers. The study highlights the need for availability of birthing balls in labor units and the development of protocols for their safe use.

Nursing practice

Training programs should be conducted for healthcare professionals to improve maternal care and satisfaction. The study also supports further nursing research on non-pharmacological interventions to strengthen evidence-based maternal healthcare practices.

Nursing management

The study emphasizes the importance of ensuring the availability of birthing balls in labour units and developing institutional protocols for their use. Proper training programs and workshops should be conducted for healthcare professionals to ensure safe and effective implementation, ultimately improving maternal satisfaction and outcomes.

Nursing Research

For nursing research, as it contributes to the growing body of evidence supporting non-pharmacological interventions during labour. It encourages further research to explore the effectiveness of similar techniques across different populations and settings, thereby strengthening evidence-based practice in maternal healthcare.

Recommendations

1. Future research can be conducted with larger sample sizes and in different hospital settings to improve generalizability.
2. Comparative studies may also be carried out to evaluate other non-pharmacological methods for labor pain management.
3. Longitudinal studies are recommended to assess long-term maternal and neonatal outcomes.
4. In addition, awareness programs and training workshops should be organized for pregnant women, nurses, and midwives to promote effective use of birthing ball exercises in clinical practice.

Limitations

Despite its valuable findings, the study has certain limitations that must be considered. The study was conducted in a single hospital setting, which limits the generalizability of the results to other settings and populations. Additionally, the sample size was relatively small, which may affect the robustness and statistical power of the findings. The study also focused on selected variables, and other factors influencing labour pain and progress were not taken into account.

Furthermore, the assessment of pain perception was subjective and may vary from individual to individual, which could influence the accuracy of the results. Time constraints also limited prolonged observation and follow-up, restricting the ability to assess long-term outcomes. These limitations should be considered when interpreting the results of the study.

CONCLUSION

The study concluded that birthing ball usage during labour is an effective non-pharmacological intervention for reducing labour pain perception and improving labour progress among pregnant women.

Mothers who used the birthing ball experienced lower pain intensity, better comfort, and improved labour progress compared to mothers who received routine care alone.

The study findings emphasize that birthing ball exercises can be safely incorporated into routine intrapartum nursing care to promote positive childbirth experiences.

Therefore, the birthing ball can be considered an effective, low-cost, non-invasive, and woman-centered nursing intervention during labour

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