BIRTHING BALL EXERCISE REDUCES PAIN AND ANXIETY IN LABORING MOTHERS

Birthing Ball Menurunkan Nyeri dan Kecemasan Ibu Bersalin

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ABSTRAK

Persalinan normal direkomendasikan karena lebih hemat biaya, durasi rawat inap lebih singkat, tanpa anestesi, serta risiko infeksi dan perdarahan yang rendah. Namun, sebagian besar ibu bersalin mengalami nyeri yang dapat memicu ketakutan dan kecemasan, sehingga berisiko menimbulkan komplikasi. Penelitian ini bertujuan untuk mengetahui efektivitas latihan birthing ball dalam menurunkan intensitas nyeri dan kecemasan pada ibu bersalin di praktik mandiri bidan wilayah kerja Dinas Kesehatan Kabupaten Kubu Raya. Penelitian menggunakan desain kuasi-eksperimen dengan dua kelompok. Sebanyak 60 partisipan dipilih melalui teknik consecutive sampling dan dibagi menjadi kelompok intervensi (latihan birthing ball) dan kontrol (latihan pernapasan rutin). Pengukuran tingkat nyeri dan kecemasan dilakukan setelah intervensi menggunakan instrumen Visual Analogue Scale (VAS), Face Pain Rating Scale (FPRS), dan Numerical Analogue Scale (NAS), yang telah terbukti valid dan reliabel. Analisis data menggunakan uji korelasi, paired t-test, dan uji Wilcoxon. Hasil menunjukkan bahwa karakteristik responden homogen, dengan mayoritas berpendidikan dasar dan multigravida. Terdapat perbedaan signifikan antara kelompok intervensi dan kontrol dalam hal penurunan tingkat nyeri dan kecemasan (p< 0,05). Dapat disimpulkan bahwa latihan birthing ball efektif dalam mengurangi nyeri dan kecemasan pada kala I persalinan normal.

Kata kunci: *kecemasan, latihan birthing ball, nyeri persalinan, persalinan normal, kesehatan maternal*

ABSTRACT

Normal childbirth was recommended due to its cost-effectiveness, shorter hospital stays, absence of anesthesia, and lower risks of infection and bleeding. However, most laboring women experienced pain that triggered fear and anxiety, potentially leading to complications. This study aimed to determine the effectiveness of birthing ball exercises in reducing pain intensity and anxiety in laboring mothers at independent midwifery practices in the Kubu Raya District. A quasi-experimental design with two groups was used. A total of 60 participants were selected using consecutive sampling and divided into an intervention group (birthing ball exercise) and a control group (routine breathing exercises). Pain and anxiety levels were measured after the intervention using the Visual Analogue Scale (VAS), Face Pain Rating Scale (FPRS), and Numerical Analogue Scale (NAS), all of which had been validated and shown to be reliable. Data were analyzed using correlation tests, paired t-tests, and the Wilcoxon test. The characteristics of respondents were homogeneous, with most having basic education and being multigravida. Results showed significant differences between the intervention and control groups in reducing pain and anxiety levels ($p < 0.05$). In conclusion, birthing ball exercises were effective in reducing pain and anxiety during the first stage of normal labor.

Keywords: anxiety, birthing ball exercise, labor pain, normal delivery, maternal health

INTRODUCTION

Normal delivery is the physiological process of spontaneous delivery of a fetus through the birth canal within 24 hours without causing complications for the mother or baby. This process begins

with regular, progressive uterine contractions and ends with the birth of the baby.[1–3] One of the main challenges during labor is the mother's intense pain, which can cause physical and emotional discomfort and increase the risk of anxiety and panic. Unmanaged labor pain can affect the body's physiological balance, such as blood pressure, oxygen saturation, and catecholamine levels, as well as psychological impacts such as loss of self-control, stress, and emotional trauma.[4–6]

Discomfort, fear, and pain are major obstacles in labor. A mother's inability to adapt to pain can lead to discoordinated uterine contractions, prolong the first stage of labor, and compromise fetal well-being.[6–8] The World Health Organization (WHO) recommends various non-pharmacological methods to reduce discomfort during labor, such as massage, the use of birthing balls, deep breathing relaxation techniques, aromatherapy, music, and emotional support during labor. Based on a literature review and preliminary studies, several non-pharmacological methods were screened for implementation in midwives' private practices, taking into account resource limitations, equipment availability, training needs, and maternal acceptance. Of the various techniques analyzed, the birthing ball was chosen because it combines physical and psychological effects, increases comfort, accelerates fetal head descent, and facilitates active maternal positions without posing risks. Furthermore, this exercise is easy to teach, is non-invasive, requires no additional medical intervention, and has been shown to be effective in reducing pain intensity and anxiety in several previous studies. This technique is also suitable for implementation in facilities with limited resources, such as private midwives' private practices in the Kubu Raya area.[9–11] Birthing balls are known as aids that support body position and assist with certain movements during pregnancy and labor.[12–14] Several studies have shown that exercising with a birthing ball can speed up the labor process, improve posture, increase flexibility, and strengthen pelvic and lower back muscles.[15–18]

Previous research by James & Hudek 2017 found that the use of a birthing ball can shorten the duration of labor.[19] Meanwhile, other studies by Sulistianingsih (2022) and Yeung (2019) showed that exercise with a birth ball can increase vaginal delivery rates and reduce cesarean section rates.[20,21] However, research findings on its effect on pain intensity have been mixed. Nevertheless, several studies still recommend the use of birth balls as a safe and effective non-pharmacological intervention for pain and anxiety management during labor.[22]While various non-pharmacological methods have been proven effective, such as breathing techniques, aromatherapy, or warm compresses, the birthing ball was chosen in this study based on its functional and practical advantages. Exercises with a birthing ball not only help reduce pain but also improve posture, accelerate fetal head descent, and facilitate labor through simple, active movements.[15.17] In addition, birthing balls provide a combination of physical and psychological relaxation, as well as increasing the production of endorphins, which play a role in reducing pain and anxiety.[13,24] This technique is also considered safe, easy to practice, non-invasive, and does not require additional equipment, making it suitable for the conditions of independent midwife practice in work areas with limited facilities.[20,21] Therefore, birthing balls are seen as a feasible, relevant, and potential intervention to increase comfort and positive experiences in childbirth.

Preliminary study data in the Kubu Raya District Health Office's work area in 2017 showed that out of 12,763 deliveries, 2,055 mothers were estimated to have experienced pregnancy complications. This finding reflects the still high number of obstetric problems

potentially influenced by suboptimal pain and anxiety management. However, based on the results of initial observations and informal interviews with midwives in several independent practices, it was discovered that non-pharmacological interventions such as the use of birthing balls have never been routinely implemented in childbirth practices in this area. This condition indicates a gap between scientific recommendations and field practice.

Therefore, this study was conducted to evaluate the effectiveness of birthing ball exercises as an effort to reduce pain and anxiety, and to provide a scientific evidence base for the implementation of this intervention at the primary care level in Kubu Raya. Based on this background, the researchers were interested in evaluating the effectiveness of birthing ball exercises in reducing pain intensity and anxiety in laboring mothers in independent midwife practices within the Kubu Raya District Health Office's work area. In this study, the main focus was evaluating the effectiveness of exercises using birthing balls in reducing pain intensity and anxiety in laboring mothers in independent midwife practices within the Kubu Raya District Health Office. This study also noted specific conditions of the region, such as the number of deliveries and the rate of pregnancy complications, which provide unique context for the expected results. This compares favorably with previous studies, such as one by James & Hudek, which found that the use of birthing balls can shorten labor duration,[19] and another study by Sulistianingsih and Yeung which observed the effect of birth balls on vaginal delivery rates and cesarean section rates, this study focused on direct evaluation of pain intensity reduction and anxiety.[20,21]

METHODS

This study was a quasi-experimental study with a non-equivalent control group posttest design. This design involved two groups: the treatment group and the control group. The treatment group consisted of 30 participants who received birthing ball exercise therapy prior to delivery. Exercises were performed from the early to active stages of labor for approximately 20–30 minutes, guided by a trained midwife. The exercises included pelvic circles, rocking, and rhythmic rising and falling on the ball in a stable sitting position. These exercises aimed to increase comfort, improve fetal position, and stimulate endorphin production to reduce pain and anxiety. The control group consisted of 30 participants who did not receive any specific intervention but underwent routine breathing and relaxation exercises according to standard delivery care. Both groups underwent post-test measurements of pain and anxiety levels after delivery without a pre-test.

This study was conducted in the working area of the Kubu Raya District Health Office. The population in this study were all normal pregnant women who were about to give birth in independent midwife practices (PMB) in the area. The sampling technique used a non-probability sampling method with a consecutive sampling approach, namely all subjects who met the inclusion criteria were included in the study sequentially until the sample size was met. The sample size in this study was determined based on the calculation of the minimum requirement in a two-group independent test with an assumption of 80% power, a 5% significance level, and a moderate effect size (Cohen's d = 0.5), resulting in a minimum requirement of 27 respondents per group. This number was then rounded up to 30 people to anticipate potential data loss. The sampling technique was carried out consecutively until the target number was reached.

Inclusion criteria for this study included pregnant women who would give birth naturally, who visited the PMB within the Kubu Raya District Health

Office, who had no confirmed history of COVID-19, who had no complications during pregnancy, who had no comorbidities, and who could communicate well. Exclusion criteria included mothers who refused to participate in the intervention procedure or were unwilling to sign an informed consent, who experienced an obstetric emergency before the intervention, who had a change in their birth plan to a cesarean section due to medical indications, and who were uncooperative during the birthing ball exercises.

The intervention group received birthing ball exercise therapy, performed from the early to active stages of labor for approximately 20–30 minutes, guided by a trained midwife. Exercises included pelvic circles, rocking, and rhythmic rising and falling in a stable sitting position. This intervention aimed to reduce pain and anxiety by improving fetal position, stimulating endorphins, and increasing maternal comfort. Pain and anxiety levels were measured after the intervention using the Visual Analogue Scale (VAS), Face Pain Rating Scale (FPRS), and Numerical Analogue Scale (NAS), which have been proven valid and reliable. These scales reflect the mother's subjective perception of pain and anxiety intensity. Anxiety management was not performed separately but rather became an integral part of the birthing ball exercises, providing physical and psychological relaxation through rhythmic movements, comfortable postures, and midwife support throughout the intervention.

This study has received ethical approval from the Ethics Committee at the Pontianak Ministry of Health Polytechnic under number 145.KEPK.PK.PKP/VI/2020. The research instruments consisted of a checklist for implementing birthing ball exercises and a questionnaire to measure pain and anxiety levels in laboring mothers.

Pain and anxiety measurement instruments used were the Visual Analogue Scale (VAS), the Face Pain Rating Scale (FPRS), and the Numerical Analogue Scale (NAS). All three are measurement tools that have been proven valid and reliable in various studies. The VAS has high validity, with a correlation with the numeric scale (r > 0.7) and excellent reliability (ICC > 0.90).[25] FPRS shows good assessment consistency with kappa values of 0.65–0.85.[26] NAS was also proven to be valid and reliable with a correlation to VAS (r > 0.8) and ICC of 0.88–0.94[27] The instruments used in this study consisted of three pain measuring instruments and one anxiety measuring instrument.

Pain measurements were conducted using the Visual Analogue Scale (VAS), the Face Pain Rating Scale (FPRS), and the Numerical Analogue Scale (NAS). The VAS is a 10 cm horizontal line that assesses pain intensity from "no pain at all" to "the worst pain," and is rated as a ratio scale. The FPRS displays six facial expressions to describe pain intensity, used as an ordinal scale to facilitate mothers who have difficulty assessing numbers directly. The NAS is a 0–10 numerical scale that allows respondents to quickly and directly state the level of pain, also including a ratio scale.

Anxiety was measured using an anxiety VAS, using the same principles as pain measurement. All instruments have been proven valid and reliable: the VAS has a reliability of ICC > 0.90 and a correlation of r > 0.70; the NAS shows a high correlation with the VAS (r > 0.80; ICC 0.88–0.94); and the FPRS has good inter-rater consistency (Kappa 0.65–0.85). The use of all three pain measures simultaneously aims to increase data accuracy, adjust for variations in respondents' subjective expressions, and minimize bias from single perceptions.

Data collection was conducted after the intervention was administered, and the measurement results were analyzed using two approaches. Univariate analysis was used to describe the frequency distribution of respondent

characteristics and each research variable. Bivariate analysis was conducted to examine the effect of birthing ball exercises on pain and anxiety levels using paired t-tests, Wilcoxon tests, and correlation analysis.

Data collection in this study was conducted in stages using a pre-test and post-test design in two groups: the intervention group and the control group. Initial measurements (pre-test) of pain and anxiety levels were conducted before the intervention, using three validated instruments: the Visual Analogue Scale (VAS), the Face Pain Rating Scale (FPRS), and the Numerical Analogue Scale (NAS). Furthermore, the intervention group was given treatment in the form of birthing ball exercises, while the control group only received breathing and relaxation exercises according to standard service procedures in independent midwifery practices.

Birthing ball exercises were administered individually to each participant by a trained midwife, during the first stage of labor (early to active), with cervical dilation between 3–7 cm. The exercises lasted for 20–30 minutes, involving three main movements: pelvic circles, rocking, and rhythmic bouncing while seated on the ball. After the intervention, pain and anxiety levels were remeasured (post-test) using the same instruments as the pre-test.

Participant recruitment was conducted through consecutive sampling of women giving birth attending independent midwife practices within the Kubu Raya District Health Office. Data collection took place in stages from March to May 2024, until the target number of 60 participants, divided into two groups (30 intervention and 30 control), was reached. Therefore, participants were not recruited simultaneously, but rather followed the arrival of women who met the inclusion criteria during the study period.

RESULT

The characteristics of the respondents in this study included age, education, and parity, as presented in Table 1. Most of the respondents in both the intervention and control groups were in the 21–30 years age range, namely 56.7% in the intervention group and 80.0% in the control group. The results of statistical tests showed no significant difference between the two groups based on age (p = 0.096), so it can be concluded that the age distribution is homogeneous. Based on education level, respondents in the intervention group mostly had primary education (50.0%), while the control group was dominated by respondents with secondary education (60.0%). Higher education was found in small proportions in both groups. Statistical tests showed no significant difference in education level between the two groups (p= 0.301), which means that educational characteristics are also homogeneous. Viewed from the parity category, most respondents in both groups were multigravida, namely 66.7% in the intervention group and 56.7% in the control group. Primigravida numbered 33.3% in the intervention group and 43.3% in the control group. There was no significant difference between the two groups in terms of parity (p = 0.595), so this characteristic was also considered homogeneous.

Table 1. Characteristics of Respondents Based on Age, Education, and Parity

Characteristics	Category	Intervention (n = 30)	Control (n = 30)	p-value
Age	1–30 years	17 (56,7%)	24 (80,0%)	0,096
	31–40 years	13 (43,3%)	6 (20,0%)	
Education	Primary	15 (50,0%)	10 (33,3%)	0,301
	Secondary	12 (40,0%)	18 (60,0%)	
	Higher	3 (10,0%)	2 (6,7%)	
Parity	Primigravida	10 (33,3%)	13 (33,3%)	0,595
	Multigravida	20 (66,7%)	17 (56,7%)	

Differences in Pain Intensity in the Intervention Group

Table 2. Differences in Pain Intensity Before and After Birthing Ball Exercises

Treatment	Mean	SD	Median	Min	Max.	*p-value Normality*	*p-value Wilcoxon*
Before	6.87	1,306	7.00	4	9	0.001	0,000
After	5.47	1,008	6.00	4	8	0,000	

Table 2 shows that the average pain intensity before birthing ball exercise in the intervention group was 6.87 (SD = 1.306) and decreased to 5.47 (SD = 1.008) after the intervention. The Wilcoxon test showed a p-value <0.05, indicating a significant difference in pain levels before and after the intervention. This indicates that birthing ball exercise was effective in reducing pain intensity in the intervention group.

Differences in Pain Intensity in the Control Group

Table 3. Differences in Pain Scale Before and After Birthing Ball Exercise

Treatment	Mean	SD	Median	Min	Max.	*p-value Normality*	*Wilcoxon p-value*
Before	5.90	1,242	6.00	3	8	0.025	0,000
After	7.30	1,088	7.00	5	9	0.015	

In Table 3, the control group's average pain level actually increased from 5.90 (SD = 1.242) before the intervention to 7.30 (SD = 1.088) afterward. The Wilcoxon test showed a p-value <0.05, indicating a significant difference between before and after in the control group. This improvement may be attributed to the absence of any specific intervention other than routine breathing exercises.

Table 4 shows an analysis of the difference in average pain levels, showing that the intervention group experienced a 0.87% decrease in pain, while the control group experienced a 2.63% increase. The Mann-Whitney test showed a p-value <0.05, indicating a significant difference between the two groups in terms of pain levels. This demonstrates the effectiveness of birthing ball exercises in reducing labor pain.

Effectiveness of Birthing Ball Exercises on Pain Intensity

Table 4. Distribution of the difference in mean pain before and after the intervention period in the intervention group and the control group

Group	Difference Mean	SD	Min	Max.	*p-value Normality*	*p-value Mann Whitney*
Intervention	0.87	0.937	-1	2	0,000	0,000
Control	2.63	0.928	1	4	0,000	

Table 5. Differences in Anxiety Levels Before and After Birthing Ball Exercise in the Intervention Group

Treatment	Mean	SD	Median	Min	Max.	*p-value Normality*	*Wilcoxon p-value*
Before	6.97	1,066	7.00	5	9	0.008	0,000
After	5.60	1,303	6.00	3	7	0,000	

In Table 5, before being given birthing ball exercises, the average anxiety level in the intervention group was 6.97 (SD = 1.066), which then decreased to 5.60 (SD = 1.303) after the intervention. The Wilcoxon test results showed a p value < 0.05, which indicates that there was a significant decrease in anxiety after birthing ball exercises.

Table 6. Differences in Anxiety Levels Before and After Birthing Ball Exercise in the Control Group

Treatment	Mean	SD	Median	Min	Max	p-value Normality	Wilcoxon p-value
Before	5.83	1,085	6.00	4	8	0.014	0,000
After	7.33	0.711	7.00	6	8	0,000	

In Table 6, unlike the intervention group, the control group experienced an increase in anxiety from 5.83 (SD = 1.085) to 7.33 (SD = 0.711) after the intervention. The Wilcoxon test yielded a p-value < 0.05, indicating a significant increase. These results support the hypothesis that maternal anxiety levels tend to increase without additional intervention.

Effectiveness of Birthing Ball Exercise on Anxiety Levels

Table 7. Distribution of Mean Differences in Anxiety Before and After the Intervention Period in the Intervention Group and the Control Group

Group	Difference Mean	SD	Min	Max.	p-value Normality	p-value Mann Whitney
Intervention	0.43	1,382	-3	3	0,000	0,000
Control	2.30	1,022	0	4	0,000	

Table 7 shows that the mean difference in anxiety between the intervention and control groups was 0.43 and 2.30, respectively. The Mann-Whitney test showed a p-value <0.05, indicating a significant difference in anxiety levels between the two groups. These results confirm that birthing ball exercises are effective in reducing anxiety in mothers undergoing normal delivery.

DISCUSSION

Respondent Characteristics

This study involved 60 respondents, evenly divided into two groups: an intervention group (given birthing ball exercises) and a control group (given deep breathing relaxation exercises). The analysis showed that the age characteristics of respondents in both groups were dominated by the 21–30 age group. This indicates that the majority of respondents were within the ideal reproductive age range. According to Sandhi 2021, this age is the optimal period for pregnancy because the reproductive organs are in prime condition and individuals have the emotional and mental maturity to face the birth process.[7]

In terms of education level, the intervention group was dominated by mothers with primary education, while the control group was dominated by mothers with secondary education. However, neither low nor high education levels were shown to significantly influence pain perception and anxiety during labor. This is supported by findings by Rusmita (2015) and Gau (2011), which stated that pain perception and labor readiness were not directly influenced by formal educational background.[28,29]However, theoretically, higher education has the potential to increase information acceptance and stress management skills by improving cognitive, affective, and psychomotor abilities.[30–32]

Based on parity, the majority of respondents in both groups were multigravida. This indicates that most respondents had previous childbirth experience. This experience positively impacts preparedness for childbirth. Previous research suggests that prior childbirth experience can reduce pain perception due to greater mental and physical preparedness.[33] However, there are different findings from other studies which state that multiparous mothers are

actually 0.9 times less likely to be prepared than nulliparous mothers, which could be influenced by other social and psychological factors.[28]

Differences in Pain Intensity and Anxiety in the Control Group

In the control group, there was a significant increase in both pain and anxiety levels after the intervention (deep breathing relaxation), indicating that this intervention was not effective enough in addressing labor stressors. The average pain level increased from 5.90 to 7.30, and anxiety from 5.83 to 7.33 ($p < 0.05$). These findings are consistent with Farrag's (2018) opinion that labor pain will increase as labor progresses, primarily due to uterine muscle contractions, cervical stretching, and pressure on surrounding organs. Anxiety experienced by the mother during labor can also exacerbate pain.[34]

According to previous research, emotional tension such as anxiety and excessive fear exacerbates pain perception, causes the birth canal muscles to stiffen, slows the labor process, and increases the risk of complications for both the mother and the fetus.

However, the results of this study also indicate that the deep breathing relaxation provided to the control group was less effective in reducing pain and anxiety. This is likely due to several factors. First, the intervention was provided solely as advice without direct guidance or prior training, which may have resulted in inappropriate or inconsistent implementation of the breathing techniques. Second, during the active phase of labor, uterine contractions are already quite strong, making it difficult for mothers to focus on a controlled breathing pattern. Third, high levels of initial anxiety can interfere with concentration when applying relaxation techniques. Fourth, the passive nature of deep breathing relaxation results in a lesser pain-distraction effect than the birthing ball method, which involves active movement, sensorimotor stimulation, and changes in body position. These findings indicate that deep breathing relaxation requires prior training and intensive support during labor to achieve optimal benefits.[35.36]

Differences in Pain Intensity and Anxiety in the Intervention Group

In contrast to the control group, the intervention group receiving birthing ball exercises showed a significant decrease in pain scores (from 6.87 to 5.47) and anxiety (from 6.97 to 5.60), with a p-value <0.05. This decrease supports the findings of several studies that suggest birthing balls are effective in reducing pain during the first stage of labor. This mechanism involves increased endorphin secretion due to the elastic and rhythmic movements on the ball, which stimulate receptors in the pelvis.[37.38,39]

The reduction in anxiety also aligns with the findings of Kurniawati et al. (2017), who explained that the use of a birthing ball can increase comfort, accelerate fetal head descent, and increase maternal satisfaction with the labor process. Furthermore, the combination of physical and psychological benefits of a birthing ball makes it a relevant non-pharmacological intervention for midwifery care.[40]

Effectiveness of Birthing Ball on Pain Intensity and Anxiety

Analysis of the pre- and post-mean differences showed that the intervention group experienced a 0.87 decrease in pain and a 0.43 decrease in anxiety. In contrast, the control group experienced a 2.63 increase in pain and a 2.30 increase in anxiety. This difference was statistically significant ($P < 0.05$) and indicates that the birthing ball was effective in reducing pain and anxiety during the active phase of the first stage of labor.

These results are supported by research by Taavoni et al. 2011 which stated that birthing ball therapy is effective in reducing pain during the active phase of labor.[41]Similarly, other studies recommend the use of birth balls

as a non-pharmacological intervention that not only accelerates the progress of labor, but also reduces anxiety and increases maternal satisfaction with the birth experience.[34]

This study has several strengths, including the use of a quasi-experimental design with a control group approach that allows for comparative analysis of the effectiveness of the intervention.birthing ball. In addition, the use of three valid and reliable pain and anxiety measurement tools (VAS, FPRS, NAS) provides methodological strength and increases the accuracy of the measurement results.

However, this study also has limitations. First, the non-randomized approach and consecutive sampling technique have the potential to introduce selection bias. Second, the lack of a pre-test in the control group limits the interpretation of changes within that group. Furthermore, psychosocial factors such as family support, previous childbirth experience, and maternal self-confidence were not further analyzed, even though they can influence pain perception and anxiety.

The practical implications of this study are that birthing ball exercises can be recommended as part of non-pharmacological interventions in antenatal and intranatal care. These exercises are easy to implement, inexpensive, and can improve maternal comfort and preparedness for labor. These findings support the integration of birthing balls into standard midwifery practice, particularly during the active phase of normal labor.

CONCLUSION

The results of this study showed a significant difference in the average pain and anxiety levels before and after the intervention in the intervention and control groups. These findings indicate that birthing ball exercise therapy is significantly effective in reducing pain intensity and anxiety levels in mothers in the active phase of the first stage of labor with normal labor. The group given the birthing ball exercise intervention experienced a decrease in pain and anxiety scores, while the control group, which was only given deep breathing relaxation, experienced an increase. The effectiveness of birthing balls in pain and anxiety management can be explained by physiological mechanisms such as endorphin stimulation, increased comfort through rhythmic movements, and contributions to labor progress. Therefore, birthing balls can be recommended as a non-pharmacological intervention in maternal nursing care to support the physical and mental readiness of pregnant women for labor. This exercise also has the potential to promote a more positive and satisfying birth experience for the mother, as well as contributing to the safety and well-being of both mother and baby.

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