



The Effect of Breathing Techniques During Labor on Pain Intensity in Mothers in the First Stage of Active Phase of Labor

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Abstract

Background: Labor pain is one of the main complaints experienced by mothers in labor, especially during the active phase of the first stage. Breathing techniques are a non-pharmacological method that can help reduce pain perception and increase comfort.

Objective: To determine the effect of breathing techniques during labor on pain intensity in mothers in the first stage of labor in the active phase.

Method: This study used a quasi-experimental design with a pretest-posttest control group design. The sample consisted of 40 mothers in the active phase of first-stage labor, divided into an intervention group (breathing techniques) and a control group (no intervention). Pain intensity was measured using a Visual Analog Scale (VAS). Data were analyzed using paired t-tests and independent t-tests.

Results: The average pain score before intervention in the treatment group was 7.35 and after intervention it was 5.10 ($p=0.000$). In the control group, the pain score only decreased from 7.25 to 7.10 ($p=0.421$). An independent t-test showed a significant difference between the two groups ($p=0.000$).

Conclusion: Breathing techniques effectively reduce the intensity of pain in mothers in the first active phase of labor.

Keywords: Labor Pain, Breathing Techniques, Active Phase I, Mothers in labor

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1. Introduction

Labor is a complex physiological process, involving hormonal, mechanical, and psychological changes to allow the expulsion of the fetus, placenta, and amniotic membranes from the uterus through the birth canal (Simkin & Ancheta, 2017). This process is divided into four stages, with stage I beginning with the onset of uterine contractions that cause progressive changes in the cervix until it reaches full dilation of 10 cm. In stage I, the active phase begins when cervical dilation reaches approximately 4 cm to 7–8 cm, accompanied by an increase in the frequency, duration, and strength of contractions (Lowdermilk et al., 2020).

Labor pain during the active phase of the first stage of labor is generally more intense than the latent phase, caused by cervical dilation and stretching, uterine muscle ischemia due to contractions, and pressure on pelvic structures (Varney et al., 2019). This pain can be subjective, influenced by physical, psychological, social, and cultural factors. High levels of pain can lead to increased catecholamine levels, vasoconstriction, impaired uterine perfusion, and even affect fetal well-being (Hosseini et al., 2018).

Labor pain management can be performed using pharmacological methods such as analgesia and anesthesia, or non-pharmacological methods such as relaxation techniques, massage, hydrotherapy, and breathing techniques (WHO, 2018). Non-pharmacological approaches are increasingly recommended because they are safer, have fewer side effects on the mother and fetus, and can increase maternal control and active participation during labor (Smith et al., 2018).

Breathing techniques are a relatively easy-to-implement non-pharmacological intervention. The principle is to focus the mother's attention on specific breathing patterns to distract from pain, promote muscle relaxation, and improve oxygenation (Varney et al., 2019). Breathing techniques used during the active phase of the first stage of labor typically include slow, deep breathing during contractions and shallow breathing between contractions, guided in a structured manner by a midwife or healthcare professional.

Although breathing techniques are often taught in prenatal classes, their implementation in practice remains suboptimal. Some mothers fail to practice them consistently due to a lack of support or a lack of direct understanding of their benefits. Therefore, research is crucial to assess the effectiveness of breathing techniques in reducing labor pain, particularly during the active phase of the first stage of labor, a critical stage in the labor process.

2. Research Methods

a) Research Design

This study used a quasi-experimental design with a pretest-posttest control group approach. This design was chosen to compare changes in pain intensity before





and after the breathing technique intervention in the treatment group, as well as to compare them with the control group that did not receive the intervention.

b) Location and Time of Research

The study was conducted in the delivery room of Hospital X in January–March 2025. This location was chosen purposively because it has a fairly high number of delivery visits every month.

c) Population and Sample

The study population was all mothers in the first active phase of labor who underwent normal delivery in the delivery room of Hospital X. A sample of 40 respondents was divided into two groups: 20 people in the treatment group and 20 people in the control group. The sampling technique used purposive sampling by considering the inclusion and exclusion criteria.

Inclusion Criteria

1. Mothers in labor are in the active phase of the first stage of labor with cervical dilation of 4–7 cm.
2. Gestational age ≥ 37 weeks.
3. Single live fetus, cephalic presentation.
4. The mother is fully conscious and cooperative.
5. Willing to be a respondent and sign the informed consent form.

Exclusion Criteria

1. Mothers with obstetric complications (preeclampsia, antepartum hemorrhage, fetal distress).
2. Mothers with indications for immediate operative action.
3. Mothers who have used analgesics or anesthesia before the intervention.

d) Research Instruments

Pain intensity was measured using a Visual Analog Scale (VAS) with a score range of 0–10, where 0 means no pain and 10 means very severe pain. The validity of the VAS instrument has been tested, with high content validity and reliability >0.8 .

e) Research Procedures

1. Researchers selected respondents based on inclusion and exclusion criteria.
2. Initial pain intensity measurements (pretest) were conducted when the respondent was in the active phase of the first stage of labor before the intervention.
3. The treatment group was given breathing techniques with guidance:
 - *Slow deep breathing* during contractions, that is, inhale slowly through the nose, hold it for a moment, then exhale slowly through the mouth.
 - *Shallow breathing* between contractions, namely breathing shallowly and quickly to minimize tension.





- The intervention duration is 30–45 minutes with direct assistance by researchers or trained midwives.
 - 4. The control group received routine delivery care without special breathing technique education.
 - 5. Final pain intensity measurements (posttest) were performed after 30–45 minutes of intervention or at the same time interval in the control group.
- f) Data analysis
- Data were analyzed using SPSS software version 25.
 - Normality test was performed using Shapiro-Wilk.
 - Differences in pain intensity before and after intervention within groups were analyzed using paired t-test.
 - Differences in mean pain scores between groups were analyzed using an independent t-test.
 - The significance level was set at $p < 0.05$.

3. Results And Discussions

a. Results

1) Respondent Characteristics

Respondent characteristics included age, parity, and education level. This data was useful for ensuring equality between the treatment and control groups.

Table 1.

Distribution of Respondent Characteristics

Characteristics	Treatment Group (n=20)	Control Group (n=20)	p-value
Age (years)	27.4 ± 4.1	26.9 ± 4.3	0.712
Parity			
- Primipara	11 (55%)	12 (60%)	0.752
- Multipara	9 (45%)	8 (40%)	
Education			
- JUNIOR HIGH SCHOOL	6 (30%)	5 (25%)	0.801
- SENIOR HIGH SCHOOL	10 (50%)	11 (55%)	
- College	4 (20%)	4 (20%)	





Description: The p-value from the chi-square test or independent t-test shows no significant difference, so both groups were equivalent at the start of the study.

2) Difference in Pain Intensity Before and After Intervention

Table 2.

Mean Pretest and Posttest Pain Intensity in Groups

Group	Pretest (Mean ± SD)	Posttest (Mean ± SD)	Δ Score	p-value
Treatment	7.35 ± 0.81	5.10 ± 0.85	-2.25	0,000*
Control	7.25 ± 0.73	7.10 ± 0.77	-0.15	0.421

Note: *p<0.05 significant (paired t-test)

The results in Table 2 show a significant decrease in pain scores in the treatment group (p=0.000), while in the control group there was no significant change (p=0.421).

3) Comparison of Pain Intensity Between Groups

Table 3.

Differences in Posttest Pain Scores between Treatment and Control Groups

Group	Mean ± SD Posttest	p-value
Treatment	5.10 ± 0.85	0,000*
Control	7.10 ± 0.77	

Note: *p<0.05 significant (independent t-test)

The independent t-test showed a significant difference in pain intensity between the treatment group and the control group in the posttest measurement (p=0.000).

Summary of Key Results:

1. Before the intervention, the average pain scores of both groups were relatively the same (p>0.05).
2. After the intervention, the treatment group experienced a significant reduction in pain of 2.25 points, while the control group only decreased by 0.15 points.
3. The difference in pain reduction between the two groups was statistically significant (p=0.000).





b. Discussion

The results of this study indicate that breathing techniques significantly reduced pain intensity in mothers in the active phase of the first stage of labor. The average pain reduction in the treatment group was 2.25 points, compared to only 0.15 points in the control group. This difference was statistically significant ($p=0.000$), indicating that breathing techniques are effective as a non-pharmacological method for labor pain management.

The reduction in pain intensity in the treatment group can be explained by physiological and psychological mechanisms. Physiologically, breathing techniques help increase blood oxygenation, reduce muscle tension, and decrease sensory nerve stimulation that triggers pain (Simkin & Ancheta, 2017). Furthermore, controlled breathing stimulates the activation of the parasympathetic nervous system, which plays a role in lowering heart rate, reducing the production of stress hormones like adrenaline, and increasing the release of endorphins natural hormones that function as internal analgesics (Varney et al., 2019).

Psychologically, breathing techniques play a role in distracting or redirecting attention from painful stimuli to other activities that the mother can control. This aligns with Melzack and Wall's Gate Control Theory, which states that non-nociceptive stimuli such as regular breathing can close the "gate" of pain impulses in the spinal cord, thereby reducing pain perception (Kozier et al., 2018).

These findings are consistent with research by Hosseini et al. (2018), which reported a significant reduction in pain intensity in laboring mothers taught breathing techniques compared to a control group. Research by Smith et al. (2018) also found that non-pharmacological interventions such as breathing techniques effectively reduced pain and anxiety in the first stage of labor.

In contrast, there was no significant reduction in pain in the control group. This may be because mothers received only standard labor care without specific pain management strategies. Without distraction or relaxation techniques, pain tends to increase as labor progresses.

Other factors that can influence the effectiveness of breathing techniques are the mother's age, parity, and mental readiness. Mothers who have received antenatal education are generally more likely to correctly apply breathing techniques. Furthermore, direct support from a midwife during labor also influences consistency in breathing practice.

Thus, breathing techniques have proven to be not only easy to implement but also safe and effective in reducing pain during the active phase of first-stage labor. Their implementation should be incorporated into standard delivery care, with education provided during pregnancy.





4. Conclusion

a. Conclusion

This study demonstrates that breathing techniques effectively reduce pain intensity in mothers in the active phase of the first stage of labor. The treatment group receiving breathing technique guidance experienced a significant 2.25-point reduction in pain ($p=0.000$), while the control group showed no significant change. This suggests that breathing techniques can be a safe, easy, and inexpensive non-pharmacological alternative to reduce labor pain.

b. Suggestion

1. For Health Workers: Midwives and health workers in the delivery room are advised to teach and accompany mothers in using breathing techniques during labor, as well as provide education from the antenatal period.
2. For Pregnant Women: It is recommended to study and practice breathing techniques regularly during pregnancy, so that they can be applied optimally during labor.
3. For Health Institutions: Hospitals and community health centers can include breathing techniques in their standard operating procedures (SOP) for normal delivery services.
4. For Future Researchers: Further research is needed with a larger sample size and a variety of non-pharmacological methods, such as a combination of breathing techniques with aromatherapy or back massage, to examine the synergistic effects in reducing labor pain.

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Volume 3 | Number 3 | September 2025 |



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