



Effectiveness of Counterpressure with Birth Ball in Reducing Labor Pain During First Stage in BaliMed Hospital

Ni Putu Anggi Astuti¹, Ni Putu Yunita Sri Lestari², Ni Made Risna Sumawati³

^{1,2,3}, Midwifery Department, STIKES Bina Usada, Bali, Indonesia

Corresponding Author: anggi.astuti04@gmail.com

ABSTRACT

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Labor pain is a major concern for mothers during childbirth, particularly in the active phase of the first stage of labor. Effective and safe pain management is essential in midwifery care. One recommended non-pharmacological method is the combination of counterpressure techniques and the use of a birth ball. This study aimed to assess the effectiveness of implementing counterpressure with a birth ball in reducing labor pain at BaliMed Hospital Denpasar. A pre-experimental study with a one-group pretest-posttest design was conducted involving 30 mothers in the active phase of the first stage of labor, selected through accidental sampling. Pain intensity was measured using the Visual Analogue Scale (VAS) before and after the intervention. The results showed that the mean pain score decreased from 5.37 ± 1.402 (moderate pain) to 3.60 ± 1.329 (mild pain). The Wilcoxon Signed Rank Test indicated a statistically significant reduction in pain ($Z = -4.869$, $p < 0.05$). These findings suggest that counterpressure combined with birth ball therapy is effective in reducing labor pain. This method can be recommended as a simple, safe, cost-effective, and non-pharmacological alternative for managing pain during labor in clinical midwifery practice.

INTRODUCTION

Maternal mortality remains a global health concern, with the World Health Organization (WHO) reporting that approximately 75% of maternal deaths result from complications during or after pregnancy¹. These complications include hemorrhage, infection, hypertension, labor-related issues, and unsafe abortion. One major contributing factor is prolonged labor, which can increase the risk of maternal and fetal morbidity and mortality². Prolonged and painful labor has been identified as a major contributor to adverse maternal and neonatal outcomes, increasing the risk of exhaustion, delayed cervical dilation, and operative delivery. Several studies have shown that effective, non-pharmacological pain management during labor can improve maternal comfort, enhance uterine efficiency, and reduce complications, thereby supporting safer birth outcomes.

To mitigate the risks of prolonged labor, various physiological approaches have been introduced, such as prenatal exercises, breathing techniques, and the use of tools like the rebozo. One increasingly utilized method is pelvic rocking using a birth ball, which supports labor progress while maintaining a physiological birthing process³. The birth ball also serves as a pain relief method by



facilitating pelvic expansion and comfort, thereby reducing pain perception and enhancing labor efficiency⁴.

In addition, non-pharmacological pain management techniques are gaining prominence due to their safety and minimal side effects. One such method is counterpressure, a technique involving firm massage on the sacral area using the hand or a tennis ball⁵. This technique stimulates the release of endorphins as natural painkillers and provides targeted relief, especially for intense lower back pain during contractions⁶. When combined with the use of a birth ball, counterpressure becomes even more effective, offering a complementary approach that facilitates labor and reduces the need for medical interventions¹. The present study evaluates their combined application in the delivery room of BaliMed Hospital Denpasar, involving local mothers with specific cultural practices and room conditions. This context allows an assessment of whether the synergistic benefits reported elsewhere also occur in a different population and clinical environment.

Previous studies support the efficacy of both techniques individually. For example, Siregar et al. (2021) found that labor progressed 224.3 minutes faster in women using the birth ball compared to those who did not, with statistically significant results ($p < 0.05$)⁷. Birth balls are designed to promote maternal mobility and utilize gravity to encourage fetal descent. Rhythmic movements while seated on the ball stimulate sensory receptors that increase endorphin secretion, contributing to pain reduction⁸.

Preliminary observations at BaliMed Hospital Denpasar revealed that nearly all laboring mothers experienced severe pain, particularly during the active phase of the first stage of labor. This pain is caused by uterine contractions, cervical effacement, and pressure from the fetal head. Moreover, psychological factors such as fear, anxiety, and fatigue further intensify the pain, impacting both maternal comfort and labor outcomes.

Despite the proven benefits of non-pharmacological methods, there remains a lack of integrated research evaluating the combined application of counterpressure and birth ball techniques during labor. Most studies examine these interventions independently, creating a gap in understanding their potential synergistic effects. Given the high intensity of pain during the active phase and the need for safe, effective interventions, there is a clear urgency to explore non-invasive strategies that improve the childbirth experience without relying on medication.

This study aims to evaluate the effectiveness of implementing counterpressure combined with birth ball therapy in reducing labor pain during the active phase of the first stage of labor at BaliMed Hospital Denpasar. The findings are expected to contribute to midwifery science by providing evidence-based support for holistic, low-risk, non-pharmacological pain management practices in clinical settings.

METHOD

This study used a pre-experimental design with a one-group pretest-posttest approach to assess the effectiveness of counterpressure combined with birth ball therapy in reducing labor pain. The research was conducted in the delivery room of BaliMed Hospital Denpasar from May to June 2025.

The sample consisted of 30 women in the active phase of the first stage of labor (cervical dilation 4–7 cm) who met the inclusion criteria of having a single-term pregnancy and willingness to participate. Participants were recruited using accidental sampling, whereby all eligible mothers present in the delivery room during the study period and consenting to the study were enrolled until the target sample size was reached. Mothers with complications requiring emergency medical intervention were excluded.

Pain intensity was measured using the Visual Analogue Scale (VAS) before and after the intervention. The intervention consisted of applying counterpressure on the sacral area using the hands or a tennis ball during contractions, combined with maternal movement on a birth ball in sitting and rocking positions⁹. During the active phase of the first stage of labor, counterpressure was applied by





trained midwives on the sacral area for 30–90 seconds during each contraction and repeated three times per session while the mother performed birth ball movements.

The study was approved by the Health Research Ethics Committee and conducted with informed consent from all participants. Data were analyzed using the Wilcoxon Signed Rank Test to compare pain levels before and after the intervention, with significance set at $p < 0.05$.

RESULT AND DISCUSSION

Characteristics of Respondents

Table 1.
Characteristic of Respondent

Variable	Category	Frequency (n)	Percentage (%)	Min	Max	Mean $\pm$ Std. Deviation
Age (years)	19–24	12	40.0%	19	37	26 $\pm$ 4.511
	25–30	13	43.3%			
	>30	5	16.7%			
Education	High School	15	50.0%	1	3	1.80 $\pm$ 0.887
	Diploma	6	20.0%			
	Bachelor's Degree	9	30.0%			
Occupation	Housewife	16	53.3%	1	3	1.60 $\pm$ 0.724
	Private Employee	10	33.3%			
	Entrepreneur	4	13.3%			
Parity	Nullipara (P0)	15	50.0%	0	2	0.57 $\pm$ 0.626
	Primipara (P1)	13	43.3%			
	Multipara ($\geq$ P2)	2	6.7%			
Gravida	First Pregnancy	15	50.0%	1	3	1.57 $\pm$ 0.626
	Second Pregnancy	13	43.3%			
	Third Pregnancy	2	6.7%			
Cervical Dilation	4 cm	15	50.0%	4	7	4.97 $\pm$ 1.129
	5 cm	5	16.7%			
	6 cm	6	20.0%			
	7 cm	4	13.3%			
Gestational Age	37–38 weeks	9	30.0%	1	1	1.60 $\pm$ 0.00
	38–39 weeks	10	33.3%			
	39–40 weeks	7	23.3%			
	40–41 weeks	4	13.3%			

The respondents in this study consisted of 30 laboring mothers in the active phase of the first stage of labor. Most participants (70%) were in the 19–30 year age range, with a mean age of 26 years ($\pm$ 4.511). This age group is generally considered the optimal reproductive period, where physiological resilience tends to be higher. Younger mothers may experience greater anxiety during labor, which can



amplify the perception of pain, but they also typically undergo faster cervical dilation due to stronger uterine responses.

Regarding educational background, half of the respondents (50%) had completed high school, while 20% held diplomas and 30% had bachelor's degrees. Education level influences maternal preparedness and understanding of the labor process. Those with higher education are often more receptive to non-pharmacological interventions, such as the use of a birth ball and counterpressure, due to better health literacy and access to information during antenatal care.

In terms of occupation, 53.3% of respondents were housewives, followed by 33.3% who were private employees and 13.3% who were entrepreneurs. Occupational background may affect maternal lifestyle and stress levels, both of which influence pain response. Housewives may have more opportunities to attend prenatal classes or rest adequately, potentially resulting in better coping mechanisms during labor.

Parity data showed that 50% of the participants were nulliparous, 43.3% were primiparous, and only 6.7% were multiparous. The predominance of first-time mothers is notable, as they generally experience longer and more painful labor due to unfamiliarity with the labor process. Multiparous women often exhibit reduced anxiety and better pain tolerance, stemming from prior experience.

Gravida status was similar, with 50% experiencing their first pregnancy, 43.3% on their second, and 6.7% on their third. A higher number of previous pregnancies is associated with increased uterine muscle memory and more efficient labor, contributing to lower pain perception. The mean gravida was 1.57 ± 0.626 , indicating that most respondents had limited childbirth experience.

Cervical dilation at the time of observation ranged from 4 to 7 cm, with the majority (50%) at 4 cm. The mean dilation was 4.97 ± 1.129 cm, placing all participants firmly in the active phase of labor. This is the phase where contractions intensify in both strength and frequency, making it a critical period for implementing pain relief strategies.

All participants were at full-term gestation, ranging from 37 to 41 weeks, with the highest proportion (33.3%) between 38–39 weeks. Gestational maturity ensures optimal fetal development and labor readiness, minimizing variation caused by preterm labor risks. The homogeneity in gestational age also supports the reliability of the intervention outcomes.

Effect of Counterpressure with Birth Ball on Labor Pain Intensity

Table 2.

Labor Pain Intensity Before and After Intervention

Variable	Category	Frequency (n)	Percentage (%)	Min	Max	Mean $\pm$ Std. Deviation
Pain Intensity (Pretest)	Moderate Pain	24	80.0%	2	3	2.20 ± 0.407
	Severe Pain	6	20.0%			
	Mild Pain	17	56.7%			
Pain Intensity (Posttest)	Moderate Pain	12	40.0%	1	2	1.47 ± 0.571
	Severe Pain	1	3.3%			

Pain intensity was measured using the Visual Analogue Scale (VAS) before and after the application of the counterpressure technique combined with birth ball therapy. The findings revealed a significant reduction in labor pain intensity following the intervention.

Before the intervention (pretest), the majority of respondents (80%) experienced moderate pain, while 20% reported severe pain. The mean pretest pain score was 2.20 ± 0.407 , within the upper range





of the moderate pain category. This finding is consistent with the characteristics of the active phase of the first stage of labor, during which uterine contractions increase in frequency, intensity, and duration, resulting in higher pain perception.

After the intervention (posttest), a notable shift was observed. The proportion of respondents experiencing mild pain increased to 56.7%, while moderate pain decreased to 40%, and only 1 respondent (3.3%) still reported severe pain. The mean posttest pain score decreased significantly to 1.47 ± 0.571 , indicating a transition from moderate to mild pain.

This decline in pain intensity supports the effectiveness of the intervention. The counterpressure technique works by applying firm, focused pressure to the sacral area during contractions. This stimulus activates mechanoreceptors, which inhibit the transmission of pain signals via the Gate Control Theory and stimulates the release of endorphins natural opioids that block pain perception at the spinal level.

In parallel, the birth ball promotes active maternal positioning, pelvic rocking, and improved uterine efficiency(10). These biomechanical advantages optimize fetal descent, reduce pressure on the lower back, and enhance maternal comfort. As a result, the combined intervention addresses both the physiological and psychological aspects of labor pain.

These findings align with previous research by Yulianingsih et al. (2019), who observed significant pain reduction following counterpressure therapy(11), and by Siregar et al. (2021), who reported that birth ball use facilitates labor progression and maternal relaxation⁷. However, this study provides added value by confirming that the combination of these two techniques yields synergistic benefits in reducing pain more effectively than when used independently. The results of this study revealed a more pronounced shift from moderate until severe pain to mild pain compared with reductions typically reported when the two techniques are used independently. These differences in intervention design, clinical environment, and participant characteristics may account for the stronger synergistic effect observed in this research.

The dramatic shift from moderate–severe pain to mild pain in the majority of participants clearly demonstrates the scientific impact of non-pharmacological methods when appropriately applied during labor. This also reinforces the study hypothesis that counterpressure with birth ball is effective in reducing labor pain intensity.

Interpretation and Implications

The decreasing trend in pain intensity observed in this study can be scientifically attributed to physiological, neurological, and biomechanical principles. The pressure stimulus from counterpressure overrides pain signals at the spinal cord level, while the mobility and support provided by the birth ball enhance pelvic alignment and maternal comfort.

This finding confirms the research hypothesis and implies that this combined intervention is not only effective but also practical, non-invasive, and easily integrated into routine midwifery care. It is a safe alternative to pharmacological methods, especially in settings where resources or pain medications are limited.

CONCLUSION

The combined use of counterpressure and a birth ball was shown to be effective in reducing labor pain during the active phase of the first stage of labor. This safe, practical, and non-pharmacological intervention can be integrated into routine midwifery care. It is recommended that midwives receive training in these techniques and that healthcare facilities consider adopting this combined approach as part of standard non-pharmacological pain management protocols. Future research is recommended to explore the long-term maternal satisfaction and labor outcomes associated with this combined technique, as well as its application in diverse maternal populations and delivery settings.



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