

Decrease in Labour Pain at First Stage with Birthing Ball Techniques in Primigravida Mothers

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ARTICLE INFORMATION

Received: 14, November, 2024

Revised: 29, December, 2024

Accepted: 30, December, 2024

KEYWORDS

Labour Pain; First Stage Primigravida; Birthing Ball

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DOI

<https://doi.org/10.36456/embrio.v16i2.9774>

ABSTRACT

Labour pain causes the release of stress hormones, resulting in decreased uterine contractions and uteroplacental circulation, reduced blood flow and oxygen to the uterus, which makes pain impulses multiply. One technique to reduce labour pain non-pharmacologically is with a birthing ball. This study aims to determine the effectiveness of birthing balls in reducing first-stage labor pain in primigravida. This study used a quick experiment with a Nonequivalent Control Group Design. The population was all mothers giving birth in three Depok City maternity centers. The sample used a purposive sampling technique, with as many as 50 samples of experimental and control groups. Data analysis using two dependent means or dependent T-test (paired T-test). Before the birthing ball intervention, the experimental group felt moderate labour pain by 76%, after the birthing ball technique experienced a decrease in the moderate pain scale by 64%. Analysis results show an average decrease in pain levels of labouring mothers who use the Birthing Ball 0.38. The results of statistical calculations also mention a p-value of 0.0001, meaning that the use of the Birthing Ball has proven effective in reducing first-stage labour pain. Birthing Ball in labour increases endorphin release, effectively reducing labour pain.

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Introduction

Labour is a natural process. Physiologically, the labouring mother will have contractions that cause the cervix to be thin and open. In normal labour, there is intermittent pain. Pain attacks begin to be felt when contractions reach their peak and disappear after the uterus relaxes. Labour pain is physiological in the process of childbirth, with different pain intensities in each individual (Cunningham, 2022).

Pain is one of the natural defense mechanisms of the human body, which is a warning of impending danger. Pain during labour is caused by the opening of the cervix, and the decrease in the lowest area of the fetus occurs in the active and transitional phases. Mothers will feel pain originating from the lower abdomen and spreading to the lumbar region of the back and down to the thighs. Mothers usually experience pain only during contractions and are pain-free in the interval between contractions. Pain in labour occurs at the beginning of labour until complete opening will last 12-18 hours, followed by the time of fetal expulsion until the expulsion of the placenta Indrayani., (2016).

As many as 91.9% of women experience pain during the first stage of labour (Widiawati, I., &

Legiati, T., 2019). The results of Another study showed that primiparas experienced a higher level of labour pain compared to multiparous which is by 2.63 times (95% CI 0.96-7.20) (Nurul et al., 2017).

Discomfort, fear, and pain are problems for labouring women. These are the biggest hurdles in labour and, if not addressed, will obstruct its progress. Labour pain can be stressful, causing excessive release of stress hormones such as catecholamines and steroids. These hormones can cause smooth muscle tension and vasoconstriction of blood vessels, resulting in decreased uterine contractions, decreased uteroplacental circulation, and reduced blood flow and oxygen to the uterus, which makes pain impulses multiply (Mathew A. et al., 2012).

Efforts to relieve labour pain can use pharmacological and non-pharmacological methods. Given the potential side effects on the mother and fetus, the use of pharmacological methods, such as analgesics and anesthetics, may not be the first choice for childbirth. Many birthing women wish to avoid pain by minimizing the use of pharmacological methods (Gau M. L. et al., 2011).

Non-pharmacological pain management is more effective than pharmacological methods that are cheap, simple, effective, and without adverse effects. Maternal care in the first stage must also be given, one of which is to provide relaxation techniques in the first stage, namely breathing, mother's position, and massage (Baston H., 2017).

Many non-pharmacological efforts can be made to reduce labour pain. Among them are warm compresses, cold compresses, hydrotherapy, counterpressure, knee compresses, positioning, relaxation and breathing exercises, back or abdominal strokes, emptying the bladder, using birth balls, aromatherapy, music therapy, hypnotherapy, acupuncture, and others. (Fitria, 2021).

The use of a birthing ball is a condition involving a large ball with gravity pushing the baby down to speed up the delivery process (Kurniawati et al., 2017). The goal is to increase blood flow to the uterus, placenta, and baby, relieve pressure and increase pelvic outlet by as much as 30%, provide comfort for knees and ankles, and counter-pressure on the perineum and thighs. Research conducted by Ulfah & Rosmaria (2021) and Fadmiyanor et al. (2020) shows a difference in the intensity of labour pain before and after being given the birth ball method with a p-value = 0.001.

Using a gym ball is a way to increase the size of the pelvic cavity by rocking the pelvis on the ball and slowly swinging the hips forward and backward, on the right side, on the left side, and in a circular way. Gym Ball is a physical therapy ball that helps mothers inpartu kala I in the progress of labour that can be used in various positions. One of the movements is to sit on the ball and wiggle to make sense of comfort and help labor progress by using gravity during increasing endorphin release because the elasticity and curvature of the ball stimulate the pelvic receptors responsible for secreting endorphin Wahyuni (Siregar et al., 2020).

One of the studies on birthing balls conducted by HAU, W. L. et al. (2023) evaluated the use of birthing balls in intrapartum. A total of 66% reported a decrease in pain levels after using the birth ball, 8% reported more pain than before, and 26% reported no change in pain levels. Regarding usage satisfaction, 84% stated that the birthing ball can relieve contraction pain, 79% can relieve back pain, and 95% stated they were comfortable using it (HAU, W. L. et al., 2023).

The benefits of using a birthing ball during labour are reduced pain and anxiety, minimised use of pethidine, assisted head lowering, reduced duration of the first stage of labour and increased maternal satisfaction and well-being (Hau W. L. et al., 2023). Birthing ball exercise can improve the pelvic mobility of pregnant women. The exercise is performed in an upright and seated position, which is believed to encourage labour and support the perineum to relax and relieve labour pain (Leung RW, et al, 2012).

Research conducted by Kobra Mirzakhani et al. (2014) in Iran showed a significant difference between the two groups in the active phase of labour, namely a P value of 0.018. It can be concluded that using birthing balls during labour is very effective because it can reduce pain during the opening, accelerate cervical dilatation, and facilitate delivery. This study aims to determine the effectiveness of birthing balls in reducing first-stage labour pain in primigravida mothers.

Method

This quantitative study uses the quasi-experiment method with a non-equivalent control group design. The population in this study consisted of all mothers giving birth in three Independent Midwife Practice Places (TPMB) in the Depok City Region from July to December 2022. The sample in this study was determined using the purposive sampling technique, as many as 50 samples were differentiated using inclusion criteria (Primigravida, gestational age 37-40 weeks, no labour complication) and exclusion (multigravida and labour complication) and then divided into experimental and control. The experimental group was given treatment, namely using a combination of gym ball techniques in active phase I labour starting from opening 4 to opening eight and then continued with the peanut ball technique from opening 8 to opening 10 (complete). Meanwhile, the control group was not given any treatment. Labour pain intensity was measured using the Numeric Rating Scale (NRS).

The data analysis was univariate, which aimed to determine the frequency distribution of the independent variables of maternity mothers (age, occupation, height, Hb, and birth weight). The statistical test used is the difference test between the two dependent means or the dependent T-test (paired T-test) to determine the effectiveness of the combination of gym ball and peanut ball techniques on labour pain during the active phase I in primigravida.

Results

Based on table 1. It was found that primigravida delivery mothers who used a combination of birthing balls were 25 respondents (50%), and as many as 25 respondents (50%) did not use birthing balls. The majority of mothers aged 20-35 years were 78% (39 respondents), and the remaining 22% (11 respondents) were aged (<20 years and >35 years. In the mother's occupation variable, 74% (37 respondents) were housewives, and 26% (13 respondents) were employees. As for the birth attendants, their husbands accompanied the majority of mothers, 92% (46 respondents), and only 8% (4 respondents) were accompanied by family.

Table 1. Frequency Distribution of Respondents' Characteristics and Use of Combination Birthing Ball and Peanut Ball Technique

Variable	Frequency (N)	Percentage (%)
Use of birthing ball and peanut ball		
Used	25	50
Not used	25	50
Maternal age		
At risk (< 20 years dan >35 years)	11	22
Not at risk (20-35 years)	39	78
Mother's occupation		
Housewife	37	74
Employee	13	26
Mother's education		
Senior high school (SMA)/equivalent	31	62
College	19	28
Birth Attendant		
Husband	46	92
Family	4	8

Table 2. Differences in Pain Levels Before and After the Intervention in the Experimental Group and Control Group

Pain Level	Experimental Group		Control Group	
	Frequency (N)	Percentage (%)	Frequency (N)	Percentage (%)
Before Intervention				
Mild pain (1 - 3)	8	32	15	60
Moderate pain (4 - 6)	16	64	9	36
Severe pain (7 - 10)	1	4	1	4
After Intervention				
Mild pain (1 - 3)	2	8	8	32
Moderate pain (4 - 6)	19	76	13	52
Severe pain (7 - 10)	4	16	4	16

Based on Table 2, it was found that before being given the birthing ball intervention, both the experimental and the control groups felt moderate levels of labor pain (4-6), where the experimental group was 76%, and the control group was 52%. After being given the birthing ball technique treatment in, the experimental group experienced a decrease in the level of pain scale, only 4% experienced severe pain, and moderate pain decreased to 64%. Meanwhile, in the control group, there was an increase in the moderate pain scale to 52% and the severe scale to 16%.

Table 3. Decrease in Pain Intensity in Primigravida Maternity Mothers in the Experimental Group

Variable	Mean	Standard Deviation	P-value
Before Intervention	1,96	0,605	0,0001
After Intervention	1,58	0,575	

Based on Table 3, the average decrease in pain levels in labouring women who use a Birthing Ball is 0.38. The statistical calculations also mention a p-value of 0.0001, which means that the Birthing Ball has been proven effective in reducing the pain level of respondents.

Discussion

Based on the results of bivariate analysis using the paired T-test statistical test, the Sig value = 0.0001, which means $\alpha < 0.05$, it can be concluded that there is an effect of Birth Ball on reducing the pain scale in the first phase of active labour.

This is in line with the research of Paninsari et al. (2021), which shows the difference in the

intensity of labour pain before birthing ball therapy (pretest) and after birthing ball therapy (posttest). In addition to reducing maternity pain, it turns out that the birthing ball also has other benefits, as mentioned in some of the literature above, namely that it can relax the mother, facilitate the mother's mobility during the delivery process, shorten the duration of delivery, increase the mother's self-efficacy, reduce the use of analgesia drugs, relieve anxiety and increase comfort. According to (Hau W. L. et al. 2023), this is in accordance with the theory that the benefits obtained when using birthing balls are reduced pain, reduced anxiety, reduced use of pethidine, better fetal head reduction and rotation, reduced duration of labor, increased maternal satisfaction and well-being.

Based on Gate Control Theory, the book *Effect of Birth Ball Therapy on Labor Pain* (2012) states that during childbirth, pain impulses travel from the uterus along large nerve fibres to the substantia gelatinosa in the spinal column (vertebral column) for transmission cells to project pain messages to the brain.

The existence of stimulation, such as vibration in the use of the birthing ball, results in an opposite message that is stronger and faster and runs along these tiny nerve fibres, closing the gate in the substantia gelatinosa and then blocking the pain message so that the use of the birthing ball to reduce labour pain can be effectively used by birthing mothers. The first journal by Sriwenda & Yulinda (2016) showed there was an effect between the use of the birthing ball in reducing labour pain (p-value <0.001).

Research by Kurniawati et al. (2017) also shows that using birthing balls is influential or effective in reducing the intensity of labour pain during the active phase. In addition, research by Shirazi

et al. (2019) showed that the birthing ball used during the first stage of labour effectively reduced the level of pain felt by the mother. Research conducted by Irawati et al. (2019); Wang & Lu (2020) showed the effect of using birthing balls with decreasing pain levels in laboring mothers and a combination of free birthing positions that also affect pain reduction. The same is true in research by Noviyanti et al. (2020), proving that birthing balls effectively reduce labour pain in the first stage.

The first Birthing Ball Effect Mechanism can help mothers in an upright position to allow the uterus to work as efficiently as possible by making the pelvic plane wider and open, an upright position by sitting straight on the ball, the earth's gravitational force will help the fetus or the lowest part of the fetus to descend into the pelvis immediately. Secondly, it provides support to balance and strengthen the back because of its shape, which can adjust the body's shape to reduce the risk of back injury. Third, as a distraction, namely focusing attention away from unwanted situations to divert attention to minimize discomfort with an object. Fourth, as relaxation, with a sitting position and the shape of the ball that can adjust the shape of the body, it will make it easier to rest and stay upright. The position on the Birthing Ball can help mothers stay relaxed and keep ligaments and muscles relaxed and tight to help the body adapt to the dramatic changes during childbirth. The position on the Birthing Ball therapy can reduce pressure on the sacroiliac joint, blood vessels in the area around the uterus, and pressure on the bladder, back, waist, and tailbone and reduce perineal pressure as well as relax the pelvic muscles. The Birthing Ball position can also be used to rest between contractions.

Conclusions

The use of the Birthing Ball is effective in reducing pain levels in primigravida women in labour during the active phase.

The use of a Birthing Ball during the first stage of labour can increase endorphin release because the elasticity and curvature of the ball stimulate receptors in the pelvis that are responsible for secreting endorphin to reduce pain during labour.

References

- Baston, H., & Hall, J. (2017). *Midwifery Essentials: Labour* (2nd ed., Vol. 3). Elsevier. <https://shop.elsevier.com/books/midwifery-essentials-labour/baston/978-0-7020-7099-0>
- Cunningham, G. (2022). *Obstetri William Edisi 23 volume 1* (23rd ed., Vol. 1). EGC Medical Publisher. <https://ebooks.gramedia.com/id/buku/obstetri-william-edisi-23-volume-1>
- Fadmiyanor, I., Rahmi, J., Ayu, M. P., Jurusan, D., Poltekkes, K., Riau, K., Prodi, M., & Kebidanan, D.-I. (2020). Pengaruh Pemberian Metode Birth Ball Terhadap Intensitas Nyeri Persalinan Kala 1 Fase Aktif Di Bpm Siti Julaeha. *JIA: Jurnal Ibu Dan Anak*, 5(2), 102–109. <https://doi.org/https://doi.org/10.36929/jia.v5i2.214>
- Oktafia, Nasrullah, Lilik Nurhidayati, Neneng Siti Robanah, Andiyed Minnanita, Moh.Amin (2012). *Birth Ball*, Seminar Akhir Departemen Maternitas, PSIK, FK Universitas Brawijaya, Malang
- Fitria, Rahmi & Wahyuny, Romy (2021). Efektivitas Pemberian Metode Birth Ball Terhadap Intensitas Nyeri Persalinan Kala I Fase Aktif Di BPM Rokan Hulu. *Maternity and Neonatal: Jurnal Kebidanan*, 9(01), 44–54. <https://doi.org/10.30606/jmn.v9i01.1035>
- Gau, M. L., Chang, C. Y., Tian, S. H., & Lin, K. C. (2011). Effects of birth ball exercise on pain and self-efficacy during childbirth: A randomised controlled trial in Taiwan. *Midwifery*, 27(6), 294–300. <https://doi.org/10.1016/j.midw.2011.02.004>
- Hau, W. L., Tsang, S. L., Kwan, W., Man, L. S. K., Lam, K. Y., Ho, L. F., Cheung, H. Y., Lai, F. K., Lai, C. Y., & Sin, W. (2023). The Use of Birth Ball as a Method of Pain Management in Labour. *Hong Kong Journal of Gynaecology, Obstetrics and Midwifery*, 12(1). <https://doi.org/10.12809/hkjgom.12.1.125>
- Indrayani, & Djami, M. (2016). *Update Asuhan Persalinan dan Bayi Baru Lahir*. PT. Trans Info Media. https://www.researchgate.net/publication/320395754_Update_Asuhan_Persalinan_dan_Bayi_Baru_Lahir
- Irawati, A., Susanti, S., & Haryono, I. (2019). Mengurangi Nyeri Persalinan dengan Teknik Birthing Ball. *Jurnal Bidan Cerdas (JBC)*, 2(3), 129. <https://doi.org/10.33860/jbc.v2i1.78>
- Kurniawati, A., Dasuki, D., & Kartini, F. (2017). Efektivitas Latihan Birth Ball Terhadap Penurunan Nyeri Persalinan Kala I Fase Aktif pada Primigravida. *Jurnal Ners Dan Kebidanan Indonesia*, 5(1), 1. [https://doi.org/10.21927/jnki.2017.5\(1\).1-10](https://doi.org/10.21927/jnki.2017.5(1).1-10)
- Widiawati, I., & Legiati, T. (2019). Mengenal Nyeri Persalinan Pada Primipara Dan Multipara. *Jurnal BIMTAS: Jurnal Kebidanan Umtas*, 2(1), 42–48. <https://doi.org/10.35568/bimtas.v2i1.340>
- Leung R. W., Li J. F., Leung M. K., Fung B. K., Fung L.C., Tai S., Leung W. (2013). Efficacy of birth ball exercises on labor pain management. *Hong Kong Med J*, 19(5), 393–399. <https://doi.org/10.12809/hkmj133921>
- Mathew, A., & Nayak, S. (2012). A Comparative Study On Effect Of Ambulation And Birthing Ball On Maternal And Newborn Outcome Among Primigravida Mothers In Selected Hospitals In Mangalor. *Journal of Health and Allied Sciences NU*, 2(2), 2–5.

<https://doi.org/http://doi.org/10.1055/s-0040-1703561>

- Mirzakani, K., Hejazinia, Z., Golmakani, N., Sardar, M. A., Shakeri, M. T. (2014). The effect of birth ball exercise during pregnancy on mode delivery in primiparous women. *Journal of Midwifery and Reproductive Health* 3(1), 269–275. https://jmrh.mums.ac.ir/article_3562.html
- Noviyanti, N., Nurdahlia, N., Munadya, F., & Gustiana, G. (2020). Kebidanan komplementer: Pengurangan nyeri persalinan dengan latihan birth ball. *Holistik Jurnal Kesehatan*, 14(2), 226–231. <https://doi.org/10.33024/hjk.v14i2.2876>
- Nurul Khoirunnisa, F., & Andriani, D. K. (2017). Karakteristik Maternal Dan Respon Terhadap Nyeri Persalinan. *IJB: Indonesia Jurnal Kebidanan* 1(2), 93–99. <https://doi.org/10.26751/ijb.v1i2.369>
- Paninsari, D., Situmorang, E., Gulo, D. E. K. C., Bago, F., Laia, N., & Swarti, S. (2021). Terapi Birth Ball Untuk Menurunkan Intensitas Nyeri Persalinan. *Jurnal Maternitas Kebidanan*, 6(1), 94–99. <https://doi.org/10.34012/jumkep.v6i1.1640>
- Shirazi, M. G., Kohan, S., Firoozehchian, F., & Ebrahimi, E. (2019). Experience of childbirth with birth ball: A randomized controlled trial. *International Journal of Women's Health and Reproduction Sciences*, 7(3), 301–305. <https://doi.org/10.15296/ijwhr.2019.50>
- Sriwenda, D., & Yulinda. (2016). Efektifitas Latihan Birth Ball terhadap Efikasi Diri Primipara dengan Persalinan Normal Effectivity of Birth Ball Exercise on Self Efficacy of Primiparous with Normal Labor. *Journal Ners and Midwifery Indonesia*, 4(3), 141–147. [http://dx.doi.org/10.21927/jnki.2016.4\(3\).141-147](http://dx.doi.org/10.21927/jnki.2016.4(3).141-147)
- Ulfah, M., Kebidanan, J., & Kemenkes Jambi, P. (2021). Pengaruh Terapi Birth Ball pada Ibu In-Partu terhadap Intensitas Nyeri Persalinan Kala I Fase Aktif di PMB Nuriman Rafida Jambi. *NURSING UPDATE : Jurnal Ilmiah Ilmu Keperawatan*, 12(4), 11–19. <https://doi.org/10.36089/nu.v12i4.491>
- Wahyuni Siregar, W., Evawanna Anuhgera, D., Hidayat Sihotang, S., Maharani, S., & Rohana, J. (2020). Pengaruh Pelaksanaan Teknik Birth Ball Terhadap Kemajuan Persalinan. *Jurnal Penelitian Kebidanan & Kespro*, 3(1), 76–83. <https://doi.org/10.36656/jpk2r.v3i1.426>
- Wang, J., & Lu, X. (2020). The effectiveness of delivery ball use versus conventional nursing care during delivery of primiparae. *Pakistan Journal of Medical Sciences*, 36(3), 550–554. <https://doi.org/10.12669/pjms.36.3.1440>