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Original research article

EFFICACY OF BREATHING TECHNIQUES FOR MANAGEMENT OF MATERNAL OUTCOMES DURING LABOR

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Abstract: *Maternal anxiety during labor can adversely affect both the mother and fetus. Effective management strategies, including non-pharmacological interventions like breathing patterns, are crucial to improving labor outcomes and maternal well-being.* ***Objective:*** *To evaluate the efficacy of breathing patterns for the management of maternal anxiety during the dilation phase of labor.* ***Methods:*** *A prospective study was conducted in the Physiotherapy and Obstetrics and Gynecology Department of DHQ Hospital from April 2023 to April 2024. One hundred fifty pregnant women in active labor with gestational ages of 37-41 weeks were included. The patients were divided into the study group (70 women) and the control group (80 women). The control group followed standard labor procedures, while the study group was guided on breathing patterns according to a specified protocol. The primary endpoint was maternal anxiety, and secondary endpoints included pain, fatigue, satisfaction, labor duration, and delivery mode. The 5-minute Apgar score was also assessed for the fetus. Statistical analysis was performed to compare outcomes between the groups.* ***Results:*** *Baseline maternal outcomes, including pain, fatigue, anxiety, satisfaction, and labor duration, showed no significant differences between the study and control groups. The mean labor duration was 7.70 ± 3.36 hours for the study group and 8.00 ± 2.54 hours for the control group, with a mean difference of 0.30 hours (95% CI 1.35-0.78). Maternal outcomes did not differ between groups after two hours of protocol implementation and sensitivity analysis. The delivery mode was similar in both groups, with a relative risk of 0.10 (95% CI 0.78-1.09) and 0.10 (95% CI 0.77-1.10) for protocol and sensitivity analysis, respectively. The 5-minute Apgar scores also showed no significant differences between the groups.* ***Conclusion:*** *Using breathing patterns during active labor did not significantly impact maternal outcomes, including pain, satisfaction, anxiety, and fatigue.*

Keywords: Anxiety, Labor, Parturient, Pregnancy, Satisfaction

Introduction

Emotional stress and excessive pain during labor can have a detrimental effect on the physiological state of the mother, halt contractions, and hinder the progression of labor. Therefore, gynecologists and awareness programs for mothers during the prenatal period instruct regarding breathing techniques upon cervical dilation (1, 2). This instruction is provided based on observation and physiology to maintain optimum maternal and fetal oxygenation, resulting in relaxation and confidence of the mother and mitigating anxiety, discomfort, and pain during labor. (3).

Breathing patterns in the first period of labor were introduced in the 1930s-40s when mothers were instructed to stay conscious and take slow and deep breaths to remain calm and reduce labor pain. (4). With the evolution of humanized birth and the resurfacing of the concept of women's involvement in the process, it was emphasized to breathe during labor to reduce stress and help women connect with their bodies. (5).

Studies have provided evidence that breathing patterns during labor reduce stress. (6). Stress disturbs the normal breathing rhythm and prolongs expiration. Hence, breathing patterns are essential to manage anxiety and stress disorders. However, despite the evidence that breathing patterns can reduce pain, discomfort, and anxiety clinically, limited clinical implications are reported that are scarce to make definitive and adequate breathing techniques during labor.

This study was conducted to evaluate the efficacy of breathing patterns for the management of maternal anxiety during the dilation phase of labor.

Methodology

A prospective study was conducted in the Physiotherapy and Obstetrics and Gynecology Department of DHQ Hospital Rajanpur from April 2023 to April 2024. A total of 150 pregnant women in active labor with gestation ages 37-41 weeks were included in the study by consecutive sampling. The Open Epi 3.0 program calculated the sample size by keeping a 30% estimated decline in anxiety in the study group, 0.05 α error, 0.20 β error, and 20% predicted loss rate. Women with multiple pregnancies, stillbirth, analgesics, clinically unstable, and those with psychiatric disorders were excluded. All women provided their informed consent to become a part of the study. The ethical board of the hospital approved the study design.

The patients were divided into the study group (70 women) and the control group (80 women). Standard labor procedures were followed in the control group, and breathing patterns guided the study group following a protocol. The patterns were demonstrated based on the degree of dilation and were paused when the patient experienced discomfort or tachypnea. The patients inhaled slowly, counting from 1-5, and then exhaled by counting

backward. Inspiratory reserve volume was noted as lungs were not fully stimulated during inhalation. After exhaling, the patient was asked to take a deep breath and pause for 1-2 seconds. When contractions were muscular, the patient was asked to take a long exhalation to decelerate expiration. The primary endpoint was maternal anxiety, and the secondary endpoint was pain, fatigue, satisfaction, labor duration, and delivery mode. The secondary endpoint for the fetus was a 5-minute Apgar score. Every woman was assessed for demographic information and anxiety after two hours of selection. Anxiety was evaluated by a 20-item State-Trait Anxiety Inventory (translated) with a Likert scale from 1-4, 4 being the highest level of anxiety. Patients with STAI scores of 20-40 were considered to have low anxiety, 41-60 scores were regarded as medium anxiety, and 61-80 scores were considered high levels of anxiety.

Maternal pain and satisfaction were measured on a visual analog scale, where 10 indicated maximum discomfort and satisfaction and 0 indicated no pain and satisfaction. A modified Borg scale was used to evaluate fatigue, where 20 was considered an exhausting activity, and six was considered an easy task. The partogram measured the labor duration until birth.

All data was analyzed using SPSS version 20. The chi-squared and Fisher's tests were used to compare categorical characteristics between the study and control groups. A T-test was used for normally distributed data, and a Maan-Whitney test was used for data not normally distributed for continuous probability distribution. The association between breathing patterns (independent variable) and pain, satisfaction, anxiety, and fatigue (independent variables) was calculated by measuring average differences with 95% CI. The relative risk for delivery method and Apgar score (dichotomous variables) was also measured with 95% CI. The significance level was set at 5%. A sensitivity analysis of associations was done using variables with missing data. For the delivery method, the C-section was considered. For the 5-minute Apgar score, a score of <7 was considered—multiple imputation methods are applied using Stata software 12.1 for anxiety, satisfaction, fatigue, and pain.

Results

Out of 150 patients included, 22 patients (7 from the study group and 15 from the control group) were excluded from further analysis due to fetal distress and prolonged labor. The mean age of patients was 19 years (20.10 ± 4.08 and 19.44 ± 4.18, respectively). Both groups did not differ significantly concerning demographic and anthropometric characteristics, as shown in Table I.

Regarding baseline maternal outcomes, i.e., pain, fatigue, anxiety, satisfaction, and duration of labor, no significant difference was recorded between both groups (Table II). No loss occurred during labor, so duration was recorded for the whole sample with a mean difference of 0.30 hours (95% CI 1.35-0.78) between both groups (study group: 7.70 ± 3.36 and control group: 8.00 ± 2.54). Similarly, maternal outcomes did not differ between groups after two hours of protocol and sensitivity analysis (Table III). The delivery mode in protocol and sensitivity analysis was similar in both groups, i.e., relative risk: 0.10, 95% CI: 0.78-1.09, and relative risk: 0.10, 95% CI: 0.77-1.10, respectively. The 5-minute Apgar score also did not differ in both groups.

Table I: Patients' demographics

Characteristics	**Study group (n=70)**	**Control group (n=80)**
Age	20.10 ± 4.08	19.44 ± 4.18
Gestational age	38.15 ± 1.07	38.05 ± 1.0
Cervical dilation		
4 cm	28 (40%)	34 (42.5%)
5-6 cm	30 (42.8%)	24 (30%)
7-8 cm	12 (17.1%)	22 (27.5%)
BMI		
Underweight	28 (40%)	32 (40%)
Normal	30 (42.8%)	28 (35%)
Overweight	9 (12.8%)	15 (18.7%)
Obese	3 (4.2%)	7 (8.75%)
Education		
Primary	49 (70%)	48 (60%)
Secondary and higher	21 (30%)	32 (40%)

Table II: Baseline maternal outcomes

Variables	**Study group (n=70)**	**Control group (n=80)**
Anxiety	44.5 ± 9.55	44.43 ± 9.42
Pain	6.62 ± 2.15	6.84 ± 1.13
Fatigue	12.11 ± 4.52	10.51 ± 4.28
Satisfaction	6.90 ± 2.61	6.37 ± 2.84

Table III: Protocol and sensitivity analysis of maternal outcomes

Protocol analysis				
Variables	**Study group (n=63)**	**Control group (n=65)**	**Mean difference (95% CI)**	**P value**
Anxiety	49.2 ± 1.3	48.1 ± 1.2	1.1 (-2.9-6.0)	0.580
Pain	7.4 ± 0.2	7.4 ± 0.2	0.0 (-0.7-0.9)	0.848

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Fatigue	7.0 ±0.2	6.0 ± 0.3	1.0 (-0.02 -1.9)	0.060
Satisfaction	14.1 ± 0.4	13.6 ± 0.4	0.5 (-1.0-3.0)	0.381
Sensitivity analysis				
Variables	**Study group (n=70)**	**Control group (n=80)**	**Mean difference (95% CI)**	**P value**
Anxiety	49.8 ± 1.2	49.3 ± 1.2	0.5 (3.9 -5.0)	0.908
Pain	7.5 ± 0.2	7.5 ± 0.2	0.0 (-0.5 - 0.4)	0.952
Fatigue	6.9 ± 0.2	6.0 ± 0.3	0.9 (-0.2-2.0)	0.080
Satisfaction	13.9 ± 0.4	13.5 ± 0.4	-0.4 (-1.6 - 2.6)	0.600

Discussion

This study evaluated the efficacy of breathing patterns on maternal outcomes during labor. The results showed no significant difference between pain, fatigue, anxiety, and satisfaction between the study and control groups. A robust and innate association between maternal pain and anxiety was noted, with an increase in pain and anxiety also elevated. High anxiety can result in spasms in the pelvis and increased pain in labor. Therefore, breathing patterns have been reported to reduce pain and mitigate anxiety, but our study results are not consistent with these findings (7, 8).

Published literature that was conducted to assess the effectiveness of slow and deep breathing during dilation and labor report contradictory results (9, 10) . A study conducted on 36 women in labor aimed to assess the efficacy of breathing patterns and calmness on maternal pain and anxiety found that patients using these techniques and patients managed by conventional methods did not differ with regards to reduction in pain, similar to our study (11). However, this study found that a prolonged reduction in anxiety was noted in latent and active labor in patients exercising breathing techniques. Other studies have reported significant pain control in active labor when breathing techniques were used with muscle relaxation exercises and sacral massages (12).

This provides evidence that breathing patterns may not be effective alone in mitigating pain during labor, as literature has shown the management of pain by drug-free therapeutic procedures through various techniques (13, 14). Data supporting the absolute effectiveness of breathing techniques to improve maternal outcomes during labor is limited. A study conducted on 56 women in labor reported no difference in pain and fatigue levels in the study group and control group during active labor, as reported in our study (15). In latent labor, fatigue increased as complex breathing techniques were used, and the involvement of accessory breathing muscles may be difficult for the mother. In the present study, no difference between groups was noted in fatigue levels, negating the previous study's finding.

No studies have been conducted to evaluate the influence of breathing techniques on labor duration in the latent phase of labor. One study investigated the effect of breathing and relaxation on pain in 36 women in labor but reported no difference between the overall duration of labor and active labor in the study and control group (16). Our study showed the same results, but since all patients were in active labor, this may have impacted differences in groups.

Breathing techniques increased maternal satisfaction in the present study. Still, according to the literature, supportive OBGYN staff, quality of care, personal expectations, physical state of the patient, and active involvement in decisions can alleviate patient satisfaction (17, 18). The lack of difference in maternal outcomes impacted the satisfaction levels. The delivery route and apgar score were also not influenced by breathing techniques in either group. No literature supports the association between breathing patterns and Apgar score.

There are some limitations of our study. Control group results may be contaminated by the involvement of doulas every week as they recommended non-traditional techniques. Women may have been distracted from breathing by physical and environmental factors. The questionnaire calculating maternal outcomes was not specific, which may have influenced the results.

Conclusion

The breathing patterns during active labor were not effective in managing maternal outcomes, i.e., pain, satisfaction, anxiety, and fatigue.

Declarations

Data Availability statement
All data generated or analysed during the study are included in the manuscript.

Ethics approval and consent to participate.
Approved by the department Concerned. (IRB/22-9-12 latter no. 916)

Consent for publication
Approved

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Conflict of interest

The authors declared an absence of conflict of interest.

Authors Contribution

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Drafting & Concept & Design of Study

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