

Systematic Review

The Effect of Birth Ball Therapy on the Intensity of Spontaneous Labor Pain

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ABSTRACT

Background: Labor pain is physiological, with different intensities in each individual, and intermittent. Birth-ball exercises are more comfortable and safer in labor. The birth ball promotes maternal delivery by assisting the mother's posture and assisting the fetus's position to be optimal in order to facilitate the birth process under normal circumstances. This study aimed to define the effect of birth ball therapy on reducing pain intensity in spontaneous labor.

Methods: The method of determining the framework uses PICO. Google Scholar, Pubmed, Science Direct, and Sage Journal were used to search for literature. The inclusion criteria were an original experiment study published in English in 2017–2021. The terms "birth ball" and "labor pain" were used. The database was filtered using the PRISMA method until the relevant articles were obtained, then a content review and discussion were carried out.

Results: There were a total of 5 articles regarding the effect of birth ball therapy on spontaneous labor pain. This article mainly carried out birth ball therapy in first-time mothers. The assessment process used to measure pain intensity in this study used the Visual Analog Scale (VAS).

Conclusion: Giving birth ball therapy for 10–20 minutes three times a week can lower pain intensity in mothers with spontaneous labor.

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INTRODUCTION

Labor is the process of birthing the fetus that occurs at term (37–42 weeks). Physiologically, pregnant women experience contractions that result in the thinning and opening of the cervix. In a normal delivery, the pain is intermittent. Attacks of pain begin at the peak of the contraction and disappear when the uterus relaxes (Isye et al., 2017).

Labor pain is a process of protection from the mother's body in childbirth to notify the mother of danger signs. It will increase sympathetic nerve activity and then cause changes in heart rate pressure, respiratory disorders, muscle tension, and stress (Rotenstein et al., 2022). Labor pain can also cause hyperventilation, increasing oxygen

demand and blood pressure, and decreasing bowel and bladder motility. These conditions can stimulate an increase in catecholamines that cause uterine inertia, prolonged labor, fetal distress, and maternal or fetal death (Solehati, 2018).

In the early stages of normal labor, the pain felt is driven by involuntary contractions of the uterine muscles. At the beginning of the labor process, the contractions felt by the mother tend to be in the lower back. The more advanced the labor process, the more pain the mother feels in her abdomen and back. Labor contractions generally last about 45 to 90 seconds. When labor progresses, the intensity of contractions increases, making the pain stronger (Reeder, 2011).

Pain management in labor can be done pharmacologically or non-pharmacologically. Non-pharmacological methods are easier and safer, one of them is birth ball therapy. Birth ball therapy is one of the non-pharmacological methods that can be used to reduce labor pain without using drugs.

A birth ball is a therapy carried out by the mother sitting on the ball during delivery. The birth ball encourages the mother's intense energy. They help the mother's posture to be upright to allow the fetus to be in an optimal position for childbirth under normal conditions (Sutringish et al., 2019).

According to the description of the background above and several journals that discuss birth ball therapy, few literature reviews still examine the effect of a birth ball on pain in spontaneous birth. Thus, this study aimed to analyze the impact of birth ball therapy on spontaneous labor pain.

MATERIALS AND METHOD

This article is a systematic literature review concerning the Preferred Reporting Items for Literature Review and Meta-Analyses (PRISMA). The systematic review was carried out according to the PICO model, namely: P (patient, population, problem), I (intervention, prognostic factor, exposure), C (comparison, control), and O (outcome). The PICO formulations in this article are P (mother giving birth), I (birth ball therapy), C (articles reviewed without using a comparison intervention), and O (reducing labor pain).

Search for primary articles using an electronic database that aims to provide relevant articles. The databases used include Google Scholar, Science Direct, Pubmed, and Sage Journal. The keywords in the search for evidence-based research in this literature review are "birth ball" and "labor pain". The selected article is an article the author can download or open access to. The inclusion and exclusion criteria for the reports that the authors compiled in this literature review are presented in Tables 1 and 2.

The article search flow begins with collecting articles according to keywords from various databases. After checking for duplication of titles, the same title is eliminated from the article search process. The search is continued by eliminating articles with titles not relevant to the topic to be reviewed.

The selection is then followed by abstract screening according to the predetermined inclusion criteria, and pieces that do not match have been eliminated from the search process. Furthermore, articles were screened up to this stage and then rescreened through full-text screening. Reports that have met the inclusion criteria and have no problems with the research methodology are involved in the review process for further article evaluation.

RESULTS

Based on search results in Google Scholar, Science Direct, Pubmed, and Sage Journal with the keywords "birth ball" and "labor pain", the author found as many as 380 articles. The screening was completed, and 14 journals were obtained. A feasibility assessment of 31 full-text journals was carried out. However, because the journals did not follow the intervention and methodology, only five journals were reviewed according to applicable regulations (Figure 1).

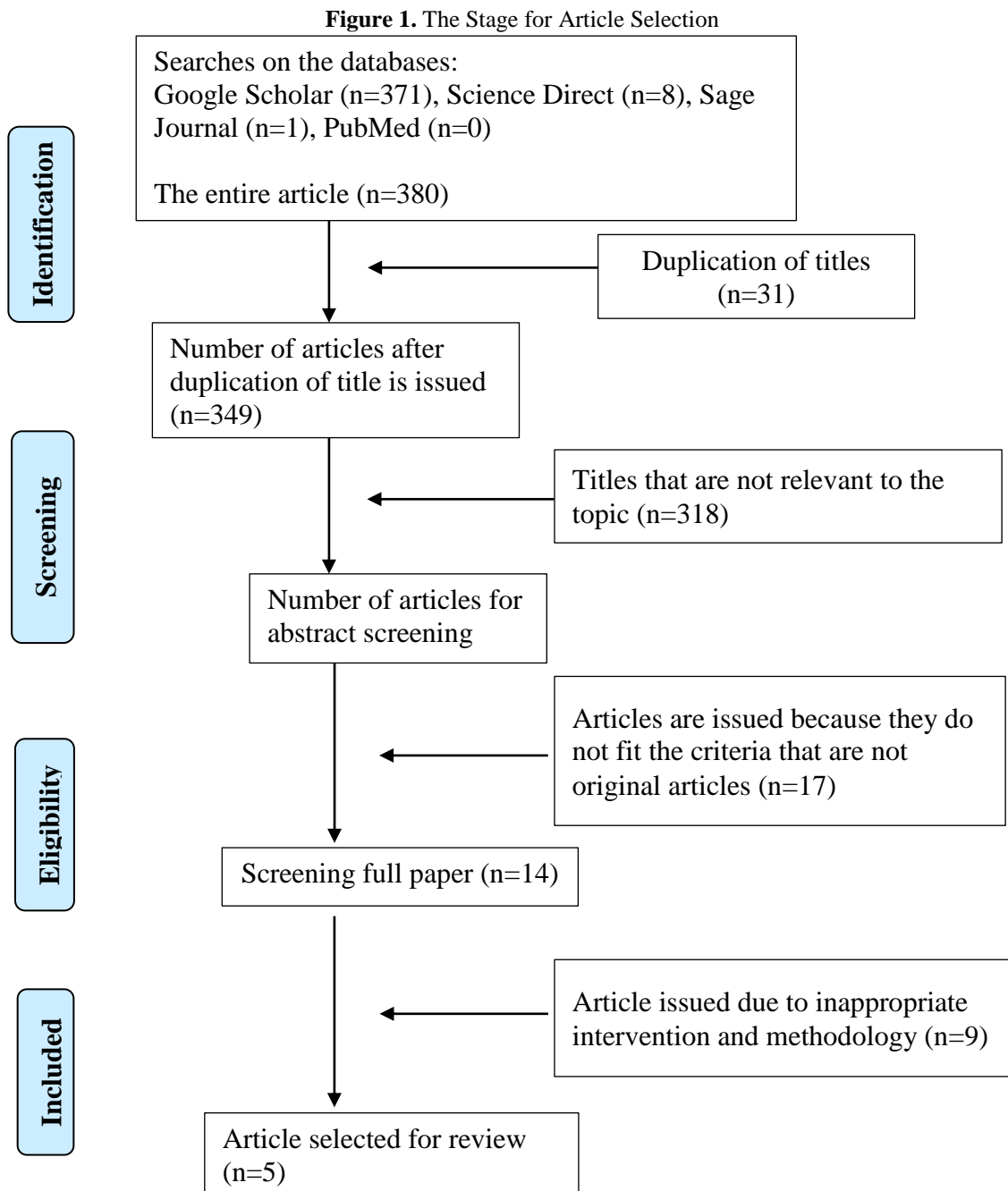


Table 1. Inclusion Criteria

Criteria	Inclusion
Period	Published less than 5 years (2017-2021)
Language	English
Subject	Mother giving birth
Article type	Original article, research article, and full text, experimental research
Research design	Experimental (RCT and Quasi Experiment)

Table 2. Exclusion Criteria

Criteria	Exclusion
Period	Published before 2017
Language	Indonesian and other than English
Subject	Not a mother giving birth
Article type	Review articles such as literature, systematic, meta-analysis, and similar article reviews
Research design	Non-experimental (review articles, descriptive research, and the like)

After assessing the quality of articles using The Joanna Briggs Institute (JBI) checklist for quasi-experimental studies (Tufanaru et al., 2020) and the checklist for randomized control trial studies (RCT) (Moola et al., 2017). The assessment process involves answering the question points contained in the questionnaire in accordance with the contents of the article in question using yes/no/unclear/not applicable answers. There are 13 question items for quasi-experimental research (nonrandomized).

The answer "yes" will get a value of 1 and the other answers will get a value of 0, then the result is divided by the total number of questions and multiplied by 100%. Good quality if the score is 80-100%, sufficient quality is 50-79%, and less quality <50%. The results of the article quality assessment are that the five articles have good quality, with a value of 92% for articles 1, 3, and 4, a value of 85% for article 2, which is an RCT-type article, and a value of 100% for article 5, which is a quasi-experimental article (Table 3).

Table 3. Randomized Controlled Trial Article Assessment

Items	Assessment			
	1	2	3	4
Was true randomization used for assignment of participants to treatment groups?	Y	Y	Y	Y
Was allocation to treatment groups concealed?	N	N	N	N
Were treatment groups similar at the baseline?	Y	Y	Y	Y
Were participants blind to treatment assignment?	Y	Y	Y	Y
Were those delivering treatment blind to treatment assignment?	Y	Y	Y	Y
Were outcomes assessors blind to treatment assignment?	Y	Y	Y	Y
Were treatment groups treated identically other than the intervention of interest?	Y	N	Y	Y
Was follow up complete dan if not, were differences between groups in terms of their follow up adequately described dan analyzed?	Y	Y	Y	Y

Items	Assessment			
	1	2	3	4
Were participants analyzed in the groups to which they were randomized?	Y	Y	Y	Y
Were outcomes measured in the same way for treatment groups?	Y	Y	Y	Y
Were outcomes measured in a reliable way?	Y	Y	Y	Y
Was appropriate statistical analysis used?	Y	Y	Y	Y
Was the trial design appropriate, dan any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct dan analysis of the trial?	Y	Y	Y	Y

Table 4. Quasi Experimental Article Assessment

Items	Assessment
Is it clear in the study what is the ‘cause’ dan what is the ‘effect’ (i.e. there is no confusion about which variable comes first)?	Y
Were the participants included in any comparisons similar?	Y
Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?	Y
Was there a control group?	Y
Were there multiple measurements of the outcome pre dan post the intervention/exposure?	Y
Was follow up complete dan if not, were differences between groups in terms of their follow up adequately described dan analyzed?	Y
Were the outcomes of participants included in any comparisons measured in the same way?	Y
Were outcomes measured in a reliable way?	Y
Was appropriate statistical analysis used?	Y

Table 5. Results of Article Quality Assessment

Article Title	Writer	Year	Critical appraised RCT/Quasi experiment	Evaluation quality
Effect of Birth Exercising for Management of Childbirth Pain in Turkish Women	Ball the of in Aktaz D, Kolsuz S, Mukadder M, Besirli EG, Gundogan FR	2021	(12/13) 92%	Well
Effect of Movement using Ball and Nature Honey Consumption on Labor Pain in Nulliparous	Pelvic Birth and Listening to sounds and Syrup Taavoni S, Charkamyani F, Hashemdabaghian F, Ekbatani N	2018	(11/13) 85%	Well

Article Title	Writer	Year	Critical appraised RCT/Quasi experiment	Evaluation quality
Women: A Randomized Clinical Trial				
Experience of Childbirth with Birth Ball: A Randomized Controlled Trial	Shirazi MG, Kohan S, Firoozehchian F, Ebrahimi E	2019	(12/13) 92%	Well
Effect of Birthball Usage on Profit Outcome and Perinatal Outcome	BSCS Jothirathne, UDP Ratanasiri	2021	(12/13) 92%	Well
Using of Birthing Ball during the First Stage of Labor: It's Effect on the Progress of Labor and Outcome among nulliparous Women	Farrag RE,	2018	(9/9) 100%	Well

Table 6. Summary of Article Review

Journal	Desain	Population	Intervention	Compare/Control	Results/Findings
Effect of Birth Ball Exercising for the Management of Childbirth Pain in Turkish Women	RCT	Sixty respondents aged 18-35 years, following routine check-ups and antenatal care, 35-week gestation, single pregnancy, normal birth weight with vertex position, planned spontaneous birth, maximum cervical dilatation of 2 cm, and delivery at term.	The birth ball therapy program includes eight exercises in 4 different positions: sitting, standing, kneeling, and squatting. Birth ball exercises are carried out once a week with a duration of 20-25 minutes in each session of the initial training program. Then proceed with exercise at least three times a week for 20 minutes at a time of 6-8 weeks.	The control group received no birth ball training and performed no birth ball exercises, only prenatal care (average 7-9 times) and routine hospital care.	The results showed that the pain of participants in the intervention group who applied birth ball training were lower than those in the control group when cervical dilatation was 4, 6, and 8 cm.
Effect of Pelvic Movement using Birth Ball and Listening to Nature sounds and Honey Syrup Consumption on Labor Pain in Nulliparous Women: A Randomized Clinical Trial	RCT	This study used a sample of 60 with the provisions of sampling that is in the age between 20-35 years old, gestational age 38-42 weeks, cephalic presentation, good physical and mental health, no history of infertility, vaginal delivery, cervical dilatation with a speed of 5 inches for less than 6 hours, no history of honey allergy, not afraid	In the birth ball intervention, the respondent moved the pelvis, tilted and rotated it, onward and back, and left and right in the birth ball. However, in this article, an intervention is added, namely, after birth ball therapy, followed by giving 150 ccs of water and 2.5 teaspoons of honey syrup every 60-30 minutes to provide energy. The intervention group respondents also heard natural sounds such as ocean waves,	The women in the control group received routine care in the same environment.	This article showed that the two groups differed in the mean pain score (p = 0.001). The severity of pain in the intervention group was lower than in the control group in the first 30 minutes to 120 minutes after the intervention. The severity of pain in the control group tended to increase.

Journal	Desain	Population	Intervention	Compare/Control	Results/Findings
		to listen to natural sounds like ocean waves, etc.	rain, and soothing birds through headphones to prevent distraction from the surrounding environment. For the volume of natural sounds to be heard, the respondents set their own according to their respective comfort levels. Pelvic movement intervention with a birth ball, listening to nature sounds.		The mean pain intensity in the intervention group was 7.61 ± 1.17 and in the control group was $nine \pm 0.0$.
Experience of Childbirth with Birth Ball: A Randomized Controlled Trial	RCT	This research used a randomized controlled trial design with a total sample of 89 with a gestational age of 30-32 weeks, had a normal pregnancy, had no history of disease or complications based on standard prenatal lines.	In this study, the intervention used four types of positions with eight exercises being taught, including sitting, standing, kneeling, and squatting. The intervention was conducted approximately 20 minutes every three times a week for 6-8 weeks.	Routine standard intervention.	In this study, it was found that birth ball exercise significantly increased self-efficacy, labor pain in the intervention group was less than in the control group ($p < 0.001$). Self-efficacy scores were higher in the intervention group.
Effect of Birth ball Usage on Profit Outcome and Perinatal	RCT	Total sample is 84 singleton pregnancy respondents, gestational age 24-30 weeks and primigravida.	The birth ball intervention was given by instructing the respondent to sit on the birth ball and move in a circle for at least 15 minutes.	The control group underwent routine labor management and was given analgesics when pain	In this study, it was found that birth ball exercise significantly reduced labor pain

Journal	Desain	Population	Intervention	Compare/Control	Results/Findings
Outcome			Respondents in the intervention group were also given a video clip demonstrating the birth ball exercise and leaflets related to the exercise.	relief was needed.	($p < 0.001$). The average pain score recorded were 3.76 (intervention group) and 6.54 (control group)
Using of Birthing Ball during the First Stage of Labor: Its Effect on the Progress of Labor and Outcome among Nulliparous Women	Quasi experiment	The total sample was 120 people with normal low risk nulliparas, spontaneous delivery without anesthesia, late latent phase, healthy term more than 37 weeks gestation, singleton fetus, and cephalic presentation.	Birth ball exercises are given in several positions, namely a sitting position (pelvic rocking-forward and backward, sideways, and rocking), sitting with legs bent 90 degrees with legs outstretched. The next position is the squat position (leaning on the ball on the wall). After this teaching session, respondents were instructed to do birth ball therapy for an early stage of labor every hour for at least 10-20 minutes up to 10 cm dilatation.	The women in the control group just receiving the routine care of the hospital.	In the fifth article, the results of the pain level during the first stage of labor showed no difference between the two groups before the intervention $p = 0.07$ and 0.09 . However, after the intervention during the active and transition phases, the intervention group experienced less pain with a statically significant difference compared to the control group.

DISCUSSION

This study consisted of five articles on birth ball exercises to reduce labor pain. Labor pain is a pain that all pregnant mothers feel. When the delivery mother focuses her attention on the pain, felt, it will affect her perception of pain, which will make the pain felt will increase.

Pain in this process needs good treatment and does not cause trauma and complications that interfere with childbirth (Sintya Dewi et al., 2020). Several studies mention interventions to reduce labor pain, one of which is birth ball therapy (Henderson, 2006). A birth ball is a ball therapy that helps mothers in the first stage of labor, and mothers can use various positions (Kurniawati et al., 2017).

Giving birth ball therapy in the first study Aktaz et al., (2021), the second Taavoni et al., (2018), the third Jothirathne & Rathnasiri, (2021), and the fifth (Farrag, 2018). The birth ball therapy program includes four types of positions with eight exercises taught, including standing (leaning forward on the ball and leaning on the ball against the wall, up and down), sitting (pelvic rocking, forward and backward, hula-hula, side to side, and rocking), squatting (leaning against the ball and wall), and kneeling (hugging the ball and swinging the hips). Birth ball exercises are carried out once a week, with a duration of 20–25 minutes in each session of the initial training program.

Then proceed with the activity at least three times a week for 20 minutes for 6–8 weeks. Meanwhile, in the fourth study Jothirathne & Rathnasiri, (2021), the birth ball intervention was given by instructing the respondent to sit on the birth ball and move in a circle for at least 15 minutes. While the second article Taavoni et al., (2018) added intervention after birth ball therapy, followed by giving 2.5 teaspoons of honey syrup in 150 ccs of water every 30–60 minutes to provide energy.

The intervention group respondents also heard natural sounds such as ocean waves, rain, and soothing birds through headphones to prevent distraction from the surrounding environment. For the volume of natural sounds to be heard, the respondents set their own according to their respective comfort levels. Those interventions continued from the active phase to the transitional phase.

From the research results of each journal, it was found that birth ball therapy can help pregnant women, especially primigravida and nulliparous women, reduce the intensity of spontaneous labor pain, especially during the first stage. One of the movements of birth ball therapy is to sit on the ball and rock to feel comfortable and help the improvement of labor using gravity while raising the curvature of the ball, stimulating the receptors of the hip that are responsible for producing endorphins (Kurniawati et al., 2017). Using a birth ball during labor prevents the mother from continuously being in a supine position and contributes to improving maternal self-efficacy during delivery, and reduces pain.

As much as 60% reported decreased pain levels after using birth balls, 8% said more pain than before, and 26% reported no change in pain levels (Gau, 2011). Mothers who can rest in time with uterine contractions will feel comfortable during the delivery process. In addition, the birth ball is handy for powerfully pushing the mother's energy needed during childbirth, and the fetus's position feels optimal, making it easier for normal birth.

Mothers sit as comfortably as possible, and the form of the ball that can alter the mother's body shape creates relaxation. In addition, ligaments and muscles, especially those in the pelvic area, become loose, reducing pressure on the sacroiliac joints,

bladder, back, waist, tailbone, and perineum (Irawati et al., 2019). Based on this theory, using a birth ball is one of the interventions to devestate pain during labor.

Besides relieving pain during the opening in the first stage, the birth ball also reduces the incidence of the prolonged first stage by revving the cervical opening, facilitating uterine contractions, enlarging the diameter of the pelvis, and revving the descent of the fetal head. So, it is recommended that pregnant women use the birth ball in labor (Maryani, 2016).

CONCLUSION

Based on the results and discussions described in the previous section, it can be concluded that birth ball therapy effectively reduces the intensity of pain in mothers who give birth spontaneously. Of the five articles that have been reviewed, the most common birth ball therapy interventions are sitting, standing, kneeling, and squatting. The intervention was performed for approximately 10–20 minutes, three times a week. The Visual Analog Scale (VAS) can use the pain assessment technique.

As for suggestions for other scientific writing related to the same topic, namely the effectiveness of birth ball therapy with other types of non-pharmacological treatment in lessening spontaneous labor pain. So that the advantages and disadvantages of each intervention can be seen and which intervention is more effectively used with a more profound and precise discussion.

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