Research Article

Effectiveness of Peanut Ball on Outcome of First Stage of Labour Among Primi Mothers

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Abstract:

Introduction: Childbirth, particularly the first stage of labour, can be physically and emotionally challenging for primigravida mothers due to labour pain, anxiety, and prolonged labour. The peanut ball is a promising non-pharmacological intervention that may reduce labour pain, facilitate cervical dilatation, promote fetal descent, and improve labour progression. Therefore, assessing the effectiveness of peanut ball use during the first stage of labour is important to promote maternal comfort and support safe, evidence-based maternity nursing care. **Objectives**: To assess the pain and progress of labor among primi mothers, in experimental and control group. To determine the effectiveness of peanut ball on outcome of first stage labour among primi mothers in experimental group. **Methodology:** Quantitative evaluative research approach applied with pre-experimental two group pre-test and post-test design. Purposive sampling technique used to select primi mothers, each experimental and control group had 21 samples. **Results:** Peanut ball intervention significantly reduced labour pain ($t = 9.12$, $p < 0.05$), improved cervical dilatation ($t = 2.11$, $p = 0.04$), and shortened labour duration ($t = 5.60$, $p < 0.05$) in the experimental group. However, no statistically significant difference was observed in the station of the presenting part ($t = 1.33$, $p = 0.19$) compared with the control group.

Key words: peanut ball, primi mothers, effectiveness, first stage of labor, pain.

Introduction:

Pregnancy is a unique and transformative journey in a woman's life, bringing physical, emotional, and psychological changes. Labour is a natural physiological process through which the fetus, membranes, umbilical cord, and placenta are delivered from the uterus. Although childbirth is a joyful experience, the process of labour can be physically demanding and emotionally challenging, particularly for primigravida mothers experiencing childbirth for the first time.

Labour is traditionally divided into four stages, with the first stage being the longest. It begins with the onset of regular uterine contractions and continues until complete cervical dilatation. This stage generally lasts approximately 12–16 hours in primigravida mothers and 6–8 hours in multiparous mothers. During this period, women experience increasing uterine contractions, labour pain, fatigue, anxiety, and discomfort. Prolonged labour may further increase maternal exhaustion and the need for obstetric interventions.

Effective labour management focuses not only on pain relief but also on promoting maternal comfort and facilitating normal labour progression. Pharmacological methods provide pain relief; however, non-pharmacological interventions such as relaxation techniques, breathing exercises, massage, hydrotherapy, music therapy, ambulation, and appropriate positioning offer additional physical and psychological support.

One promising non-pharmacological intervention is the peanut ball, an innovative, peanut-shaped exercise ball with a narrow centre and wider rounded ends. It is positioned between the mother's thighs or knees, particularly in lateral and semi-recumbent positions. Peanut ball positioning helps facilitate pelvic opening, encourage fetal rotation and descent, and support cervical dilatation (Roth et al., 2016). It is particularly useful for women receiving epidural analgesia, as it helps maintain comfortable positioning during labour (Mercier & Kwan, 2018).

The World Health Organization recommends mobility and position changes during labour to support physiological childbirth. In this context, peanut ball use may provide a practical approach to improving maternal comfort and labour progress.

Need for the study:

Childbirth is a significant life event, but the experience of labour can be physically and emotionally challenging, particularly for primigravida mothers. The first stage of labour is often associated with intense uterine contractions, severe pain, anxiety, fatigue, and prolonged labour. Prolonged labour may increase the risk of maternal complications such as chorioamnionitis and postpartum haemorrhage, as well as neonatal complications, including admission to the neonatal intensive care unit (NICU). Therefore, identifying safe, effective, and affordable interventions to promote normal labour progression is essential.

Research evidence highlights the potential benefits of peanut ball use during labour. A randomized controlled trial conducted by Roth et al. (2016) demonstrated that peanut ball positioning significantly reduced the duration of the first stage of labour among primiparous women undergoing elective induction with epidural analgesia ($p = 0.018$). However, no significant reduction was observed among multiparous women ($p = 0.057$), and pushing duration was not significantly affected. These findings indicate that peanut ball intervention may be particularly beneficial for first-time mothers.

Appropriate maternal positioning during labour can facilitate pelvic opening, encourage fetal rotation and descent, improve maternal comfort, and support physiological labour progression. Zwilling, Johnson, and Allen (2006) suggested that pelvic expansion through positioning may help achieve optimal fetal alignment for delivery.

The peanut ball is a non-invasive, reusable, non-pharmacological, and relatively affordable intervention, making it a practical option in maternity care. It may help reduce dependence on pharmacological pain management while supporting maternal comfort.

During clinical experience, the researcher observed that many primigravida mothers experienced severe labour pain, anxiety, fear of childbirth, and difficulty coping with uterine contractions. This observation created an interest in exploring alternative comfort measures, particularly peanut ball positioning.

Therefore, the researcher considered it important to assess the effectiveness of peanut ball use during the first stage of labour among primigravida mothers, focusing on labour pain, cervical dilatation, descent of the presenting part, and total duration of labour. The study aims to generate evidence supporting its integration into quality, safe, and woman-centred maternity nursing care.

Aim: The aim of the study is to evaluate the effectiveness of the peanut ball on the outcome of the first stage of labor among women in labor. Objectives: To assess the pain and progress of labor among primi mothers, in experimental and control group. To determine the effectiveness of peanut ball on outcome of first stage labour among primi mothers in experimental group.

Materials And Methods:

Research approach: Quantitative evaluative research approach. Research design: Pre-experimental two group pre-test and post-test design. Setting: Labor room of selected hospitals. Sampling Technique - Purposive sampling technique. Sample and sample size: The sample size decided for the present study was 42 primi mothers who meet the inclusion and exclusion criteria, each experimental and control group had 21 samples. Inclusion criteria: Primi mothers who are; when a singleton pregnancy, presenting with a vertex presentation, with full-term pregnancy and without any high risk condition. Exclusion criteria: Fetal distress, mothers who are willing to participate, those who are not present at the time of data collection.

Operational Definitions:

Peanut ball: The term "peanut ball" in this study refers to a large, 40–50 cm plastic exercise ball with a peanut-like form. During the active phase of labor, this ball will be positioned lateral to the mother's legs (4 cm), and it will be taken out after the cervix is fully dilated (10 cm) at the end of the first stage of labor.

Calibration method for using peanut ball:

1. Selection of Correct Ball Size: Choose peanut ball size according to maternal height and pelvic width. Short mothers → small size ball, Average height → medium size ball. Tall mothers → large size ball The ball should keep hips slightly abducted and aligned with pelvis when placed.

2. Inflate the peanut ball to firm but compressible consistency: When pressed with palm, the ball should depress slightly but not collapse. Ensure no air leakage before use.
3. Maternal Positioning Calibration: Place the mother in side-lying or semi-recumbent position. Position the peanut ball between the thighs, ensuring: Knees slightly flexed, Hips open and relaxed, Spine in neutral alignment. Adjust ball position until pelvic opening is maintained without discomfort. Comfort and Safety Assessment
4. Infection Control: Clean the peanut ball with 0.5% Sodium hypochlorite solution (bleach solution) → widely used for equipment disinfection. Wipe the peanut ball before and after each patient use. Allow surface to air dry before reuse

Outcome of 1st stage of labor: In this study it refers to assessment of pain and duration of 1st stage of labor by using numerical pain scale and observation method (rate of cervical dilatation and descent of presenting part) by doing PV examination. **Effectiveness:** The degree to which peanut balls lessen the pain and length of the first stage of labor in primi Mothers is the study's definition of effectiveness.

Intervention protocol for study:

1.Preparation Phase: Obtain ethical committee permission from the institution. Obtain written informed consent from primi mothers. Explain the purpose and procedure of peanut ball use.
Assess eligibility according to inclusion and exclusion criteria. Record baseline maternal and fetal parameters.
2.Materials Required: Peanut ball of appropriate size that is 40 cm. Disposable cover/clean sheet Pillow and bed support. Fetal monitoring equipment. Partograph, Clock, hand sanitizer and disinfectant solution.
3.Intervention Protocol (Experimental Group): Peanut ball intervention will be started when the mother enters active phase of labor (4-5 cm cervical dilatation).
4. Procedure of Peanut Ball Application: Wash hands and maintain aseptic precautions. Place the mother in comfortable side-lying or semi-sitting position. Explain each position before application.
5. Duration of Intervention: Each position maintained for approximately 20-30 minutes.
Positions changed every 30-60 minutes according to maternal comfort and labour progress.
Peanut ball used continuously during active first stage of labour until full cervical dilatation.
6. Monitoring During Intervention: Assess and record-Cervical dilatation, Descent of presenting part, Maternal vital signs, Pain perception level, Maternal comfort and tolerance
Monitoring done every 30 minutes to 1 hour as per labour room protocol.
7. Control Group: Mothers in the control group will receive routine labour care without use of peanut ball.
8. Outcome Measures: Duration of first stage of labor, Cervical dilatation progress, Descent of presenting part, Pain perception, Maternal and fetal outcome
9. Infection Control Measures: Clean peanut ball with disinfectant solution before and after each use. Use clean covers for every mother.
10. Termination Criteria: intervention will be stopped if- Mother experiences discomfort or exhaustion, Fetal distress occurs, Obstetric complications arise, Emergency cesarean section is required.
Tool used for the study: Section I**- S**ocio-demographic data, Section II- Numerical pain rating scale is used to assess pain. Section III-Cervical dilatation and presenting part descent are assessed by observation.

Hypotheses: - H0- There will be no significant difference in outcome of first stage of labour after use of peanut ball among primi mothers in experimental group and control group. H1: There will be a significant difference in outcome of first stage of labour after use of peanut ball among primi mothers in experimental group.

Results:

Table 1: Frequency & percentage distribution of socio-demographic data of primi mothers

Socio-demographic variable	Experimental group Freq.(%)	Control group Freq.(%)
Age (in years)		
18-24	4(19.05%)	7(33.33%)

25-28	9(42.86%)	7(33.33%)
29-32	8(38.10%)	7(33.33%)
> 33	0	0
Religion		
Hindu	21(100%)	16(76.19%)
Christian	0	3(14.29%)
Muslim	0	2(9.52%)
Educational status of parent		
Primary education	6(28.57%)	3(14.29%)
Secondary education	9(42.86%)	9(42.86%)
Graduate	6(28.57%)	9(42.86%)
Post graduate	0	0
Occupational Status		
House wife	13(61.90%)	11(52.38%)
Private job	8(38.10%)	5(23.81%)
Government job	0	5(23.81%)
Daily wages	0	0
Type of family		
Nuclear	12(57.14%)	3(14.29%)
Joint	5(23.81%)	10(47.62%)
Extended	4(19.05%)	8(38.10%)
Dietary pattern		
Vegetarian	5(23.81%)	5(23.81%)
Mixed	6(28.57%)	6(28.57%)
Non-Vegetarian	10(47.62%)	10(47.62%)
Place of living		
Rural	13(61.90%)	8(38.10%)
Urban	8(38.10%)	13(61.90%)

In experimental group: Majority 42.86% of primi mothers were age 25-28 years, all were from Hindu religion, 42.86% primi mothers were completed up to secondary education, 61.90% mothers were housewives, 57.14% mothers from nuclear families, 47.62% of mothers answered as non-vegetarian dietary pattern, and 61.90% mothers from rural residence

In control group: Majority 33.34% of primi mothers were of age 29-32 years, 76.19% mothers from Hindu religion, 42.86% primi mothers were completed up to secondary education and post graduates equally, 52.38% mothers were housewives, 47.62% from joint families, 47.62% of mothers answered as non-vegetarian dietary pattern, and 61.90% of mothers were from urban residence.

Table2: Level of labor pain among Primi mothers - Experimental & control group n=42

	Experimental group		**Control group**	
Pain	**Pretest**	**Posttest**	**Pretest**	**Posttest**
	Freq.(%)	**Freq.(%)**	**Freq.(%)**	**Freq.(%)**
No Pain (0)	-	-	-	-
Mild Pain(1-3)	-	-	-	-
Moderate Pain(4-6)	-	10(47.62%)	-	-
Severe Pain (7-9)	15(71.43%)	11(52.38%)	13 (61.90%)	15(71.43%)
Worst possible pain (10)	6(28.57%)	-	8(38.10%)	6(28.57%)
Range	7-10	4-8	4-8	8-9

Average (SD)	8.81 (0.98)	6.38 (1.11)	9.19 (0.75)	9.04 (0.74)

In experimental group in pretest mothers had severe pain 15(71.43%) and worst possible pain 6(28.57%), whereas in post test mothers had moderate pain 10(47.62%) and severe pain 11(52.38%). Similarly in control group pretest mothers had severe pain 13 (61.90%) and worst possible pain 8(38.10%), whereas in post test mothers had severe pain 15(71.43%) and Worst possible pain 6(28.57%)

Table 3: Comparisons of labor pain among Primi mothers - Experimental & control Group

n=42

Group	Test	Mean	S.D.	t value	table value	P value
Experimental	**Pre-Test**	8.81	0.98	12.79	2.09	0.00
	Post Test	6.38	1.11			
Control	**Pre Test**	9.19	0.75	1.83	2.09	0.08
	Post Test	9.04	0.40			

The comparisons of labour pain means of pretest and posttest of experimental group were done by paired t test. The pretest average score was 8.81 with standard deviation of 0.98. The posttest average score was 6.38 with standard deviation of 1.11. The test statistics value of paired t test was 12.79 with p value 0.00. The p value less than 0.05, hence reject null hypothesis and accept alternative hypothesis. Shows, significant difference in the pre and posttest labour pain means.

The comparisons of labour pain means of pretest and posttest of control group were done by paired t test. The pretest average score was 9.19 with standard deviation of 0.75. The posttest average score was 9.04 with standard deviation of 0.40. The test statistics value of paired t test was 1.83 with p value 0.08. The p value more than 0.05, hence accept null hypothesis and reject alternative hypothesis.

Table 4: Effectiveness of peanut ball on labour pain among primi mothers in experimental vs Control Group in post test

n=42

Group	Mean	S.D.	t value	table value	P value
Experimental	6.38	1.12	9.12	2.02	0.00
Control	9.04	0.74			

The comparisons of labour pain means of experimental group and control group were done by unpaired t test. The experimental group average score was 6.38 with standard deviation of 1.12. The control group average score was 9.04 with standard deviation of 0.74. The test statistics value of the unpaired t test was 9.12 with p value 0.00. The p value less than 0.05, hence reject the null hypothesis & accept alternative hypothesis. Shows, significant difference in the labour pain in experimental and control group.

Table 5: Comparisons of Cervical Dilatation of first stage of labour among Primi mothers – Experimental & control group

n=42

Group	Test	Mean	S.D.	t value	table value	P value
Experimental	**Pre Test**	4.66	0.96	22.60	2.09	0.00
	Post Test	9.71	0.71			
Control	**Pre Test**	4.95	1.02	11.55	2.09	0.00
	Post Test	9.14	1.01			

The comparisons of cervical dilatation mean of pretest and posttest of experimental group were done by paired t test. The pretest average score was 4.66 with standard deviation of 0.96. The posttest average score was 9.71 with standard deviation of 0.71. The test statistics value of paired t test was 22.60 with p value 0.00. The p value less than 0.05, hence reject null hypothesis and accept alternative hypothesis. Shows, significant difference in the pre and posttest cervical dilatation means.

Table 6: Effectiveness of peanut ball on Cervical Dilatation of first stage of labour among primi mothers in experimental vs Control Group in post test

n=42

Group	Mean	S.D.	t value	table value	P value
Experimental	9.71	0.71	2.11	2.02	0.04
Control	9.14	1.01			

The comparisons of cervical dilatation mean of experimental group and control group were done by unpaired t test. The experimental group average score was 9.71 with standard deviation of 0.71. The control group average score was 9.14 with standard deviation of 1.01. The test statistics value of the unpaired t test was 2.11 with p value 0.04. The p value less than 0.05, hence reject the null hypothesis & accept alternative hypothesis. Shows, significant difference in the cervical dilatation means in experimental and control group.

Table7: Comparisons of Total duration for labor among Primi mothers – Experimental vs Control group n=42

Group	Mean	S.D.	t value	table value	P value
Experimental	5.67	2.37	5.60	2.02	0.00
Control	9.81	2.43			

The comparisons of average total duration for labour of experimental group and control group were done by unpaired t test. The experimental group average score was 5.67 with standard deviation of 2.37. The control group average score was 9.81 with standard deviation of 2.43. The test statistics value of the unpaired t test was 5.60 with p value 0.00. The p value less than 0.05, hence reject the null hypothesis & accept alternative hypothesis. Shows, significant difference in the average total duration for labor in experimental and control group.

Table 8: Comparisons of Station of Presenting Part of first stage of labour among Primi mothers – Experimental vs Control group

Post test	Mean	S.D.	t value	table value	P value
Experimental	4.71	0.56	1.33	2.02	0.19
Control	4.47	0.60			

The comparisons of station of presenting part means of experimental group and control group were done by unpaired t test. The experimental group average score was 4.71 with standard deviation of 0.56. The control group average score was 4.47 with standard deviation of 0.60. The test statistics value of the unpaired t test was 1.33 with p value 0.19. The p value more than 0.05, hence accept the null hypothesis & reject alternative hypothesis. Shows, no significant difference in the Station of Presenting Part means in experimental and control group.

Discussion:

1. Labour Pain and Progress Among Primigravida Mothers: The The experimental group's mean labour pain score decreased from 8.81 (SD = 0.98) in the pretest to 6.38 (SD = 1.11) in the posttest. The paired t-test value was 12.79 ($p < 0.05$), indicating a statistically significant reduction in labour pain following peanut ball intervention. These findings are supported by Alan Dikmen and Gönenç, who reported reduced labour pain and fatigue and improved

childbirth experiences among mothers using a peanut ball. Similarly, Mercier and Zwelling reported improved maternal comfort, reduced pain and stress, and better labour coping. Overall, the peanut ball may be an effective non-pharmacological intervention for labour pain management.

2. Effectiveness of the Peanut Ball on First-Stage Labour Outcomes: The mean total duration of labour was 5.67 (SD = 2.37) in the experimental group and 9.81 (SD = 2.43) in the control group. The unpaired t-test value was 5.60 ($p < 0.05$), indicating a statistically significant difference between the groups. These findings suggest that peanut ball intervention reduced labour duration among primigravida mothers. The results are supported by Roth, who reported a significant reduction in first-stage labour duration among primiparous women using a peanut ball. Similarly, Tussey found that peanut ball positioning shortened labour duration and improved labour progress. Overall, peanut ball use may promote more efficient first-stage labour progress.

3. The comparisons of cervical dilatation mean of experimental group and control group were done by unpaired t test: The mean cervical dilatation score was 9.71 (SD = 0.71) in the experimental group and 9.14 (SD = 1.01) in the control group. The unpaired t-test value was 2.11 ($p = 0.04$), indicating a statistically significant difference between the groups. These findings suggest that peanut ball intervention improved cervical dilatation during the first stage of labour. Similar findings were reported by Jayasudha, who observed greater cervical dilatation among mothers using a peanut ball. Tussey and Roth also reported improved labour progress, supporting the potential effectiveness of peanut ball positioning in promoting cervical dilatation and fetal descent.

Summary:

This quantitative study assessed the effectiveness of peanut ball use during the first stage of labour among 42 primigravida mothers, with 21 each in the experimental and control groups, admitted to selected hospitals in Maharashtra. A two-group pretest–posttest design was used to evaluate labour pain, cervical dilatation, descent of the presenting part, and labour duration. The experimental group demonstrated improved cervical dilatation, faster descent, and shorter labour duration. The mean labour duration was 5.67 (SD = 2.37) in the experimental group and 9.81 (SD = 2.43) in the control group. The difference was statistically significant ($t = 5.60$, $p < 0.05$), supporting the effectiveness of peanut ball intervention.

Conclusion:

The study concludes that the use of a peanut ball during the first stage of labour is an effective non-pharmacological nursing intervention for primigravida mothers. Mothers in the experimental group experienced a significant reduction in labour pain, improved cervical dilatation, faster descent of the presenting part, and shorter labour duration compared with the control group. The statistically significant findings demonstrate the positive impact of peanut ball positioning on labour progress. Thus, incorporating peanut ball use into routine maternity nursing care may enhance maternal comfort, promote physiological labour progression, and contribute to a more positive childbirth experience.

Financial support and sponsorship:
Nil.
Conflicts of interest:
There are no conflicts of interest. Institute ethical committee clearance obtained.

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