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The Effect of Birthing Ball on the Pain Scale of First Stage of Labor in the Active Phase in the Bukit Sari Health Center Work Area

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ABSTRACT

Labor pain is a feeling and emotional reaction that begins with regular contractions, helping to open the birth canal. It can lead to higher blood pressure, heart rate, and breathing rate. Unmanaged pain can increase worry and anxiety. This research sought to evaluate how a birthing ball influences labor discomfort during the initial active stage. The research design is a pre-experimental one-group pretest-posttest. The study population includes 45 active phase I maternity mothers. Accidental sampling is used, with a sample size of 28 people. Univariate analysis uses a frequency distribution table, and bivariate analysis uses the Wilcoxon test. Based on the results of the study obtained an average of labor pain in mothers before the intervention, as many as 26 people (92.9%) respondents were in severe pain. After the intervention, the average labor pain of 21 people (75%) of respondents decreased to moderate pain. Based on the test mc near test between pretest and posttest values obtained a p-value of 0.000 ($p<0.05$) so that it can be concluded that there is an influence of birth ball in reducing the pain scale of maternity mothers during the first active phase. The birth ball reduces the pain scale of maternity mothers in the first active phase.

Keywords: *Labor Pain, Birthing Ball, First Stage Of Labor*

INTRODUCTION

Labor is a complex physiological process, in which the products of conception are expelled from the uterus through the birth canal. This process involves uterine contractions, cervical dilation, and fetal descent which can cause labor pain. The pain occurs due to contractions of the myometrium muscles and stretching of the tissues around the birth canal, which requires proper care and support to reduce the discomfort of the mother in labor. (Sulisdiana, 2019).

Labor pain is a sensory and emotional response that occurs as a result of regular contractions, which aim to open the birth canal. This pain is often accompanied by fatigue and emotional reactions such as fear and anxiety, which can worsen the mother's perception of pain. (Alchalidi., 2023)

Based on Pietrzak's research. (2022) in the United States, out of 500 mothers giving birth, 72% reported severe pain, 5.2% felt unbearable pain, 25.5% experienced moderate pain, and only 2.5% reported mild pain. The average scale of labor pain reported in the study was 7, which is categorized as severe pain.(Pietrzak, 2022)

Untreated labor pain can cause increased blood pressure, heart rate, and respiratory rate, which ultimately triggers stress and increased adrenaline levels. This condition can reduce oxygen flow to the uterus, thereby increasing the risk of fetal hypoxia. (Sulistianingsih, 2022). Therefore, effective pain management is essential to optimize the labor experience and reduce the likelihood of complications.

Midwives have an important role in providing quality midwifery care during normal labor, including in pain management. Pain management can be done with pharmacological and non-pharmacological approaches. Some non-pharmacological methods that have been proven effective in reducing labor pain include breathing techniques, music therapy, back massage, acupressure, and the use of birthing balls.(Yustiari, 2022). Birthing ball, also known as fitness ball or Swiss ball, can help mothers in labor to move more freely, increase the flexibility of the pelvic muscles, and reduce tension on the back and bladder.(Yeung, et al, 2019).

Research results from Zainiyah (2021)shows that the use of a birthing ball can help reduce labor pain during the active phase of the first stage. Another study by Suryani (2020) also found that this method is not only effective in reducing pain, but can also shorten the duration of the first stage of labor. Hip movements performed when using a birthing ball can speed up the cervical opening process and increase maternal comfort during labor.

The results of an initial survey conducted at the Bukit Sari Health Center in April 2023 on 10 mothers giving birth showed that 70% (7 people) experienced severe pain with a score of 7-9, while 30% (3 people) experienced moderate pain with a score of 4-6. These data indicate that the majority of mothers experience significant pain during labor, so an effective pain management strategy is needed to improve the comfort of mothers giving birth.

Based on this background, further research is needed to evaluate the effectiveness of the birthing ball method in reducing the scale of labor pain in mothers giving birth in the first active phase.

METHOD

This study adopted a pre-experimental research design of one group pretest-posttest type. The target of this study was all mothers who gave birth with HPL in January to February 2024 at Bukit Sari Health Center as many as 45 people. The sampling technique in this study was accidental sampling and with a drop out of 20%, the number of samples was 28 people.

The study inclusion included mothers who were in the active phase of normal labor, experiencing moderate and mild labor pain, did not have serious illnesses, without complications, and agreed to Informed consent. The study exclusion was mothers who did not complete the intervention session, experienced fetal distress, and did not agree to be respondents. This research instrument used a questionnaire for respondent characteristics, birthing ball, and VAS pain scale observation.

This study was conducted in the service area of Bukit Sari Health Center during January to February 2024. In this study, the analysis was carried out using a non-parametric test, namely the Wilcoxon test. This study has obtained approval from the Health Research Ethics Committee of Stikes Guna Bangsa Yogyakarta with registration number 004/KEPK/III/2024.

RESULTS AND DISCUSSION

Univariate analysis.

a. Respondent Characteristics

Table 1. Respondent Characteristics

Respondent Characteristics		Frequency (n: 28)	
		N	%
Age	< 20 years	6	21.4
	20-35 year	22	78.6

	>35 years	-	-
Parity	Primigravida	9	32.1
	Multigravida	19	67.9
Work	Work	7	25
	Doesn't work	21	75
Education	SD		
	JUNIOR HIGH	2	7.1
	SCHOOL	8	28.6
	SENIOR HIGH	10	35.7
	SCHOOL	8	28.6
	College		
Economic Level	<UMR	12	42.9
	≥UMR	16	57.1

Source: Primary Processed Data

Based on table 1, the age of the most respondents was 20-35 years (22 people, 78.6%), the most parity was multigravida (19 people, 67.9%), respondents were unemployed (21 people, 75%), 10 people (35.7%) had a high school education, and 16 people (57.1%) were at an economic level ≥UMR.

b. Distribution of labor pain levels before intervention

Table 2. Distribution of labor pain levels before birthing ball intervention

Pain Scale	**Pretest (n : 28)**	
	N	**%**
No pain	-	-
Mild pain	-	-
Moderate pain	2	7.1
Severe pain	26	92.9
Very severe pain	-	-
The pain is so bad it is unbearable	-	-

Source: Primary Processed Data

Based on table 2 above, the level of labor pain in mothers before the intervention was given was 26 people (92.9%) who had severe pain.

c. Distribution of labor pain levels after intervention.

Table 3. Distribution of labor pain levels after birthing ball intervention

Pain Scale	Posttest (n: 28)	
	N	%
No pain	-	-
Mild pain	-	-
Moderate pain	21	75
Severe pain	7	25
Very severe pain	-	-
The pain is so bad it is unbearable	-	-

Source: Primary Processed Data

Based on table 3 above, the level of labor pain in mothers after being given birthing ball intervention was found to be 21 people (75%) experiencing a decrease in pain to moderate pain.

Bivariate Analysis

a. Data normality test

Before conducting bivariate analysis, the data obtained were tested for normality using the Shapiro-Wilk method because the number of samples was less than 30 individuals, which can be seen in the table below:

Pain Scale	p-value
Pretest pain scale	0,000
Posttest pain scale	0,000

Table 4. Normality Test Results

Source: Primary Processed Data

Based on table 4. above, it was found that the p value results of the pretest and posttest pain scales were 0.000, meaning that the data was not normally distributed because p was less than 0.05, so the test carried out was the Wilcoxon test.

b. Bivariate analysis

The impact of using a birthing ball on reducing the level of pain in mothers giving birth during the first active phase in the Bukit Sari Health Center service area.

Table 5. Impact of using a birthing ball on reducing maternal pain levels during childbirth in the active phase of the first stage of labor in the Bukit Sari Health Center service area.

Variables	Pretest		Posttest		p-value
	N	%	N	%	
No pain	-	-	-	-	
Mild pain	-	-	-	-	
Moderate pain	2	7.1	21	75	
Severe pain	26	92.9	7	25	0,000
Very severe pain	-	-	-	-	
The pain is so bad it is unbearable	-	-	-	-	

Source: Primary Processed Data

Based on table 5. above, the results of the Wilcoxon test were obtained, namely the p-value = 0.000 (p <0.05) so it can be concluded that there is an effect of the birthing ball method in reducing the pain scale of mothers giving birth in the first active phase.

DISCUSSION

Respondent characteristics

a. Age

The results of this study indicate that the majority of respondents, namely 22 people (78.6%), are in the age range of 20-35 years. This finding is in line with research conducted by.Nurcahyani, et al, (2024). who also reported that most of the mothers giving birth were in the 20-30 years age group.

Physiologically, the age range of 20-35 years is the optimal reproductive period for a woman to undergo pregnancy and childbirth. At this age, the reproductive organs have developed perfectly, so the risk of obstetric complications is lower compared to ages under 20 years or over 35 years.(Maryuni, 2020).

Pregnant women under the age of 20 are still in the growth stage, so their reproductive organs are not fully mature. This condition can increase the risk of premature labor, preeclampsia, dystocia (difficulty in labor), and fetal growth disorders in the womb.(Maryuni, 2020). Meanwhile, pregnant women over 35 years old have a higher risk of experiencing obstetric complications, such as hypertension in pregnancy, gestational diabetes, and longer labor due to decreased elasticity of the pelvic tissue.

These findings confirm that pain management interventions, including the use of birthing balls, can benefit both primiparous and multiparous mothers. Although multiparous mothers tend to have a higher pain threshold, psychological factors and previous birth experiences still play a role in pain perception. Therefore, it is important for health workers to consider a personalized approach to labor pain management, while still considering the obstetric characteristics of each mother.

b. Parity

The results of this study indicate that the majority of respondents were multiparous mothers, namely 19 people (67.9%), while 9 people (32.1%) were primiparous. Parity is defined as the number of pregnancies that have reached a viable age (≥ 20 weeks) and resulted in the birth of a live baby or stillbirth, excluding abortion. (Nurcahyani, et al, 2024).

Parity has a significant effect on the perception and intensity of labor pain. Primiparous mothers tend to experience more severe labor pain than multiparous mothers. This can be explained by several physiological and psychological factors, Cervical rigidity in primiparas makes the dilation process more difficult than in multiparas, so that uterine contractions are more intense and the pain felt is higher, Stronger uterine contractions in the first delivery can increase the perception of pain due to greater nerve stimulation, Higher ignorance and anxiety in primiparas cause the release of stress hormones, such as catecholamines, which can increase sensitivity to pain(Maryuni, 2020).

In contrast, multiparous mothers usually have previous childbirth experience, which causes the cervix to be more elastic, so that the labor process is faster and the level of pain is lower compared to primiparas. However, in this study, it was found that some multiparous mothers still experienced severe pain during labor. Several factors that can influence this phenomenon include, Differences in individual pain thresholds, where some mothers have a higher sensitivity to uterine contractions, History of previous childbirth, especially if the mother has had a difficult or traumatic labor, which can increase anxiety and strengthen the perception of pain, Duration and frequency of contractions, which can vary between individuals even though they have previous labor experience(Utami & Putri, 2020).

The results of this study indicate that labor pain management interventions, including the use of birthing balls, need to be applied to both primiparous and multiparous mothers. Although multiparous mothers tend to have higher pain tolerance, previous labor experiences and psychological factors still play an important role in pain perception. Therefore, an individualized approach to pain management is needed to improve maternal comfort during labor.

c. Work

The results of the study showed that the majority of respondents, namely 21 people (75%), were mothers who did not work, while 7 people (25%) had jobs. This finding is in line with research conducted byFitrianingsih, et al, (2019)which reports that 80% of mothers giving birth work as housewives (IRT).

The employment status of pregnant women can affect the experience of labor and perception of pain. Working mothers generally have higher physical activity than mothers who do not work. Higher physical activity can increase muscle tone and endurance, which contribute to the ability to cope with labor contractions. Conversely, mothers who do not work or have low physical activity may have a lower pain threshold, making them more susceptible to experiencing more intense labor pain. (Hastutining Fitri et al, 2023).

In addition, psychosocial factors also play a role in pain perception. Working mothers tend to be busy and distracted during pregnancy, which can reduce their focus on pain during labor. Conversely, non-working mothers may be more focused on pregnancy and labor, which can increase anxiety levels and perceptions of labor pain.(Fitrianingsih et al., 2019).

The results of this study indicate that employment status can be one of the factors that affect the intensity of labor pain. Therefore, in labor pain management, it is important for health workers to consider the factors of physical activity and mental readiness of the mother. Providing education on relaxation techniques, physical exercise during pregnancy, and mental preparation for childbirth can help increase pain tolerance, especially for mothers who do not work.

d. Education

The results of the study showed that the majority of respondents had a high school education level, namely 10 people (35.7%). This finding is in line with research conducted bySusilowati, & Kamidah, (2024), who reported that 53% of mothers in their study had a high school education.

The mother's education level plays an important role in understanding the labor process and the ability to manage pain. Mothers with higher education levels generally have better access to health information, including knowledge about labor pain management, breathing techniques, and relaxation strategies that can help reduce the intensity of pain during labor.(Maryuni, 2020).

In addition, education level is also related to the mother's ability to make decisions during pregnancy and childbirth. Mothers with higher levels of education tend to be more proactive in seeking information, attending pregnancy education classes, and having a more positive attitude towards childbirth. Conversely, mothers with lower levels of education may have limited understanding of the labor process, which can increase anxiety and decrease pain tolerance.(Maryuni, 2020).

The results of this study indicate that midwifery education interventions must be adjusted to the mother's education level.

d. Economic level

The results of the study showed that the majority of respondents had an economic level ≥ Regional Minimum Wage (UMR), which was 16 people (57.1%), while 12 people (42.9%) were in the economic category <UMR. Economic factors are one of the important determinants in access to health services, management of labor pain, and maternal welfare during the labor process.

Mothers with higher economic levels tend to have better access to quality health facilities, optimal nutritional intake, and adequate psychosocial support. In addition, they are more likely to receive better antenatal education, including labor pain management techniques, so they are better prepared for the labor process.(Maryuni, 2020).

In contrast, mothers with low economic conditions often face various obstacles, such as limited access to health services, lack of information about methods of managing labor pain, and stress due to financial pressures, which can increase anxiety and worsen the perception of pain during labor.(Apsari, 2024).

Several studies have shown that economic factors play a role in the choice of pain management methods. Mothers with better economic conditions have a wider choice in accessing non-pharmacological and pharmacological pain management techniques, such as pregnancy exercises, hypnobirthing, or epidural analgesia, while mothers with lower economic conditions may rely more on social support and traditional methods to cope with labor pain.(Maryuni, 2020)

The results of this study indicate that midwifery interventions in labor pain management need to consider maternal economic factors. An inclusive approach is needed, where health services can provide education and equal access for all pregnant women, especially those with economic limitations. Community-based antenatal education programs, support from health workers, and increased access to affordable non-pharmacological pain management methods (such as birthing balls and breathing techniques) can help reduce disparities in labor pain management.

1. Average frequency distribution of labor pain before intervention

The results of the study showed that before the intervention, most respondents experienced severe labor pain, namely 26 people (92.9%). This finding is in line with research conducted byAndarwulan, (2022)who found that the average intensity of pain in the first stage of active labor before intervention was 5.16, which is included in the category of severe pain.

Labor pain is a complex sensory and emotional experience, influenced by physiological, psychological, and environmental factors. Physiologically, labor pain occurs due to uterine muscle contractions, fetal descent, and pressure of the fetal head on the cervical tissue and pelvic floor. This process involves activation of the afferent nerve pathways from the T10-

S4 spinal segments, which causes pain to be felt in the lower abdomen, lower back, and perineum.(Apriani, & Sari, 2021).

In addition to physiological factors, the mother's psychological condition also plays an important role in pain perception. Pregnant women who experience anxiety and fear tend to have a lower pain threshold, so the intensity of pain felt is higher. Studies show that excessive anxiety can trigger activation of the sympathetic nervous system, which increases the secretion of catecholamines (epinephrine and norepinephrine), which in turn causes vasoconstriction of the uteroplacental blood vessels and decreased oxygen supply to the fetus.(Herinawati, 2019). This condition not only increases pain, but can also prolong the active phase of labor due to ineffective uterine contractions.

If labor pain is not managed properly, the impact can worsen the condition of the mother and fetus. Unmanaged pain can cause physical exhaustion, increased blood pressure, and psychological disorders such as panic and stress, which can ultimately slow down the labor process and increase the risk of medical interventions such as induction or cesarean section.(Ginting, 2019). Therefore, effective pain management strategies are needed, both pharmacological and non-pharmacological methods, to improve maternal comfort during labor.

These findings emphasize that effective pain management strategies should be implemented from the early stages of labor, especially for mothers with high levels of pain. One approach that can be used is non-pharmacological methods, such as the use of birthing balls, which have been shown to help reduce pain intensity through pelvic floor stimulation and muscle relaxation. Therefore, it is important for health workers to ensure education and access to pain management methods to improve a more comfortable and safe labor experience for mothers.

2. Average frequency distribution of labor pain after intervention

The results of the study showed that after intervention using a birthing ball, 21 people (75%) experienced a decrease in pain to a moderate level. This finding is in line with research conducted bySutriningsih, et al, (2019), which shows that the results of the bivariate analysis produced a p value <0.001, indicating that there is a significant relationship between the use of birthing balls and a decrease in pain intensity in mothers giving birth in the active phase of the first stage of labor.

Physiologically, labor pain in the first stage occurs due to a combination of uterine contractions, stretching of the lower uterine segment, and pressure from the fetal head on the cervix and pelvic floor. This pain fluctuates, with the highest intensity during contractions and decreasing during the relaxation phase between contractions. Psychological factors such as anxiety and fear can worsen the perception of pain by increasing the secretion of stress hormones (catecholamines and cortisol), which can cause hyperventilation, increased blood pressure, and impaired uteroplacental circulation.(Sintya et al., 2020).

The use of birthing balls in labor helps reduce pain through biomechanical and neurophysiological mechanisms. Pelvic rocking movements with birthing balls can reduce pressure on the lower back muscles, as well as increase blood circulation to the uterus, thereby reducing the perception of pain. In addition, this movement also stimulates the passive movement mechanism, which contributes to the release of endorphins, which are natural analgesic neurotransmitters that play a role in reducing the sensation of pain and providing a relaxing effect and a feeling of comfort during labor.(Sulistianingsih, et al., 2022).

If labor pain is not managed properly, it can lead to longer labor, increased risk of medical intervention, and increased maternal stress which has a negative impact on fetal well-being.(Dirgahayu et al., 2021). Therefore, non-pharmacological methods such as birthing balls are an effective alternative because they are not only safe, but can also increase maternal control over labor without side effects such as pharmacological interventions.

The results of this study confirm that the use of birthing balls can be an effective and widely applicable method of pain management, especially for mothers who want a non-pharmacological approach. With its biomechanical and neurophysiological mechanisms, birthing balls not only reduce labor pain but can also accelerate the active phase of labor, increase maternal comfort, and reduce anxiety and stress. Therefore, health workers, especially midwives, need to educate pregnant women about the benefits of using birthing balls as part of antenatal preparation to face labor more comfortably.

3. The Effect of Using Birthing Balls on Reducing the Pain Scale of Mothers During the First Active Phase of Labor in the Bukit Sari Health Center Work Area

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CONCLUSION AND SUGGESTIONS

Based on the study, it can be concluded that most respondents were aged 20-35 years, most were multigravida, unemployed, had a high school education, and had an income ≥UMR. Before the intervention, most respondents experienced severe labor pain (92.9%). After the intervention, many experienced a decrease in pain to moderate (75%). The birthing ball method has been proven to be effective in reducing the pain scale of mothers in the first active phase of labor ($p < 0.05$).

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