

# The Use of Birth Ball as a Method of Pain Management in Labour

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**Objectives:** To evaluate the effectiveness of using birth ball as a method of pain management in labour.

**Methods:** This study adopted a non-equivalent control group design to investigate the effect of birth ball as a pain relief management in labour based on pain and anxiety scores. It was conducted in three local public hospitals over the period December 2009 to May 2010. Women in labour who met the inclusion criteria were approached and a birth ball was introduced. Those who chose to use it were identified as the study group, and the others as the controls. Using a visual analogue scale, baseline pain and anxiety states were measured for both groups and then hourly thereafter. After delivery, the study group was asked to complete a questionnaire to evaluate their satisfaction on the use of the birth ball.

**Results:** A total of 217 labouring women were recruited; 110 were in the study group and 107 were the controls. The results showed that use of the birth ball reduced pain and anxiety levels of women in labour. As for its effect on the process and outcomes of labour, there were no differences between the two groups in terms of duration of second stage, rate of vaginal delivery, and episiotomy. However, the duration of the first stage of labour was significantly shorter in the study group (5.3 vs 7.1 hours,  $p < 0.03$ ). After delivery, women in the study group commented that the birth ball could promote comfort and relaxation, and reduced anxiety and pain during labour. The majority (95%) indicated that they would like to use birth ball in future pregnancies.

**Conclusion:** Our preliminary data suggested that use of the birth ball is safe and offers women an alternate means of pain management in labour.

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## Introduction

In Hong Kong, for many years, management of labour pain has relied on a medical model of care that emphasised elimination of physical sensation and the use of pharmacological methods. Common choices are the use of nitrous oxide + oxygen (Entonox) inhalation, pethidine injections, and epidural analgesia. In recent years, advocacy to keep birth normal has shifted the emphasis of pain management towards the midwifery model of care,

which encompasses the psycho-emotional and spiritual components of care. Instead of passive compliance, there is a focus on building a woman's confidence to cope with pain, thus maintaining a sense of mastery and well-being<sup>1</sup>. Common choices are antenatal preparations, labour support, breathing and relaxation exercises, the use of

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transcutaneous electrical nerve stimulation, and the birth ball.

The birth ball is also known as the fitball, swissball, and Petzi ball, and was first used by physiotherapists for patients with back pain in the 1960s. In the 1980s, Perez and Simkin introduced it into antenatal classes and called it a birth ball<sup>2</sup>. Later it was developed as a midwifery tool to help women to control their labour. Obstetric units in Germany and the United Kingdom started to use it in the 1990s<sup>3</sup>. Gradually, its use became widespread and has been recommended as an excellent comfort and fitness tool for women to use during pregnancy, labour, birth, and the postpartum period.

The suggested benefits of using birth ball during labour are decrease of pain, anxiety reduction, less use of pethidine, facilitation of fetal head descent and rotation, reducing the duration of the first stage of labour, and enhancing maternal satisfaction and well-being<sup>4-7</sup>. As there are no observed side-effects from its use, the main concern is its safety<sup>8</sup>. To ensure the optimal and safe use of the birth ball, a policy or protocol should be formulated<sup>2,9</sup>.

However, most of the reported benefits from the birth ball were descriptive, and to date its use has not been studied or evaluated using objective research methods. As there appeared to be increasing interest in using the birth ball as an alternative means of labour pain relief, appropriate investigation of its effectiveness for this purpose appeared necessary. This served the purpose of this study, which is the first of its kind in Hong Kong.

## Methods

This study adopted a non-equivalent control group design to determine the effect of the birth ball for pain relief during labour. The objectives were to: (1) investigate the effect of using the birth ball as a means of pain and anxiety management during labour; (2) explore the maternal experience stemming from such use; and (3) search for any consequential adverse obstetric outcomes.

### *Samples*

Participants for this study were women in labour giving birth in three local public hospitals over the period December 2009 to May 2010. The following criteria were used for recruiting subjects: (1) Chinese women able to speak Cantonese, and (2) primigravida in early labour, having regular uterine contractions and cervix of less than 1 cm long, and more than 1 finger dilated. A total of 217

participants were recruited into the study; 110 were in the study group and 107 were controls.

### *Data Collection*

On admission to the labour ward, women who met the inclusion criteria were approached and had the details of the study explained. Those who agreed to participate were asked to sign the consent form. Basic demographic and clinical information were then obtained by the investigators.

When the participants began to ask for pain relief, they were given a detailed description on the use of the birth ball, including a reference pamphlet. Those who chose to use the birth ball were deemed to be in the study group. Following this, their baseline pain and anxiety state was measured using two self-reported visual analogue scales (VASs). Both of these scales consist of a 10-cm horizontal line with descriptors of 'no anxiety/pain' on the left and 'worst possible anxiety/pain' on the right. Participants were asked to indicate how anxious and painful they were feeling 'right now' by marking the appropriate place on the line. Higher values indicated increased levels of anxiety/pain. Pain and anxiety states were then measured hourly to assess their association with the birth ball. Participants were given the option to continue or stop using the birth ball at any time, and other pain relief methods (including drugs) were offered as required.

The VAS was a simple, self-reporting device used extensively to measure unpleasant symptoms such as pain, nausea, fatigue, and dyspnoea<sup>10</sup>. It avoids the pitfalls of language involved in a graphic rating scale, and is appropriate for a variety of subjects, including women in labour. Previous studies on labour pain had adopted this tool widely and it was shown to have high validity and reliability<sup>11,12</sup>.

Those who declined use of the birth ball were assigned as the control group. They were allowed to choose other available pain relief methods as required. As for the study group, their pain and anxiety were measured before using other methods and then hourly thereafter. Within 2 hours of being delivered, participants in the study group were asked to respond to a questionnaire, which was designed to collect data on their satisfaction with the birth ball experience.

## Results

### *Sample Characteristics*

A total of 217 primiparous women took part in this

study; 110 were in the study group and 107 were deemed controls. On comparison of their respective demographic and obstetric data, there were no significant differences ( $p>0.05$ ) between the two groups in terms of age, maternal height, gestational age, and infant birth weight. The only difference was that the controls were heavier ( $p<0.04$ ). Table 1 summarises their characteristics.

**Pain and Anxiety Scores of the Study and Control Groups**

Before initiation of the intervention, the mean VAS scores for pain and anxiety were significantly lower in the study group than in the controls, respective values being 3.6 vs 5.4 for pain and 2.9 vs 4.8 for anxiety. Both the study group and the controls showed a mild increase in their mean VAS pain scores 1 hour after using their respective pain relief methods, from 3.6 to 3.8, and from 5.4 to 5.5, respectively. The pain scores for both groups continued to be determined, whether or not they chose a second pain relief method. For the study group, this second method could be any method other than the birth ball (e.g. nitrous oxide + oxygen or pethidine injections). For the controls, the second method could be any method other than the one they had already used. Once again, the study group had significantly lower mean VAS scores (6.1 vs 7.0). The anxiety score showed a similar pattern (Table 2).

**Effects of Using the Birth Ball on the Process and Outcome of Labour**

No adverse effects were noted in association with use of the birth ball. Recourse to intrapartum oxytocin (syntocinon) was similar in both groups, although the study group had a higher percentage of women for whom labour was induced. There were no differences between the two groups in terms of duration of the second stage, and rates of vaginal delivery and episiotomy, Apgar score of the babies, and admissions to the neonatal intensive care unit. Although the episiotomy rate in the study group was 10% lower, this difference was not statistically significant. However, the mean duration of the first stage of labour was significantly shorter in the study group (5.3 vs 7.1 hrs; Table 3).

**Duration of Using Birth Ball and the Obstetric Outcomes**

Correlation analysis between the duration of birth ball use and obstetric outcomes showed no statistically significant difference in terms of length of first and second stages of labour and mode of delivery (Table 4).

**Other Pain Relief Methods Used**

Concerning the use of other means of pain relief, both groups used a variety of pain relief methods including

**Table 1. Demographic data of the birth ball study**

Demographics	Mean ± standard deviation		p Value
	Study group (n=110)	Controls (n=107)	
Age (years)	29.7 ± 5.1	29.7 ± 5.1	0.743
Height (cm)	157.0 ± 14.8	158.0 ± 5.3	0.522
Weight (kg)	67.4 ± 8.6	70.0 ± 9.3	<0.04
Gestation (weeks)	39.3 ± 1.3	38.9 ± 3.3	0.243
Baby birth weight (g)	3184.8 ± 441.4	3182.3 ± 393.4	0.978

**Table 2. Pain and anxiety scores of the 2 groups\***

Time of measurement	Pain score			Anxiety score		
	Study group	Control group	p Value	Study group	Control group	p Value
On starting	3.6 ± 2.9 (n=110)	5.4 ± 2.5 (n=97)	<0.001	2.9 ± 2.9 (n=110)	4.8 ± 3.3 (n=97)	<0.001
1 Hour after 1st pain relief intervention	3.8 ± 3.1 (n=107)	5.5 ± 2.6 (n=95)	<0.001	2.9 ± 2.9 (n=106)	4.7 ± 3.2 (n=95)	<0.001
On starting 2nd method of pain relief intervention	6.1 ± 2.4 (n=91)	7.0 ± 2.3 (n=66)	0.022	4.1 ± 2.9 (n=91)	5.9 ± 2.9 (n=66)	<0.001

\* Data are shown as mean ± standard deviation

**Table 3. Process and outcome of labour**

Process / outcome of labour	Data*		p Value
	Study group (n=110)	Control group (n=107)	
Induction of labour (%)	84.5	63.6	<0.002
Use of syntocinon (%)	87.3	77.6	0.072
Duration of first stage (hours)†	5.3 ± 5.1	7.1 ± 5.3	<0.03
Duration of second stage (mins)†	41.4 ± 32.8	43.7 ± 35.6	0.634
Vaginal delivery (%)	71.8	75.7	0.310
Episiotomy (%)	61.8	71.0	0.098
Apgar score at			
1st minute	8.3 ± 1.0	8.4 ± 0.8	0.821
5th minute	9.0 ± 1.0	9.2 ± 0.9	0.073
% of babies admitted to:			
SCBU	16.5	14.3	} 0.222
NICU	0.9	4.8	

Abbreviations: SCBU = Special Care Baby Unit; NICU = Neonatal Intensive Care Unit

\* Data are shown as % or mean ± standard deviation

† Caesarean section cases excluded

**Table 4. Correlations between the duration of using birth ball and the obstetric outcomes**

Process / outcome of labour	Duration of using birth ball			p Value
	25th Percentile (n=50)	50th Percentile (n=33)	75th Percentile (n=27)	
Mode of delivery (%)	(n=41)	(n=25)	(n=18)	
Caesarean section	24.0	27.3	37.0	} 0.474
Vaginal birth	76.0	72.7	63.0	
Duration of 1st stage (%)	(n=39)	(n=24)	(n=17)	
<8 Hours	56.3	18.8	25.0	} 0.564
>8 Hours	47.1	32.4	20.6	
Duration of 2nd stage (%)				
<1 Hour	46.7	31.7	21.7	} 0.796
>1 Hour	55.0	25.0	20.0	

transcutaneous electrical nerve stimulation, massage, nitrous oxide + oxygen, pethidine injections, and epidural analgesia. More women in the study group received massage (p<0.001) and more women among the controls received epidural analgesia (p<0.01; Table 5).

**Women’s Subjective Experience on the Use of Birth Ball**

In response to the questionnaire presented to the study group after delivery, 85% reported that they were satisfied with the use of birth ball, and 12% stated they were highly satisfied. On being asked to identify which body parts they felt most comfortable during use of the

birth ball, the top three areas identified were the back, the pelvis, and the perineum. There were many reasons for stop using the birth ball. The most common reason for ceasing use of the birth ball was wanting to rest in bed (67%). A few women (8%) found it useful at the beginning. As pain increased, however, they wanted to try other methods.

When asked to comment on the effectiveness of using the birth ball, most women reported that it promoted comfort and relaxation, and reduced anxiety as well as labour and back pains. Approximately 10% of the women strongly agreed that the birth ball could reduce back pain

**Table 5. Use of other pain relief methods**

Other pain relief method	Study group (n=110)	Control group (n=107)	p Value
Transcutaneous electrical nerve stimulation (%)	2.7	5.6	0.236
Entonox (%)	90.0	94.4	0.174
Pethidine injection (%)	49.1	45.8	0.363
Epidural analgesia (%)	17.3	34.6	<0.01
Massage (%)	17.3	2.8	<0.001

**Table 6. Usefulness of using birth ball during labour (n=110)**

	Strongly disagree (%)	Disagree (%)	Agree (%)	Strongly agree (%)
Reduce labour pain	3.6	15.5	74.5	6.4
Reduce back pain	0.9	16.4	70.9	10.0
Reduce anxiety	0	7.3	79.8	12.8
Promote comfort	0	5.5	86.4	8.2
Promote relaxation	0	10.0	82.7	7.3

and anxiety (Table 6). Approximately 95% of the study group indicated that they would like to use the birth ball in a future pregnancy.

## Discussion

Although the birth ball has been used in a variety of birth settings and is believed to be a simple, effective, and safe method of support and pain relief for women in labour, there have been few studies to substantiate this belief. This study has shed some lights on the effects of using the birth ball during childbirth. Its findings suggest that recourse to the birth ball could reduce pain and anxiety levels, shorten the first stage of labour, and that women were satisfied with its use.

With respect to pain management, using the birth ball appeared to reduce labour pain although not strikingly. The study and the control groups were not homogenous; women in the control group had higher VAS scores of pain and anxiety before implementation of any intervention. Thus, it could not be excluded that the two groups of women had different pain tolerance, and that women with a higher pain score at the beginning preferred other pain relief methods. Although the two groups used different pain relief methods, they had a similar mild increase of pain score in the first hour after the intervention. This probably demonstrated that the effect of birth ball was similar to the other methods. When women on either group found the pain intolerable and requested a second pain relief method, the mean pain score of the study group increased 70%

while that in the controls increased 29%. This suggested that the use of the birth ball did help to reduce the pain and anxiety level of women in labour.

One of the objectives of this study was to examine whether there were any adverse effects in using the birth ball during labour in terms of obstetric outcomes. In this respect, the main finding was a significant reduction in the duration of first stage of labour, and for all other outcomes, there were non-significant differences. It has therefore been suggested that one of the benefits of the birth ball was to help the baby find its best fit through the pelvis and facilitate fetal head rotation and descent, thus making labour shorter<sup>4,7</sup>. These findings also demonstrated that use of the birth ball during labour was safe.

Another significant finding was the impact on other pain relief methods. More women in the study group received massage, while more in the controls had epidural analgesia. For women using the birth ball, their husbands might have been more involved in helping their wives. Moreover, massage could more readily be performed for women sitting or leaning on the birth ball. As the birth ball required a supportive personal presence, it is possible that the favourable effects were, in part, due to continuous emotional support. For the use of epidural analgesia, the previous assumption about different pain tolerance in the two groups might be relevant; persons with a low pain tolerance and a higher pain are more likely to choose epidural analgesia.

Regarding the experience of using the birth ball during labour, most women reported that it could promote comfort and relaxation, reduce their anxiety, as well as labour and back pains. This was consistent with the information in the literature<sup>6,7</sup>. The high proportion willing to use the birth ball in future pregnancies and labour suggested that women were satisfied with its use.

The most common reason for ceasing birth ball use was not that they found it no longer useful, but that they wanted to have rest in bed. Not surprisingly, women might need more than one method to help them to cope with the labour pains. Many studies have also demonstrated that women should be able to ambulate and move about freely during labour, which can make them feel better in control and contribute to a positive childbirth experience<sup>1,13</sup>. The birth ball does offer women such a choice.

#### Limitations of the Study

A shortcoming of this study was that it was conducted in three local public hospitals, although the

protocol was standardised. Differences of working culture, staff attitudes, and the choice of pain relief methods in various units might have affected the results. Another limitation was the lack of objective pain measurement, though the VAS score is a tool that has been widely applied and validated for assessment of pain. The duration of birth ball use posed another subject for discussion. As women found it tiring using it continuously over a period of time, they often preferred intermittent use. This created difficulty in measuring the exact duration of use, and in the corresponding analysis.

## Conclusion

This was a preliminary study based on a non-equivalent control group and small sample. Nevertheless, it has offered a better understanding on the effectiveness and women's experience in using the birth ball during labour as the topic has never been studied in Hong Kong. The study provided evidence that the use of birth ball was safe, and offered women an alternate means of pain management during labour.

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