

# Effect of birth ball usage on labour outcome and perinatal outcome

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## Abstract

**Introduction:** Reduction of pain during labor is addressed via general approaches, pharmacologic and non-pharmacological methods. Birth ball promotes optimal positioning of foetal presenting part to maternal pelvis and pain sensation reduction during labor.

**Objectives:** To determine the effectiveness of birth ball exercises on reducing labour pain and duration and improving labour outcome among pregnant mothers.

**Methods:** Randomized control trial was conducted in Obstetric Unit in Castle Street Hospital for Women. SNSOE technique was applied for allocation concealment. Interviewer administered data collection sheet, birth ball and an analogue visual pain scale were used as study instruments. Selected perinatal outcomes, duration and labour pain were compared between two study groups. Study was ethically cleared by the Ethic Review Committee of Faculty of Medicine, Colombo. Trial was registered in Sri Lanka Clinical Trial Registry.

**Results:** Mean age was 29.33 years (SD=5.27 years). Mean gestational age of all the study participants was 279.47 days. (SD=5.63 days). Majority of the study participants had delivered their babies via NVD (N=66: 78.65) and 16.7% (N=16), of them were subjected to EM/LSCS. Mean BMI value was 28.13 kg/m<sup>2</sup> (SD=1.72). Height and weight of the study participants showed a negative correlation with the duration of labour. Duration of labour showed a positive correlation with the BMI of the mothers. Significant reduction of mean labour pains and labour duration was noted in the group which experienced birth ball exercises when compared to the control group.

**Conclusions and recommendations:** Duration of labour can be significantly reduced by applying the birth ball exercises procedure. It is beneficial to use the birth ball exercise procedure as a method of reducing labour pains. Expected amount of adverse perinatal outcomes was less among the mothers who used birth ball exercise. Birth ball exercise procedure can be identified as a practical strategy to increase intrapartum obstetric outcomes

**Key words:** birth ball, labor, safety, effectiveness

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## Introduction

Coping with labor pains during childbirth is a serious challenge for any woman. Management of labour pain is an essential aspect of obstetric care<sup>1</sup>. When preparing a woman for childbirth, it is very important to eliminate the fear of labor pains. Various methods are used to manage labour pain. Among them are pharmacological as well as non-pharmacological methods. There is a wide variety of non-pharmacological pain relief techniques, that are expected to address the physical sensation of labour pain, but also attempt to reduce pain by enhancing the psychological or emotional components of care<sup>9</sup>. The pain relief techniques are relaxation, breathing techniques, positioning or movement, massage, hydrotherapy, water immersion, hot or cold therapy, music, guided imagery, acupuncture, acupressure, aromatherapy, transcutaneous electrical nerve stimulation, hypnosis, and use of a birth ball<sup>9,10</sup>.

Scientific evidence is being generated that birth ball exercises during pregnancy and childbirth can make the labor process more comfortable<sup>11</sup>. Use of the birth ball incorporates both rocking and movement, which, theoretically, helps the foetus find a better fit through the pelvis as labour progresses<sup>5</sup>. The objective of this study to determine the effectiveness of BB exercises on reducing labour pain and duration and improving labour outcome among pregnant mothers.

## Methods

A randomized control trial was conducted with 42 participants in each arm among pregnant women presented to Obstetric Unit (ward 10) in Castle Street Hospital for Women, Colombo Sri Lanka. Singleton pregnancies, gestational age 24-30 weeks and primigravidae were included. Women with chronic or pregnancy induced illnesses, any contraindication to vaginal delivery and experienced ante-partum haemorrhage were excluded.

Participants selected for the study were properly explained regarding all the activities involved in the study before being grouped. It was emphasized that allocation into groups is done randomly and that those who are allocated into an intervention group may undergo birth ball exercise if they wish, during pregnancy and childbirth. It was also clearly explained that any person who wants can leave the study at any time.

Selection of the study participants for the research was done at the Antenatal Clinic at Castle Street Hospital

for women Colombo. First recruited participant was the first eligible participant who visited the first clinic of the study period and all the eligible pregnant mothers who visited the clinic after that were selected to introduce the study. This procedure was continued until the minimum sample size was completed. SNSOE technique was applied for allocation concealment. A training programme to introduce the birth ball exercise was conducted for the study participants who were selected to the intervention group.

Two sizes of birth balls were available for the participants to select one. Each birth ball tolerated 300kg at a time. Selection of the birth ball was done accordingly to the standard guidelines and requirements,

Introduction of the exercise and supervision of the procedure were done by the principal investigator. This birth ball exercise training was done for a single participant at a time.

Women were instructed to sit on the birth ball and do rocking movements on the birth ball and move around in circle for a minimum 15 minutes. To all women participated in birth ball exercise a video clip was given to demonstrate birth ball exercise, with a leaflet that explained the exercise procedure.

Principal investigator involved in supervising the birth ball exercise procedure, observing the outcome events and data collection. Principal investigator personally explained the procedure to each and every participant of the study and was present at each and every instance they performed the birth ball exercise. Therefore, principal investigator had an opportunity to be involved in any inconvenience or problem which any of the study participants face during their labour. The data was collected using an interviewer administered data collection sheet. The principal investigator collected data by following up participants from the beginning to the end of the study. Participants of the control group were followed by routine intrapartum management procedures in the labour room. Any participant needing pain relief medications were given analgesics adequately.

Data was analysed by SPSS 23:0 statistical software. 95% confidence interval and 0.05 probability cut off level was taken for statistical significance. Student's t test was used to describe and analyse the comparison of parameters between the two study groups. Intention to treat analysis method was used during the data

analysis. Separate analysis was conducted for the eligible participants and non-eligible or withdrawn participants. A comparative analysis was also expected to be done between the eligible participants and the non-eligible participants. Ethical approval was obtained from the Ethical Review Committee (ERC), Faculty of Medicine, University of Colombo. Trial was registered in the Sri Lanka Clinical Trial Registry (SLCTR).

**Definition of outcome variables**

• **APGAR**

A measure of the physical condition of a newborn infant. It is obtained by adding points (2, 1, or 0) for heart rate, respiratory effort, muscle tone, response to stimulation, and skin coloration; a score of ten represents the best possible condition.

• **Labour pain**

Pain encountered during the uterine contractions of childbirth. It was measured by using visual analogue scale of pain measurements.

• **Duration of labour**

Time duration from the 4cm effacement of cervix of the participants to the time of delivery of the placenta. It was measured by minutes.

• **Foetal distress**

Detection of signs before and during childbirth indicating that the fetus is not well.

• **SCBU admission**

In case of any complications during the perinatal period, the baby may need to be admitted to the intensive care unit. That incidence will be considered as the outcome of interest.

**Results**

Individuals in the age group of 31-40 years were equally divided between the two study groups. Teenage pregnancies were more represented in the intervention group. Graduates were more represented in the control group. Five professional groups were seen among the study participants (Table 1).

**Table 1. Distribution of age, educational status and occupation of the participants**

	<b>Intervention group-n (%)</b>	<b>Control group n (%)</b>	<b>Total n (%)</b>
<b>Age category</b>			
<20 years	6 (14.2)	2 (4.7)	8 (9.5)
21-30 years	18 (42.8)	22 (52.4)	40 (47.6)
31-40 years	18 (42.8)	18 (42.8)	36 (42.8)
<b>Educational Status</b>			
Up to O/L	16 (38.1)	10 (23.8)	26 (30.9)
Up to A/L	22 (52.4)	25 (59.5)	47 (55.9)
Graduated	4 (9.5)	7 (16.6)	11 (13.1)
<b>Occupation</b>			
Housewife	22 (52.4)	27 (64.3)	49 (58.3)
Teacher	12 (28.6)	7 (16.6)	19 (22.6)
Clerk	2 (4.7)	4 (9.5)	6 (14.3)
Labourer	4 (9.5)	-	4 (4.7)
Nursing Officer	2 (4.7)	4 (9.5)	6 (14.3)
<b>Total</b>	<b>42 (100.0)</b>	<b>42 (100.0)</b>	<b>84 (100.0)</b>

Table 2 illustrates the comparative distribution of selected perinatal outcomes between the two study groups. According to the findings it is described that larger number of babies who achieve an APGAR status of 10 within the first minute of birth were reported in the study group with mothers who practiced birth ball exercise before delivery. This shows that performing birth ball exercise is a significant contributory factor for achieving APGAR 10 status within the first minute of birth. Also, birth ball exercise acts as a positive contributory factor for experiencing a non-complicated normal vaginal delivery. On the other hand, birth ball exercise showed a negative contribution for SCBU admissions (OR<1.0).

When study variables are compared, a significant difference is observed between the two study groups with regard to labour pain and labour duration. Mean duration of labour of the group which experienced

birth ball exercises was significantly less than the mean duration of labour of the group which did not experience the birth ball exercises. Also, when labour pains were considered, a significant reduction of mean labour pains was noted in the group which experienced birth ball exercises when compared to the mean labour pains of the control group (Table 3).

Table 4 describes the distribution of adverse perinatal outcomes among the study participants. According to the findings, number of foetal distress events and SCBU admissions reported among the interventional group was significantly less when compared to the control group. Percentage of new-borns who could achieve an APGAR score of 10 within the first minute of birth was significantly less among the interventional group. Reported assisted vaginal deliveries were higher among the interventional group.

**Table 2. Association of birth ball exercise with perinatal outcome**

	Birth ball exercise		OR	95% CI
	Yes	No		
<b>APGAR</b>				
10 at 1 <sup>st</sup> minute	26	13	3.62	1.469-8.945
<10 at 1 <sup>st</sup> minute	16	29		
<b>SCBU admissions</b>				
Yes	14	22	.455	0.188-1.098
No	28	20		
<b>Mode of delivery</b>				
NVD	28	26	1.23	0.503-3.009
LSCS /AVD	14	16		
<b>Total</b>	<b>42</b>	<b>42</b>		

**Table 3. Comparison of labour pain and duration between two study groups**

	Mean (SD)	Mean Difference	t	P value
<b>Labour Pain (VAPS)</b>				
Intervention group	3.76 (0.98)	2.69	7.005	<0.001
Control group	6.54 (1.29)			
<b>Labour duration (hours)</b>				
Intervention group	5.76 (1.89)	2.78	11.27	<0.001
Control group	8.45 (1.61)			

VAPS= Visual analogue pain scale

**Table 4. Distribution of adverse perinatal outcomes between two study groups**

	Yes (%)	No (%)	Z-value	P-Value
Foetal distress	4 (9.5)	10 (23.8)	1.8	0.0786
AVD	10 (23.8)	6 (14.3)	1.1	0.2676
SCBU Admission	14 (33.3)	22 (52.4)	1.8	0.0769
APGAR <10	16 (38.1)	29 (69.0)	2.8	0.0045

## Discussion

Labour pain is generally considered as the most intolerably severe pain identified in the clinical practice. This is also a socially accepted fact and due to severe labour pain greater reluctance and fear are created towards child birth. As a result, a clearly identified trend is generated to request elective LSCS without any other indication. Although there are many methodological implications developed according to modern medical techniques. It is not possible to apply all of them for labour pain relief due to identified limitations. Due to situational characteristics associated with labour pain, many practical difficulties are also encountered when applying pain relief medications. Therefore, there is a need of finding more simple, acceptable, and cost-effective pain relief methodologies in this field.

As clearly illustrated by the present study findings there is a possibility of reducing labour pain and duration of labour by birth ball exercises. This method which can

be practiced during the antenatal period is a procedural intervention which is possible to practice even at home following proper training. For this procedure, extra expenses are needed only for purchasing the birth ball. Routine monthly clinic visits are practiced in the existing antenatal care delivery system of Sri Lanka and there is a feasibility of introducing birth ball exercise method during these clinic visits.

In the Sri Lankan health care set up, antenatal clinics functioning at village level are also conducted under close supervision of a qualified medical officer and on the other hand several home visits are performed by the midwives of the relevant area. Therefore, there is a possibility of practicing the birth ball exercise procedure under supervision of the midwives at home and there will not be a necessity of visiting the hospital. These study findings should be studied in detail by using different study settings and different study populations. Depending on the consistency of the findings, it is possible to identify birth ball exercise procedure to the obstetric management guidelines.

## Conclusion and recommendations

Duration of labour can be significantly reduced by applying the birth ball exercise procedure. It is beneficial to use the birth ball exercise procedure as a method of reducing labour pain. Expected amount of adverse perinatal outcomes was less among the mothers who used birth ball exercise. Birth ball exercise procedure can be identified as a practical strategy to increase intrapartum obstetric outcomes.

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