

## Effectiveness of Rebozo and Birth Ball Techniques on the Acceleration of the First Stage of Labor at TPMB Midwife Diati Pakis

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### ABSTRACT

Background: Prolonged labor during the active phase of the first stage remains a significant contributor to maternal and neonatal complications. Various non-pharmacological interventions have been used to support labor progress; however, comparative evidence regarding the effectiveness of the Rebozo and Birth Ball techniques in accelerating the first stage of labor is still limited. Therefore, this study aimed to compare the effectiveness of the Rebozo and Birth Ball techniques in accelerating the active phase of the first stage of labor. Methods: This study employed a quantitative quasi-experimental design using a pretest–posttest control group approach. A total of 36 laboring mothers who met the inclusion criteria were selected using purposive sampling and divided into two groups: 18 respondents in the Rebozo group and 18 respondents in the Birth Ball group. The interventions were administered during the active phase of labor for approximately 15–20 minutes under standardized supervision by trained midwives. Data were collected using structured observation sheets and partographs to measure the duration of the active phase of the first stage of labor. Statistical analysis was performed using the Wilcoxon Signed Rank Test and Mann-Whitney U Test with a significance level of  $p < 0.05$ . Effect size analysis was also conducted to determine the practical significance of the interventions. Ethical permission was obtained from the Bachelor of Midwifery Program, Institut Teknologi, Sains, dan Kesehatan RS dr. Soepraoen Malang under reference number SPeng/025/XI/2025/S1 Kebidanan. Results: The mean duration of labor decreased from 3.53 hours before intervention to 2.91 hours after intervention. The Wilcoxon Signed Rank Test showed significant differences before and after intervention in both the Rebozo group ( $Z = -3.727$ ;  $p = 0.000$ ;  $r = 0.88$ ) and the Birth Ball group ( $Z = -3.629$ ;  $p = 0.000$ ;  $r = 0.86$ ). The Mann-Whitney U Test also demonstrated a significant difference between groups ( $Z = -5.132$ ;  $p = 0.000$ ;  $r = 0.86$ ), indicating large intervention effects. Conclusion: Both the Rebozo and Birth Ball techniques were effective non-pharmacological interventions for accelerating the first stage of labor. The findings suggest that the Rebozo technique showed a greater effect compared to the Birth Ball technique in this study population. However, the results should be interpreted cautiously due to the relatively small sample size and the quasi-experimental design without randomization. Further studies with larger randomized samples are recommended to confirm these findings.

## Introduction a

Maternal Mortality Rate (MMR) remains an important indicator of public health and the quality of maternal healthcare services in a country. Despite significant improvements in maternal health services worldwide, maternal mortality continues to be a major global health problem, particularly in developing countries. According to the World Health Organization (WHO), approximately 287,000 women died during and following pregnancy and childbirth in



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2020, with nearly 800 maternal deaths occurring every day from preventable causes related to pregnancy and delivery. WHO also reported that the global maternal mortality ratio decreased by approximately 34% between 2000 and 2020; however, the number of maternal deaths remains unacceptably high, especially in low- and middle-income countries. The leading causes of maternal mortality include postpartum hemorrhage, hypertensive disorders such as preeclampsia and eclampsia, sepsis, obstructed labor, and unsafe abortion, most of which are preventable through timely and appropriate interventions (WHO, 2025).

In Indonesia, maternal mortality also remains a serious health challenge. Based on the Indonesia Health Profile 2023 by the Ministry of Health, the maternal mortality ratio in Indonesia is still above the Sustainable Development Goals (SDGs) target of 70 per 100,000 live births by 2030. Maternal deaths in Indonesia are mainly associated with obstetric complications such as hemorrhage, hypertension in pregnancy, infection, and prolonged labor. WHO data also indicate that Indonesia remains one of the countries in Southeast Asia with relatively high maternal mortality rates compared to several neighboring countries (WHO, 2025). In East Java Province and Malang City, maternal mortality rates have shown a declining trend in recent years; however, the numbers remain above the national SDG target, indicating the need for continuous improvement in maternal healthcare quality and emergency obstetric management.

One of the important contributors to maternal morbidity and mortality is prolonged labor. Prolonged labor not only increases maternal exhaustion but also raises the risk of postpartum hemorrhage, uterine atony, uterine rupture, infection, fetal distress, neonatal asphyxia, and maternal-neonatal mortality. WHO identifies prolonged and obstructed labor as significant causes of preventable maternal deaths, particularly in settings with limited access to emergency obstetric care (WHO, 2025). Several factors influence the progress of labor, including uterine contractions, maternal pushing efforts, fetal position, pelvic adequacy, maternal mobility, and psychological conditions such as anxiety and fear. Maternal anxiety during labor may increase catecholamine secretion, which can inhibit uterine contractions and prolong labor duration. Monitoring labor progress during the active phase of the first stage is commonly conducted using a partograph. Labor is considered prolonged when cervical dilation crosses the alert line toward the right side of the partograph, indicating delayed labor progression and increased risk of complications (Kementerian Kesehatan Republik Indonesia, 2023).

Management of prolonged labor can be performed using pharmacological and non-pharmacological approaches. Recently, non-pharmacological interventions have gained increasing attention because they are relatively safe, inexpensive, non-invasive, and can improve maternal comfort during labor. One of these interventions is the Rebozo technique. The Rebozo technique is a traditional Mexican method using a shawl-like cloth to perform rhythmic pelvic and abdominal movements that help optimize fetal positioning, relax pelvic muscles, and improve maternal comfort during labor. A study by Tandoğan et al (2024), reported that the Rebozo technique significantly reduced labor pain perception and improved childbirth experience among laboring mothers. Another study by Munafiah et al. (2024), found that the Rebozo technique contributed to shortening the duration of the first stage of labor and increasing maternal relaxation during childbirth.

Another commonly used non-pharmacological intervention is the Birth Ball technique. Birth Ball exercise involves the use of a large elastic exercise ball to facilitate maternal pelvic movement, improve posture, enhance comfort, and assist fetal descent during labor. According to Jha et al. (2023), birth ball exercises significantly reduced labor pain intensity and improved labor outcomes among primigravida mothers. Aslantaş, & Çankaya, (2023) demonstrated that the use of a birth ball reduced labor pain, improved birth comfort, increased maternal satisfaction, and shortened labor duration. Additional evidence from Sari et al. (2024). also showed that birth ball intervention effectively decreased pain intensity during the active phase of labor.



Although previous studies have demonstrated the effectiveness of the Rebozo technique and Birth Ball intervention separately, limited studies have directly compared the effectiveness of these two non-pharmacological interventions in accelerating labor progress during the active phase of the first stage of labor. Most previous research primarily focused on reducing labor pain and improving maternal comfort without comprehensively comparing labor duration and cervical dilation progress between both interventions. Therefore, this comparative study is important to identify which intervention provides greater effectiveness in supporting labor progress and preventing prolonged labor. The novelty of this study lies in the direct comparison between Rebozo technique and Birth Ball exercise in improving labor outcomes during the active phase of the first stage of labor. The findings are expected to contribute additional scientific evidence regarding evidence-based non-pharmacological labor management and provide recommendations for midwives and maternity healthcare providers in selecting effective and safe interventions to support normal labor progression.

## Methods

This study employed a quantitative research design with a quasi-experimental approach using a pretest–posttest control group design. The research was conducted at TPMB Midwife Diati Pakis from January to March 2026. The population consisted of primigravida and multigravida women in the third trimester (37–42 weeks of gestation) who underwent labor at the study site. The sample consisted of 36 respondents who met the inclusion and exclusion criteria and were divided into two groups: 18 respondents in the intervention group (Rebozo technique) and 18 respondents in the control group (Birth Ball technique). Sampling was conducted using purposive sampling. The inclusion criteria included mothers with normal singleton pregnancies, cephalic presentation, active phase of the first stage of labor, and willingness to participate in the study. The exclusion criteria included mothers with obstetric complications, high-risk pregnancies, cephalopelvic disproportion, and emergency labor conditions requiring immediate medical intervention. The sample size was determined based on the availability of eligible respondents during the study period and adjusted to the minimum sample requirement for quasi-experimental studies with two comparison groups. Although a formal statistical power analysis was not conducted, the sample size was considered adequate to identify differences between intervention groups based on previous similar studies.

The Rebozo intervention was administered by trained midwives using standardized procedures. The technique was performed during the active phase of the first stage of labor for approximately 15–20 minutes using gentle pelvic rocking and shifting movements with a rebozo cloth. Meanwhile, the Birth Ball intervention was conducted by assisting mothers in performing pelvic mobility exercises while sitting on a birth ball for approximately 15–20 minutes during the active phase of labor. Both interventions were performed once during the active phase under direct supervision by certified midwives to ensure consistency of implementation. Data were collected through direct observation using structured observation sheets and partograph sheets to measure the duration and progress of the active phase of the first stage of labor. The observation instruments were reviewed and validated by maternity nursing and midwifery experts prior to data collection. Observer consistency was maintained by providing standardized training and guidelines for all research assistants involved in data collection.

The collected data were processed through several stages, including editing, coding, scoring, entering, tabulating, and cleaning. Descriptive statistics were used to present respondent characteristics, mean, median, standard deviation, minimum and maximum values. Inferential statistical analysis included the Wilcoxon Signed Rank Test to assess differences before and after intervention within each group and the Mann-Whitney U Test to compare differences between



groups. Effect size analysis was also performed to determine the practical significance of the interventions. Statistical significance was determined at  $p < 0.05$ .

This study involving human participants was conducted in accordance with ethical principles for research involving human subjects. Ethical eligibility and research permission were granted by the Final Project Coordinator of the Bachelor of Midwifery Program, Faculty of Health Sciences, Institut Teknologi, Sains, dan Kesehatan RS dr. Soepraoen Malang, under reference number SPeng/025/XI/2025/S1 Kebidanan issued in 2025. All participants provided informed consent prior to participation, and confidentiality and anonymity were maintained throughout the study.

## Results

**Table 5.1 Respondent Characteristics**

Variable	Category	Frequency (f)	Percentage (%)
Age	17–25 years	19	52.8
	26–35 years	17	47.2
Parity	Primipara	18	50.0
	Multipara	18	50.0
Education	Elementary School	5	13.9
	Junior High School	12	33.3
	Senior High School	8	22.2
	Diploma (D3)	10	27.8
Occupation	Bachelor (S1)	1	2.8
	Housewife	17	47.2
	Civil Servant	4	11.1
	Private Employee	6	16.7
	Entrepreneur	9	25.0

Based on the results of the study, the age characteristic shows that the majority of respondents were in the 17–25 years age group, totaling 19 individuals (52.8%). In terms of parity, the number of respondents was equally distributed between primipara and multipara, with 18 individuals each (50.0%). Regarding education level, most respondents had a junior high school education, totaling 12 individuals (33.3%). For occupational characteristics, the majority of respondents were housewives, totaling 17 individuals (47.2%).

## Normality Test

**Tabel 5.2 Normality Test**

Variable	Group	Kolmogorov-Smirnov		Shapiro-Wilk		d	
		Statistic	f	Statistic	f	f	Sig.
Labor Duration	Pretest (Rebozo Group)	0.131	1	0.20	0.968	1	0.7
	Posttest (Rebozo Group)	0.153	8	0*	0.934	8	55
Pretest (Birth Ball Group)	Pretest (Birth Ball Group)	0.185	1	0.20	0.888	1	0.2
	Posttest (Birth Ball Group)	0.270	8	0*	0.790	8	24
Posttest (Birth Ball Group)	Pretest (Birth Ball Group)	0.185	1	0.10	0.888	1	0.0
	Posttest (Birth Ball Group)	0.270	8	5	0.790	8	35
Posttest (Birth Ball Group)	Pretest (Birth Ball Group)	0.185	1	0.00	0.790	1	0.0
	Posttest (Birth Ball Group)	0.270	8	1	0.790	8	01

Based on the normality test using the Shapiro-Wilk test (since the sample size was less than 50), it was found that in the Rebozo group, the pretest significance value was 0.755 ( $p > 0.05$ ) and the posttest significance value was 0.224 ( $p > 0.05$ ), indicating that the data in the Rebozo



group were normally distributed. In contrast, in the Birth Ball group, the pretest significance value was 0.035 ( $p < 0.05$ ) and the posttest significance value was 0.001 ( $p < 0.05$ ), indicating that the data in the Birth Ball group were not normally distributed. Therefore, non-parametric tests were used for further analysis, namely the Wilcoxon Signed Rank Test for within-group analysis and the Mann-Whitney U Test for between-group analysis.

**Table 5.3 Descriptive Statistics of Labor Duration Before and After Intervention**

Variable	N	Mea n	Media n	Std. Deviation	Minimu m	Maximu m	P- Valu e
Pre-Intervention Labor Duration	36	3.53	3.40	0.51	2.40	4.60	0,000
Post-Intervention Labor Duration	36	2.91	2.95	1.48	1.00	5.30	

**Tabel 5.4 Effect Size Analysis**

Analysis	Z Value	N	Effect Size (r)	Interpretation
Rebozo Group	-3.727	18	0.88	Large Effect
Birth Ball Group	-3.629	18	0.86	Large Effect
Between Groups (Mann-Whitney)	-5.132	36	0.86	Large Effect

The descriptive statistics showed that the mean duration of labor decreased from 3.53 hours before intervention to 2.91 hours after intervention. The effect size analysis demonstrated large intervention effects in both the Rebozo group ( $r = 0.88$ ) and the Birth Ball group ( $r = 0.86$ ). In addition, the comparison between groups also showed a large effect size ( $r = 0.86$ ), indicating strong practical significance of the interventions in accelerating the first stage of labor.

## Discussion

### Effectiveness of the Rebozo Technique on the Acceleration of the First Stage of Labor

Based on the results of the study, it was found that the application of the Rebozo technique in the intervention group had a significant effect on accelerating the first stage of labor. This was evidenced by the Wilcoxon Signed Rank Test result with a p-value of 0.000 ( $p < 0.05$ ), indicating a significant difference before and after the intervention. Most respondents experienced a reduction in labor duration after the application of the Rebozo technique, suggesting that this technique is effective in accelerating the progress of the first stage of labor.

The Rebozo technique is a non-pharmacological method that uses a long cloth to assist in maternal relaxation and pelvic mobilization during labor. According to Diana (2023), the Rebozo technique helps reduce tension in the uterine ligaments and increases pelvic flexibility, thereby facilitating fetal descent and accelerating cervical dilation. In addition, Hasana et al. (2024) stated that the Rebozo technique can enhance the release of oxytocin, a hormone that plays a crucial role in strengthening effective uterine contractions. Other studies have also shown that the Rebozo technique is effective in accelerating the active phase of the first stage of labor (Syairaji et al, 2024).

According to the researcher, the Rebozo technique has advantages because it provides optimal relaxation without requiring significant physical effort from the mother, making it highly suitable for mothers experiencing fatigue or anxiety during labor. Furthermore, this technique indirectly helps improve fetal positioning through gentle and controlled pelvic movements. The researcher also suggests that the improved psychological condition of the mother after the application of the Rebozo technique contributes to more effective uterine contractions, resulting in faster and more regular cervical dilation.



### **Effectiveness of the Birth Ball Technique on the Acceleration of the First Stage of Labor**

Based on the study results, the control group that received the Birth Ball technique showed a p-value of 0.000 ( $p < 0.05$ ), indicating that the Birth Ball technique also has an effect on the first stage of labor. However, the findings revealed that the duration of labor in this group tended to be longer compared to the Rebozo group.

The Birth Ball is a non-pharmacological method used to assist mothers in performing pelvic movements during labor. According to Batubara (2022), the use of a Birth Ball can increase pelvic diameter, facilitate fetal head descent, and accelerate cervical dilation. Additionally, it can stimulate the production of endorphins, which help reduce pain and provide a relaxing effect Hasana et al., (2024), Therefore, the Birth Ball technique can support the progression of the first stage of labor.

According to the researcher, the effectiveness of the Birth Ball technique is highly dependent on the mother's ability to actively perform movements during labor. In certain conditions, such as when the mother experiences fatigue or intense pain, the use of a Birth Ball may be less optimal because it requires active participation. Although the Birth Ball technique offers benefits in facilitating labor progression, its application should be adjusted to the mother's physical condition and readiness to achieve optimal outcomes.

### **Comparison of the Effectiveness of Rebozo and Birth Ball Techniques on the Acceleration of the First Stage of Labor**

Based on the Mann-Whitney test results, a p-value of 0.000 ( $p < 0.05$ ) was obtained, indicating a significant difference between the group receiving the Rebozo technique and the group receiving the Birth Ball technique. The results showed that the Rebozo group experienced a shorter duration of labor compared to the Birth Ball group.

According to Wahyuni (2024). both the Rebozo and Birth Ball techniques are non-pharmacological methods that can be used to accelerate the first stage of labor, but they differ in their mechanisms of action. The Rebozo technique works more passively by promoting relaxation and assisting fetal repositioning, whereas the Birth Ball technique works actively through maternal movement. These differences in mechanisms contribute to variations in their effectiveness.

According to the researcher, the Rebozo technique is more effective than the Birth Ball technique in this study because it does not require excessive active involvement from the mother, making it feasible even when the mother is fatigued. Additionally, the relaxation effect produced by the Rebozo technique is experienced more quickly, which helps create more regular and effective uterine contractions. Although both techniques have their respective benefits, the researcher suggests that the selection of the appropriate method should be tailored to the mother's condition to achieve optimal results in accelerating the first stage of labor.

### **Conclusion**

This study concludes that both the Rebozo technique and the Birth Ball technique are effective non-pharmacological interventions in accelerating the first stage of labor. Prior to the intervention, the duration of labor tended to be longer, indicating slower labor progress among respondents. After the implementation of both techniques, there was a significant reduction in the duration of the first stage of labor, as evidenced by statistical analysis showing p-values  $< 0.05$  in each group. However, the findings demonstrate that the Rebozo technique is more effective compared to the Birth Ball technique in accelerating labor. The Rebozo technique provides optimal relaxation, improves fetal positioning, and enhances uterine contractions without requiring excessive maternal effort. In contrast, although the Birth Ball technique also contributes to labor progress and pain reduction, its effectiveness depends largely on the mother's active



participation and physical condition. These results highlight the importance of non-pharmacological approaches in maternal care, particularly in promoting safer and more comfortable labor experiences. Therefore, the integration of the Rebozo technique and Birth Ball into routine maternity care is recommended, with consideration of the mother's physical and psychological condition. Further research is suggested to explore long-term outcomes, include larger sample sizes, and examine additional variables that may influence labor progression.

### **Ethics Approval and Consent to Participate**

This study involving human participants was conducted in accordance with ethical principles. Based on the introductory letter issued by the Final Project Coordinator of the Bachelor of Midwifery Program at Institut Teknologi, Sains, dan Kesehatan RS dr. Soepraoen Malang (Reference Number: SPeng/025/XI/2025/S1 Kebidanan), the research entitled "The Effectiveness of Rebozo and Birth Ball Techniques on the Acceleration of the First Stage of Labor at TPMB Midwife Diati Pakis" was declared eligible to undergo ethical review. All procedures performed in this study were carried out with respect for participants' rights, safety, and well-being. Participants were informed about the purpose and procedures of the study prior to data collection and provided informed consent to participate. Confidentiality and anonymity of respondents were strictly maintained throughout the research process.

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