

## Effectiveness of Breathing Exercise on Reducing Pain Perception and State Anxiety among Primi Parturients

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### Abstract

**Aim:** This study aims to evaluate effectiveness of breathing exercise on reducing pain perception and state anxiety among primi parturients. **Methods:** A quasi experimental research design was opted. A non-probability purposive sampling technique was used to recruit 118 primi parturient women from the Labour and Delivery room of Zagazig University Hospitals, Egypt. Parturients were equally divided into two groups. The intervention group performed breathing exercise during the active phase of labour; beside conventional care. Meanwhile, the control group received conventional care only. Data were collected using Visual Analogue Scale-Pain, State-Anxiety Inventory Scale and Partograph sheet. **Results:** At baseline, there was no significant difference between both groups in pain perception and state anxiety. Immediately after initiating breathing exercise, there was significant decline in women's perception of pain and state-anxiety in intervention group compared to control group (4.6±2.0 vs. 5.9±1.8 and 60.0±7.8 vs. 64.3±8.8 respectively). As well, intervention group subjects perceived lower pain and experienced lower state-anxiety compared to those of the control group after 2 hours (4.4±2.1 vs. 5.8±1.7 and 57.1±7.8 vs. 63.8±8.8) and after 4 hours (3.6±1.4 vs. 5.7±1.6 and 53.7±7.8 vs. 63.3±8.9 respectively). Also, a shorter active phase was noticed in intervention group equated to control group (5.9±0.8 vs. 7.9±0.8 respectively;  $p < 0.001$ ). **Conclusions:** Performing breathing exercise during active labour was an effective option in reducing pain perception and state-anxiety of primi parturient women.

**Key Words:** Breathing exercise, pain perception, state-anxiety, and primi parturients.

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### I. Introduction

Childbirth is unforgettable marvelous event in woman's life. Pain and anxiety during labour often prevent most women from delight in this event. Pain during labour is the extreme pain woman experienced in life; it is higher among primi parturient women. Anxiety during labour tightens pelvic floor muscles and this tightness rises perception of labour pain and extreme pain increases fear of parturient woman [1, 2]. Furthermore, anxiety feeling increases release of cortisol stress hormone. Greater cortisol level decreases blood flow to the uterus, thus delay or even stop uterine contractions. Inefficient uterine contractions results in alteration in labour progress with its associated fetal and maternal complications [3-5].

To improve labour and delivery experience, breaking the anxiety-pain-fear cycle is a main concern of nurses working in labour and delivery rooms. There is a wide variety of non-pharmacological techniques which is useful to interrupt that cycle. Breathing exercise is one of the most effective non-pharmacological techniques in reducing pain perception and anxiety levels during labour [6]. It acts by diverting parturient's woman attention; from being overwhelmed by pain of uterine contractions to focus on breathing and be actively participate in childbirth, where woman performs breathing exercise can cope well with labour pain and be less anxious [7-8].

Previous clinical trials revealed a helpful effect of performing breathing exercise during labour on reducing pain perception, anxiety levels either state or continuous [9-11]. Other trials had shown advantageous effect of breathing exercises in shortening active phase and second stage of labour [12-13]. To the best of our knowledge, there is lack of the national studies addressed outcome of breathing exercise on pain perception and state-anxiety in primi parturient women. A vital nursing role during waiting times for childbirth, is to assist parturients in reducing pain perception and properly cope with uterine contractions. Thus, the present study was done to evaluate effectiveness of breathing exercise on reducing pain perception and state anxiety among primi parturients.

### **1.1 Significance of the study**

Labour pain differ broadly from woman to another and from pregnancy to the other. It was evidenced that about 60% to 70% of nulliparous parturients and 35% to 40% of multiparous ones suffer horrible pain, while around 10% experience painless labour [14]. Non pharmacologic methods aim to relieve labour pain are consistent with nursing management. Since reducing pain perception and state anxiety can enhance women's satisfaction about childbirth experience, the present study aims to evaluate effectiveness of breathing exercise on reducing pain perception and state anxiety among primi parturients.

### **1.2 Aim of the study**

The existing study aims to evaluate effectiveness of breathing exercise on reducing pain perception and state anxiety among primi parturients.

### **1.3 Study hypotheses**

Three hypotheses were formulated to attain aim of the present study:

**Hypothesis 1:** "Primi parturient women who perform breathing exercise during their active labour perceive lower pain than those who do not".

**Hypothesis 2:** "Primi parturient women who perform breathing exercise during their active labour go through a faster progress than those who do not".

**Hypothesis 3:** "Primi parturient women who perform breathing exercise during their active labour experience lower anxiety levels than those who do not".

## **II. Subjects And Method**

### **2.1 Study Design**

A quasi-experimental research was designed to achieve aim of the present study.

### **2.2 Study Setting**

The current study was done at the Labour and Delivery unit of Zagazig University Hospitals, Egypt. It is an emergency unit prepared for providing health care for low and high risk parturient women; three days weekly.

### **2.3 Sampling**

A non-probability purposive sampling technique was used to recruit 18 Primi parturient women during the study period from 1<sup>st</sup> of January to end of December 2018. Each parturient woman was eligible to be enrolled in current study when met the following inclusion criteria:

1. Primi parturient in active phase of labour (i.e.,  $\geq 4$ cm cervical dilation).
2. Aged between 20 and 35 years.
3. At gestation weeks of 37 or beyond.
4. Did not receive analgesic or anesthetic medication during the previous 6 hours.
5. Not known to have a preexisting respiratory disorders that may impair applying the breathing exercise.
6. Cooperative; understands and obeys given instructions.

#### **2.3.1 Sample size calculation**

This is a quasi-experimental study proposed to evaluate effectiveness of breathing exercise on reducing pain perception and state anxiety among primi parturients. Based on data from previous literature [15], considering level of significance of 5%, and power of study of 80%, the sample size can be calculated using the following formula:  $n = [(Z_{\alpha/2} + Z_{\beta})^2 \times \{2(SD)^2\}] / (\text{mean difference between the two groups})^2$ . Where SD = standard deviation,  $Z_{\alpha/2}$ : This depends on level of significance, for 5% this is 1.96,  $Z_{\beta}$ : This depends on power, for 80% this is 0.84. Therefore,  $n = [(1.96 + 0.84)^2 \times \{2(6.3)^2\}] / (88.2 - 90.5)^2 = 117.6$ . Accordingly, the total sample size required is 118 parturient women, 59 in each group.

#### **2.3.2 Recruitment and group's allocation**

To prevent the extent of the test effect between subjects of the both groups, data were collected first from the control group then from the study group. The first 59 eligible parturient women were assigned for the control group. Meanwhile, the next 59 Primi parturient were allocated into the study group.

## **2.4 Tools of data collection**

To achieve aim of the current study, three tools were used in collecting the required data. Specifically, Visual Analogue Scale for Pain (VAS-Pain), State-Anxiety Inventory (SAI), and the Partograph sheet.

### **2.4.1 Visual Analogue Scale for Pain**

The VAS-Pain was used for evaluating the pain intensity. It is a horizontal line of 10 cm. Its leftmost side refers to no pain, while the right most end refers to worst imaginable pain. The score ranges from 1 to 10; with higher scores indicating greater pain intensity. The woman was instructed to make a cross on the line indicating pain intensity right now. The scale is scored by measuring how far the applicator mark from the left most extreme in millimeters [16].

### **2.4.2 State-Anxiety Inventory**

The SAI was developed by Spielberger and colleagues at 1972 [17]. It consists of 20 self-administered items to assess State-Anxiety. In current study, the participant women were instructed to complete the State-Anxiety scale aiming to rate intensity of the anxiety feeling on 4 options rating scale; 1 indicates not at all, 2 means somewhat, 3 means moderately so, and 4 very much so.

*Scoring and interpretation:* A score of 4, point to high anxiety level for 10 items. However, score of 4 point to absence of anxiety for the remaining 10 State-Anxiety items. The items indicate absence of anxiety in State-Anxiety scale; such as I feel calm or I feel secure are reversely scored. Instead of being 1, 2, 3, or 4, it was scored as 4, 3, 2, or 1. Those items require reverse scores are: 1, 2, 5, 8, 10, 11, 15, 16, 19, and 20. The total State-Anxiety score was determined by adding score of all items; considering reverse scored items. The total State-Anxiety score ranges from 20 to 80. The Arabic version of SAI scale was used in current study. It was previously validated in five specialties and proposed its utility for evaluating state anxiety in Egyptian population. Its reliability was assessed in Egyptian population; with internal consistency coefficient was 0.94 for Anxiety State in female population and in current study it was 0.858.

### **2.4.3 Partograph sheet**

The World Health Organization designed the partograph as a single sheet to reflect labour events through three sections from up to down; the fetal condition, maternal condition and progress of labour [18]. Duration of the active phase of labour was recognized by reviewing the labour progress section of the partograph. The labour progress section is the middle section in the partograph sheet. It is illustrated to give a complete idea about all labour progress events; including dilatation of the cervix, fetal head descent, and uterine contractions' duration and frequency.

## **2.5 Ethical considerations**

Prior starting the research process, official approvals were taken from the concerned authorities. The informed written consents were obtained from all participants before registration in the current research study.

### **The Breathing Exercise Technique**

Abdominal breathing was the breathing type of choice in current study; where it carries multi-pros for parturient women. It was performed based on applying Mason's guides [19]; where participants in study group were asked to do the following steps:

1. Set comfortably in leather armchairs during the exercise time, keep one hand on the chest and the other on the abdomen at the umbilicus level.
2. Gradually inspire air for 4 seconds; while nose in supine state. Until feel abdomen were filled with air first then chest.
3. Slowly expire the inhaled air within 6 seconds through pursed lips; producing "Hoo" sound.
4. Repeat step 2 and 3 during each contraction. During periods of rest, participants were taught to take breaths as in normal state.

## **2.6 Research process**

The control group subjects were received the conventional care. However, intervention group subjects were performed breathing exercise. This intervention was managed by preparing for and implementing the intervention. Thereafter, evaluation of its outcomes.

### **Preparation for the intervention**

As an initial step to conduct the current study, the researchers were keen to take approvals from the concerned authorities and applying a pilot study. Approvals were taken from the board of Obstetrics and Gynecology Department of Zagazig University Hospitals and the Ethics Committee of Nursing Faculty, Zagazig University for implementation of the current research work. A pilot study was done on 10% of the pre specified sample size. It was aimed to assess clarity of the study tools and to estimate participant's ability of continuing breathing exercise during time of uterine contractions. Results of the piloting were, clarity of the tools and feasibility of continuing breathing exercise during time of uterine contractions. No modifications were done in the tools. Final data analysis did not involve the pilot sample.

### **Implementation of the intervention**

#### *(1) Training the parturient women on breathing exercise*

On arrival to the Labour and Delivery room, the study aim and procedure were explained to each potential subject. Every subject gave an informed written consent before enrollment. At this time, both groups completed the baseline assessment. One practical session was done individually to each parturient woman at the study setting. Practical session content was brief and focused on technique and precautions taken while performing abdominal breathing exercise. Demonstration and redemonstration were used in providing the practical training.

#### *(2) Implementing the breathing exercise*

Each participant was performed abdominal breathing exercise according to the above clarified steps; during the time of uterine contractions in the active phase of first stage of labour. Each subject of the intervention group was instructed to implement the assigned exercise from the beginning to end of each uterine contraction.

### **Outcomes evaluation**

The following study outcomes were assessed: 1) Intensity of labour pain, 2) State-Anxiety, and 3) Duration of active phase and second stage of labour. The first two outcomes were assessed immediately before the exercise and on three time points of assessment: immediately and again 2 and 4 hours after starting the breathing exercise for the intervention group subjects. The same outcomes were evaluated for the control group subjects at the same time but without intervention. Duration of the active phase determined by time lapse from 4 cm cervical dilation until full cervical dilation, while second stage determined from full cervical dilation until fetal expulsion in minutes.

### **2.7 Limitations of the study**

Conducting this study in one setting and limiting the enrollment to Primi parturient women only may limit generalizability of the results. Another limitation is that it was difficult to control all the extraneous factors affecting length of labour. As, the setting policy was to augment the labour progress in primi parturient using oxytocin; and it was not possible to arbitrate the conventional care. However, using oxytocin in both groups making its effect is negligible.

### **2.8 Data analysis**

All statistical analyses were performed using SPSS for windows version 20.0 (SPSS, Chicago, IL). All continuous data were normally distributed and were expressed in mean  $\pm$  standard deviation (SD). Categorical data were expressed in number and percentage. The comparisons were determined using Student's t test for variables with continuous data. Chi-square test was used for comparison of variables with categorical data. Statistical significance was set at  $p < 0.05$ .

## **III. Results**

### **3.1 General characteristics of the study groups**

The general characteristics of the intervention and control groups were shown in **Table 1**. There was no significant differences between both groups regarding maternal age, educational level, working status and gestational age ( $p > 0.05$ ).

### **3.2 Effect of the breathing exercise on VAS-Pain at different points of time**

In this study the VAS-pain level was evaluated at baseline, immediately after the exercise and after 2 and 4 hours from initiating exercise performance and was demonstrated in **Table 2**. At the baseline evaluation, the VAS-pain did not differ significantly between the two groups. However, immediately following the breathing exercise the VAS-pain in the intervention group was significantly lower than in the control group ( $4.6 \pm 2.0$  vs.  $5.9 \pm 1.8$  respectively,  $p < 0.001$ ). After 2 hours from initiating breathing exercise, the VAS-pain was further better in the intervention group compared to the control group ( $4.4 \pm 2.1$  vs.  $5.8 \pm 1.7$  respectively,  $p < 0.001$ ). Post exercise by 4 hours, there was further improvement in the VAS-pain score in the intervention group compared to the control group ( $3.6 \pm 1.4$  vs.  $5.7 \pm 1.6$  respectively,  $p < 0.001$ ).

**3.3 Effect of the breathing exercise on duration of labour**

The parturient women who were performed the breathing exercise had significantly shorter duration of the active phase of first stage of labour than those in the control group (5.9 ±0.8 vs. 7.9 ±0.8 hours respectively, p<0.001) while the duration of 2<sup>nd</sup> stage of labor did not differ significantly between the two groups (Table 3).

**3.4 Effect of the breathing exercise on State-Anxiety at different points of time**

Table 4 and Figure 1 demonstrates the change of state-anxiety at baseline, immediately after the exercise and 2 and 4 hours after initiating the breathing exercise. At baseline, the state-anxiety did not differ significantly between the two groups. Whereas after performance of the breathing exercise, the state-anxiety level in the intervention group was significantly lower than in the control group (60.0 ±7.8 vs 64.3 ±8.8 respectively, p=0.006). After initiation of the breathing exercise by 2 hours, state-anxiety level was further better in the intervention group compared to the control group (57.1 ±7.8 vs. 63.8 ±8.8 respectively, p<0.001). Four hours after initiating the breathing exercise, state-anxiety level was further better in the intervention group compared to the control group (53.7 ±7.8 vs. 63.3 ±8.9 respectively, p<0.001).

**Table 1.** The general characteristics of the intervention and control groups (n=118)

Characteristics	Intervention group (n=59)		Control group (n=59)		Chi square test	
	N	%	n	%	X <sup>2</sup>	P
<b>Age (Years)</b>						
21 – 25	24	40.7	18	30.5		
26 – 30	18	30.5	21	35.6		
31 – 34	17	28.8	20	33.9	1.331	0.514
<b>Mean ±SD</b>	27.4 ±4.3		27.8 ±4.0		0.600	0.550
<b>Educational level</b>						
Illiterate	18	30.5	23	39.0		
Basic	15	25.4	12	20.3		
Higher	26	44.1	24	40.7	1.023	0.600
<b>Working status</b>						
No	30	50.8	32	54.2		
Work	29	49.2	27	45.8	0.136	0.712
<b>Gestational age (weeks)</b>						
37 – 39	33	55.9	30	50.8		
40 – 41	26	44.1	29	49.2	0.306	0.580
<b>Mean ±SD</b>	39.3 ±1.3		39.2 ±1.4		0.069	0.945

**Table 2.** VAS-Pain at different points of time between the intervention and control groups (n=118)

Assessment time	Intervention group (n=59)		Control group (n=59)		Student's t test	
	Mean ±SD		Mean ±SD		t	P
<b>At baseline</b>	6.5 ±2.1		5.9 ±1.8		1.535	0.128
<b>After initiating breathing exercise</b>						
Immediately	4.6 ±2.0		5.9 ±1.8		3.856	<0.001**
After 2 hours	4.4 ±2.1		5.8 ±1.7		3.810	<0.001**
After 4 hours	3.6 ±1.4		5.7 ±1.6		7.557	<0.001**

Note: \*\* indicates to highly significance

**Table 3.** Duration of labour stages in the intervention and control groups (n=118)

Items	Intervention group (n=59)		Control group (n=59)		Student's t test	
	Mean ±SD		Mean ±SD		t	p
<b>Duration of active phase of labour (hours)</b>						
	5.9 ±0.8		7.9 ±0.8		14.276	<0.001**
<b>Duration of 2<sup>nd</sup> stage of labour (minutes)</b>						
	49.5 ±4.5		50.4 ±1.7		1.415	0.160

Note: \*\* indicates to highly significance

**Table 4.** State-Anxiety at different points of time between the intervention and control groups (n=118)

Assessment time	Intervention group (n=59)		Control group (n=59)		Student's t test	
	Mean ±SD		Mean ±SD		t	P
<b>At baseline</b>	62.6 ±7.7		64.3 ±8.8		1.431	0.155
<b>After initiating breathing exercise</b>						
Immediately	60.0 ±7.8		64.3 ±8.8		2.820	0.006*
After 2 hours	57.1 ±7.8		63.8 ±8.8		4.379	<0.001**
After 4 hours	53.7 ±7.8		63.3 ±8.9		6.262	<0.001**

Note: \* refers to significance and \*\* refers to highly significance

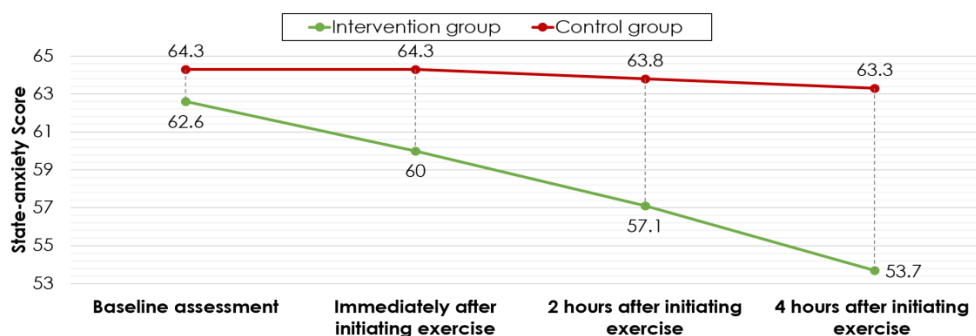


Figure 1. State-Anxiety at different points of time between the intervention and control groups

#### IV. Discussion

The current study was aimed to evaluate effectiveness of breathing exercise on reducing pain perception and state anxiety among primi parturients. This aim was realized through the present study findings; which revealed significant decline in pain and anxiety among the intervention group subjects compared to those of the control group. As well as, study group subjects showed reduction in duration of active phase and second stage of labour. Hence, the study hypotheses were accepted.

Concerning perception of pain, the intervention group subjects of the current research work recorded lower pain scores on VAS-Pain scale compared to those in the control group at the three assessment points of time. Hence, the 1<sup>st</sup> study hypothesis: "Primi parturient women who perform breathing exercise during their active labour experience lower pain scores than those who do not", was accepted. The results of an intervention study involved 48 primigravida women in labour at **Karad city, India** supported the present study findings [20]. As per data analysis of facial pain scales and behavioral checklists indicated lower pain intensity among the intervention group subjects; who implemented breathing exercises three times during the active phase of labour, compared to those who did not. Likewise, a quasi-experimental study; conducted on 60 Primi parturient **Indian** women, evaluated the influence of breathing training on perception of labour pain [21]. Such study found significant decrease of labour pain in intervention group; who practiced 2 sets of breathing exercise during the active and transitional phase of labour, compared to the control group.

Authors of the present study, attribute evidenced pain reduction in subjects of the intervention group to three rationales. Firstly, abdominal breathing exercise enhance endorphins release into the circulation. Endorphins release is tremendously useful in reducing physical pain. Another rationale, breathing exercise is a technique of relaxation and there is a notion that the relaxed woman behave in a positive manner with pain feelings. Lastly, abdominal breathing offers additional oxygenation which promotes abdominal muscles relaxation, decrease friction of the uterus against abdominal wall during uterine contractions. Thus, reduce pain feelings in active phase of labour.

The current study intervention group had shorter active phase and second stage of labour compared to the control group. However, differences between both groups were significant for the active phase and insignificant for second stage of labour. Thus, the 2<sup>nd</sup> hypothesis: "Primi parturient women who perform breathing exercise during their active labour go through a faster progress than those who do not", was supported. The same findings were noticed in a randomized controlled trial involved 70 **Turkish** pregnant women practiced breathing training at early labour and continued until delivery [22]; supporting present study findings. The shorter active phase of labour in the intervention group, may be explained by that the breathing exercise results in more oxygen reserve and improvement of maternal energy, which in turn makes parturient woman more productive. Moreover, repeated deep inhalation and exhalation improve oxygen supply to abdominal and pelvic floor muscles, which activates their contractions and increase fetal descent. Consequently, enhance labour progress and reduce its duration [23].

However, **Iranian** clinical trial studied effect of breathing exercise; in 120 parturient women randomized to breathing exercise or control groups, and found the reduction in duration of second stage of labour among intervention group was significant [24]. Similarly, significant reduction of duration of second stage was noticed by Yuksel et al., (2017) in a randomized controlled trial evaluated effect of breathing exercise on duration of second stage of labour in 250 **Turkish** parturients [15]. Authors of the present study back this finding to the differences in sample size, different approaches and timing of the implemented breathing exercises.

Concerning state-anxiety, intervention group of the present research work recorded lower anxiety scores than those of the control group. Accordingly, the 3<sup>rd</sup> hypothesis: "Primi parturient women who perform breathing exercise during their active labour experience lower anxiety scores than those who do not", was established. Likewise, a quasi experimental **Indian** study [25]; involved 60 parturient women, found a significant decline of the anxiety scores on State-anxiety scale among subjects performed breathing exercise in form of cleansing and focal breathing compared to control group [25]. Correspondingly, Cicek and Basar (2017) used the same anxiety measure and revealed a significant reduction in anxiety scores among the intervention group subjects after implementing breathing exercise [22]. Anxiety reduction after breathing exercise may be related to the evidenced notion; breathing exercise is an effective relaxation approach which corrects the autonomic nervous system dysfunction associated with anxiety leading to emotion enrichment and anxiety reduction [26, 27].

### **Nursing implications for practice**

Nurses working in labour and delivery room are subjected to act in response to meticulous obstetric emergencies. Nurses should apply measures that help in reducing pain and anxiety feelings evident during labour; such as abdominal breathing exercise. Breathing exercise is a cost effective, noninvasive, easy and safe practice in alleviating such feelings in labour. It does not demand physician's permission.

### **V. Conclusion And Recommendations**

The present study findings revealed a helpful effect of practicing abdominal breathing exercise on reducing pain, anxiety, and duration of labour. Findings of the present research work stimulate the following recommendations:

1. As an implication for nurses working in labour and delivery rooms, is to be aware about pain and anxiety feelings of parturient women and keenly encourage them to apply abdominal breathing exercise as an integral part of management.
2. Future research to compare different types of breathing exercise is suggested.

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