Health Science & Biomedical Journal
Volume 1, Issue 1, April 2025 | Pages 20–27
e-ISSN: 3090-7353 | p-ISSN: 3090-7543

RESEARCH ARTICLE

Open Access

The Effect of Deep Breath Relaxation Techniques on Pain of Labor Phase 1 Active Phase in Mothers Mability at Kolonodale Hospital North Morowali Regency

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Article History
Received: March 2025
Accepted: April 2025
Published: April 2025

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Abstract

Background: One of the fundamental efforts to reduce maternal mortality rate (MMR) is to minimize labor pain experienced by the mother. Labor pain can be managed through two methods: pharmacological and non-pharmacological. Pharmacological methods, which use chemical drugs, are often more expensive and may have adverse effects on both the mother and fetus. In contrast, non-pharmacological methods, such as relaxation techniques, are simpler, cheaper, and more effective, with no side effects. **Objective**: The purpose of this study was to determine the effect of breath relaxation techniques in reducing labor pain during the active phase I. **Method**: This research employed a quasi-experimental design with a one-group pretest and posttest approach. The study population consisted of 31 respondents selected through total sampling. Data were collected using a questionnaire, and data analysis was performed using the Wilcoxon statistical test with a significance level of $\alpha = 0.05$. **Results**: Almost all respondents experienced a decrease in pain scale after being given the deep breathing relaxation method. Analysis of the Wilcoxon test results showed a P-value of <0.001, which is less than 0.05, indicating a significant effect of the deep breathing relaxation technique on reducing labor pain. **Conclusion**: The study concluded that the deep breathing relaxation technique significantly decreased the intensity of pain felt by women in the first active phase of labor.

Keywords: Inpartuity, Pain Intensity, Deep Breathing Relaxation

Introduction

Labor is the physiological process involving the expulsion of the fetus, placenta, and membranes from the uterus through the birth canal. This process begins with the opening and dilation of the cervix, which results from regular uterine contractions characterized by increasing frequency, duration, and intensity. Initially, the contractions are mild but gradually become stronger, ultimately facilitating the expulsion of the fetus from the maternal uterus (Rohani, 2015, p. 2)

According to the World Health Organization (WHO), in 2016, approximately 303,000 maternal deaths occurred worldwide. In low-income countries, it is estimated that 25–50% of deaths among women of reproductive age are attributable to health problems related to pregnancy, childbirth, and the postpartum period. Maternal mortality remains a significant public health concern in developing countries. Several regions report high maternal mortality rates, including Sub-Saharan Africa with 179,000 deaths, South Asia with 69,000 deaths, and Southeast Asia with 16,000 deaths. In Southeast Asian countries, the maternal mortality ratio (MMR) varies, with Indonesia reporting 190 deaths per 100,000 live births, Vietnam 49 per 100,000 live births, Thailand 226 per 100,000 live births, Brunei 27 per 100,000 live births, and Malaysia 29 per 100,000 live births (WHO, 2017). In 2021, the number of births in Indonesia increased by 691,259. In the same year, Central Sulawesi recorded a total of 53,590 births, with 1,916 births occurring in North Morowali Regency. Specifically, Kolonodale Regional General Hospital (RSUD Kolonodale) reported a total of 306 births.

The first stage of labor (Stage I) refers to the cervical dilation phase, which spans from zero dilation to complete dilation of the birth canal. This stage is typically marked by the discharge of mucus mixed with blood, indicating the onset of cervical effacement and dilation. The presence of blood results from the rupture of capillaries in the cervical canal as the cervix thins and dilates. During this stage, cervical dilation and effacement are driven by uterine contractions and uterine ischemia caused by the contraction of the myometrial arteries. Generally, the mother experiences pain only during contractions and is pain-free during the intervals between them.

The majority of labor cases (approximately 90%) are accompanied by pain (Oxorn, DC, as cited in Sri Rejeki et al., 2014). Labor pain typically begins during the latent phase of the first stage of labor, characterized by cervical dilation up to 3 cm, and continues into the active phase, during which the cervix dilates from 4 cm to 10 cm. In the active phase, there is a marked increase in the intensity and frequency of uterine contractions, resulting in the peak pain response during this period (Reeder, 2012, as cited in Tetti et al., 2018). According to a study conducted by Murray involving 2,700 laboring women, 15% reported mild pain, 35% experienced moderate pain, 30% reported severe pain, and 20% experienced very severe pain (Gondo, 2011, as cited in Lidia Fitri et al., 2019).

Labor pain activates the sympathetic nervous system, leading to various physiological responses such as nausea, vomiting, excessive sweating, and changes in blood pressure, pulse rate, respiratory rate, and skin coloration. Specific behavioral changes may also occur, including heightened anxiety with narrowed cognitive focus, groaning, crying, hand movements, and generalized muscle tension, all of which may exacerbate the perception of pain during labor (Bobak, 2005, as cited in Wan Anita, 2017).

One of the fundamental efforts to reduce maternal mortality (MMR) is by minimizing labor pain experienced by the mother. Labor pain can be managed using two primary approaches: pharmacological and non-pharmacological methods. Pharmacological methods involve the use of chemical drugs, which tend to be more expensive and may pose potential adverse effects on both the mother and fetus. In contrast, non-pharmacological methods are generally simpler, more cost-effective, safe, and have no harmful side effects, while also enhancing maternal satisfaction during labor (Biswan, 2017).

Various non-pharmacological pain management techniques include counter pressure, hypnobirthing, endorphin massage, effleurage massage, relaxation techniques, warm compresses, classical Mozart music therapy, Qur'anic recitation therapy (murottal), acupressure, and aromatherapy (Anita, 2017). Pain and discomfort during labor are primarily caused by strong uterine contractions in the lead-up to childbirth, and this is a natural physiological process. However, each woman experiences labor pain differently. The perception of pain can be influenced by various physical or physiological factors, as well as emotional or psychological states. Negative emotional responses, such as fear and anxiety, often stem from subconscious negative suggestions. The subconscious mind cannot distinguish between reality and imagination, making it susceptible to such influences. As a result, tension and fear experienced by the mother can intensify the perception of pain during labor, potentially slowing the progression of the birthing process.

One of the non-pharmacological methods for reducing labor pain is the relaxation technique. Relaxation involves resting both the body and mind from physical and psychological stress, enabling the mother to achieve a calmer state. This technique also enhances blood circulation to the uterus, placenta, and fetus. Improved circulation helps relax the pelvic, back, and abdominal muscles. During labor, relaxation facilitates safer, more natural, and smoother uterine contractions. According to Mander, this method can also prevent excessive errors or complications in the postpartum period (Priyanto, D., 2008, as cited in Elly Susilawati, 2017).

One form of breathing relaxation technique is deep breathing relaxation. This method involves a supportive care approach in which the midwife teaches the client how to perform deep breathing, slow breathing (maximally sustaining inspiration), and how to exhale slowly and steadily (Smeltzer & Bare, 2002). The technique is performed by taking a deep breath during contractions using chest breathing through the nose, which facilitates the flow of oxygen into the bloodstream and throughout the body. This process promotes the release of endorphins, which serve to reduce the perception of pain within the body (Andriana, 2007, as cited in Winny, 2015).

Methods to reduce labor pain include relaxation, guided imagery, distraction, and cutaneous stimulation (Perry & Potter, 2011). Among these, breathing relaxation techniques are considered highly beneficial, as they significantly contribute to reducing discomfort during labor. Breathing relaxation during labor helps maintain the sympathetic nervous system in a state of homeostasis, thereby preventing excessive physiological stress responses. This technique also reduces anxiety and fear, enabling the mother to better adapt to labor pain and supporting a smoother birthing process. Moreover, it can help minimize the risk of excessive complications during the postpartum period.

Pain management techniques, including non-pharmacological interventions, are essential practices for healthcare providers to help reduce pain experienced during labor, especially during the first stage of labor. There are various techniques available to alleviate pain, one of which is deep breathing relaxation, where the breathing pattern is adjusted in such a way that it helps reduce the pain caused by cervical dilation during the labor process.

Based on the background outlined above, the researcher is interested in conducting a study on the relationship between deep breathing relaxation techniques and the incidence of pain during the active phase of the first stage of labor at Kolonodale Regional General Hospital (RSUD Kolonodale). This study is of particular interest because it has not been previously conducted at RSUD Kolonodale, despite the high number of deliveries at the hospital.

Methods

This study employs a quantitative research design using a quasi-experimental one-group pretest-posttest approach. This design was chosen to assess the effectiveness of the intervention by comparing outcomes measured before and after the intervention within the same group of participants.

The population in this study includes women who are in the active phase of the first stage of labor. The sampling technique used is total sampling, in which all eligible participants who meet the inclusion criteria during the data collection period are included in the study. This method ensures comprehensive representation of the accessible population. Inclusion criteria for the study are: (1) women aged 18–35 years; (2) primigravida or multigravida mothers in the active phase of the first stage of labor (cervical dilation 4–7 cm); (3) singleton pregnancy with cephalic presentation; and (4) willingness to participate as indicated by signed informed consent. Exclusion criteria include: (1) women with pregnancy complications such as preeclampsia or placenta previa; (2) those with medical conditions requiring special monitoring; and (3) those who received analgesic medication during labor before the intervention.

Data collection was carried out in the delivery room of a selected health facility. Prior to the intervention, participants were assessed using a standardized observation checklist and pain scale (e.g., Visual Analog Scale) to obtain baseline data. The intervention was then administered according to the study protocol. After the intervention, the same instruments were used to collect posttest data. All procedures were conducted by trained research assistants under the supervision of the principal investigator. Data were analyzed using SPSS version 25. Descriptive statistics were used to summarize participant characteristics. Paired t-tests (or Wilcoxon signed-rank test for non-parametric data) were employed to compare pretest and posttest scores. A p-value of less than 0.05 was considered statistically significant.

Results

A study has been conducted on the use of deep breathing relaxation techniques to reduce labor pain in women during the first stage of labor at RSUD Kolonodale, with the following results:

Respondent Characteristics

Table 1 Respondent Characteristics

Characteristics	n	%
Age		
< 20 Year	1	3.2
20thn -35 Year	22	71.0
>35 Year	8	25.8
Total	31	100
Education		
Elementary School	5	16.1
Senior Hight School	20	64.5
University	6	19.4
Total	31	100
Duration of Pregnancy		
≤ 3	21	67.7
>3	10	32.3
Total	31	100

Based on the table 1, the majority of respondents were between 20 and 35 years of age, with 22 women in labor (71.0%). Nearly half of the respondents had a high school education, with 20 women in labor (64.5%). Additionally, half of the respondents were experiencing their first to third pregnancy, with 21 women in labor (67.7%).

Univariate Analysis

Table 2 Pain Scale of Mothers in Labor Before Deep Breathing Relaxation Technique

Category	n	%
No Pain	0	0
Mild Pain	2	6.5
Moderate Pain	9	29
Severe Pain	20	64.5
Total	31	100

Based on Table 2, none of the 31 respondents reported not experiencing pain during labor. Two women in labor (6.5%) reported mild pain, nine women in labor (29.0%) reported moderate pain, and 20 women in labor (64.5%) reported severe pain.

Table 3 Pain Scale of Mothers in Labor After Deep Breathing Relaxation Technique

Category	n	%
No Pain	0	0
Mild Pain	5	16.1
Moderate Pain	18	58.1
Severe Pain	8	25.8
Total	31	100

Based on the table 3, after the deep breathing relaxation technique was applied, none of the 31 respondents reported no pain during labor. Five women in labor (16.1%) experienced mild pain, 18 women in labor (58.1%) experienced moderate pain, and eight women in labor (25.8%) experienced severe pain.

Bivariate Analysis

Table 4 Differentiation of labor pain between pre & post intervention of Deep Breathing Relaxation Technique

	Mean	Min–Max	P-Value*
Pre-Intervention	8	4–10	<0.001
Post-Intervention	5	2–8	

**Wilcoxon test*

Based on Table 5.5, the average pain level experienced by women in labor before the deep breathing relaxation technique was administered was 8, with a minimum score of 4 and a maximum of 10. After the technique was applied, the average pain level decreased to 5, with a minimum score of 2 and a maximum of 8. The P-value was <0.001 ($P < 0.05$), indicating a statistically significant reduction in pain.

Discussion

Labor pain in women before and after the application of deep breathing relaxation technique

From the data analysis, before the deep breathing relaxation technique was applied, nearly half of the respondents experienced severe pain, with 20 women in labor (64.5%) reporting intense pain. However, after the application of the deep breathing relaxation technique, the number of women experiencing severe pain decreased, with only 8 women in labor (25.8%) reporting severe pain. Amita D demonstrates that individual pain perception varies in both scale and intensity, as it is a subjective experience of discomfort. When the deep breathing relaxation technique is applied, the patient relaxes the skeletal muscles that are experiencing spasms caused by increased prostaglandins, leading to vasodilation of blood vessels (1). This improves blood flow to the areas affected by spasms and ischemia. Additionally, the technique stimulates the body to release endogenous opioids, namely endorphins and enkephalins, which act as natural analgesics. These opioids block receptors on nerve cells, disrupting the transmission of pain signals. As a result, the frequency and intensity of pain can be reduced.

This study aligns with the research conducted by (2), where the results of the pre-intervention pain assessment using the Numeric Rating Scale (NRS) showed that 64.3% of the 28 women in labor experienced moderate pain, and 35.7% experienced severe pain. After the intervention, the post-intervention pain assessment revealed that 67.9% of the 28 women in labor experienced mild pain, and 32.1% experienced moderate pain.

The intensity of labor pain is determined by how the mother perceives and prepares for the pain during the labor process. The intensity of labor pain can be assessed by asking the mother to rate it on a pain scale, such as the 0-10 Numeric Rating Scale. Labor pain is a combination of physical pain caused by myometrial contractions along with the stretching of the lower uterine segment, coupled with the psychological state of the mother during labor. Anxiety and worry contribute to intensifying the physical pain already present. As the pain perception intensifies, it increases the mother's anxiety, leading to a cycle of fear-stress-pain, and this cycle continues. Pain is influenced by both physiological and psychological factors. Labor pain follows a predictable pattern, with the location of the pain changing during labor. The intensity and frequency of pain increase in tandem with the progression of uterine contractions (Syaripudin A. Nurhaeni, 2019).

During the intervention, the researcher also paid attention to the psychological condition of the mother, including anxiety, restlessness, and fear during the labor process, particularly from the onset of cervical dilation until 4 cm dilation in both primigravida and multigravida mothers. Many mothers complained of pain before the intervention, with reports of heat sensation in the lower back, lower abdominal pain, and increasing intensity of contractions, which created pressure on the abdomen, leading to discomfort. The researcher assessed the pain level of the laboring women starting from the time they arrived with cervical dilation between 1 cm to 4 cm. Afterward, the researcher administered the deep breathing relaxation technique to address the intensity of pain during the active phase of the first stage of labor, and evaluated the observation sheet before and after the intervention.

The effect of the deep breathing relaxation technique on the reduction of labor pain

The results of the study revealed a P-value of 0.000, indicating a significant effect of the deep breathing relaxation technique on the reduction of pain intensity experienced by women in labor during the active phase of the first stage of labor.

During the deep breathing relaxation technique, the patient relaxes the skeletal muscles experiencing spasms caused by increased prostaglandin levels, leading to vasodilation of blood vessels and improved blood flow to areas affected by spasms and ischemia. Additionally, this technique stimulates the body to release endogenous opioids, such as endorphins and enkephalins, which function as natural analgesics. These opioids block receptors on nerve cells, disrupting the transmission of pain signals. As a result, the frequency of pain experienced by patients undergoing cesarean section surgery can be reduced. Regular periods of relaxation can help alleviate fatigue and muscle tension associated with chronic pain, thereby reducing pain intensity.

This study is consistent with the research conducted by (3) where statistical analysis using the Wilcoxon test resulted in a p-value of 0.000, which is less than α (0.05). This indicates that there is an effect of the deep breathing relaxation technique on reducing labor pain during the active phase of the first stage of labor at PMB Desita, S.SiT, Pulo Ara Village, Kota Juang District, Bireuen Regency in 2021. The findings of this study align with the research conducted by Titi Astuti (2019) showed that deep breathing relaxation techniques significantly impacted labor pain (p-value 0.000, p-value < 0.05). The study also found that there was an effect of relaxation techniques on the duration of labor in the first stage (p-value 0.000, p-value < 0.05).

The findings of this study are further supported by the research conducted by Lidia Fitri in 2019. Based on the results, it can be concluded that the deep breathing technique is effective in reducing pain intensity during the active phase of the first stage of labor. Prior to the intervention, the pain level was at 5.04 on the pain scale with a standard deviation of 1.595 and a standard error of 0.4. After the deep breathing intervention, the pain intensity decreased to 4.07 on the pain scale, with a standard deviation of 1.163 and a standard error of 0.3. These results demonstrate a significant relationship between the deep breathing technique and the reduction in pain intensity during the active phase of the first stage of labor.

According to the results of this study, measurements before and after the deep breathing relaxation technique show a decrease in pain intensity. This is evident in the shift from moderate pain to mild pain. Respondents experiencing moderate pain showed signs such as grimacing, frowning, and could describe the location of their pain while following commands. Meanwhile, after the deep breathing intervention, those experiencing mild pain were able to communicate effectively, remain active, smile, and appeared more relaxed than before. This improvement is likely due to the deep breathing technique stimulating the body to release endogenous opioids, namely endorphins and enkephalins, which act as natural analgesics, thus helping to reduce pain intensity.

Conclusion

The application of the deep breathing relaxation technique significantly reduces the intensity of labor pain experienced by women during the active phase of the first stage of labor. Before the intervention, the majority of respondents experienced severe labor pain, but after the application of the deep breathing technique, the pain intensity decreased notably. This technique works by promoting skeletal muscle relaxation, enhancing blood flow, and stimulating the release of endogenous opioids such as endorphins and enkephalins, which serve as natural pain relievers. The findings of this study are consistent with previous research, reinforcing that deep breathing relaxation is an effective non-pharmacological method to manage labor pain. Therefore, deep breathing relaxation can be recommended as an effective strategy to reduce labor pain in clinical practice, offering a simple, safe, and cost-effective alternative for pain management during childbirth.

Acknowledgments

Authors would like to Department of Midwifery Institut Kesehatan dan Bisnis Kurnia Jaya Persada Palopo, South Sulawesi, Indonesia in facilitating this research.

Conflict of Interest

The authors declare that there's no conflict of interest regarding this article.

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