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Effect of breathing exercise during labour on delivery outcome: an interventional study

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Abstract

Background and objective: Labor is a physically and emotionally demanding process, often accompanied by pain, anxiety, and physiological stress. Lamaze breathing techniques are evidence-based, non-pharmacological methods that promote maternal control, reduce labor discomfort, and improve delivery outcomes. This study aimed to evaluate the effect of Lamaze breathing exercise on maternal and fetal outcomes among primigravida women.

Methods: A quasi-experimental design was used with a purposive sample of 118 primigravida women, who were equally divided into a study group and a control group (n = 59 each). The study group received Lamaze breathing intervention during the first and second stages of labor, while the control group received routine care. Data were collected through structured questionnaires, the perceived stress scale, and observation checklists for maternal and neonatal outcomes.

Results: Results from the post-intervention revealed that the study group's stress levels had significantly decreased. (66.1% low stress vs. 0% in the control group; P <0.001), shorter second-stage labor (<30 minutes in 59.3% vs. 10.2%; P<0 .001), and higher first-minute APGAR scores (93.2% normal vs. 61.0%; P <0.001). No statistically significant differences were found in fifth-minute APGAR scores, NICU admissions, newborn weight, or maternal complications, although trends favored the intervention group.

Conclusion: Lamaze breathing exercises significantly reduced maternal stress and second-stage labor duration, and improved neonatal condition at birth. Integrating such interventions into antenatal education is recommended for enhancing birth outcomes in primigravida women.

Keywords: Breathing Exercises, Delivery Outcome, Labour, Childbirth, Lamaze Breathing exercise.

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Introduction

Giving birth is a dramatic and transformative event for a woman and her family. The time has come to find a balance between fulfilling experiences and expectations (1). Evaluations of delivery experiences include a number of characteristics, such as labor expectations, pain, labor length, and midwife help (2). Women who might have a bad birth experience might sustain serious psychological harm. People have a high priority on spontaneous deliveries with little help, yet they believe that delivery is a medical problem (3). Lamaze is a supportive teaching method that is non-invasive, non-pharmacologic, and effective in reducing labor pain and improving the behavioral responses of women in labor. The premise behind Lamaze breathing techniques is that controlled breathing may enhance relaxation, reduce the feeling of pain, and assist women in giving birth in a safe, healthy manner without the need for unnecessary medical intervention (4). Learned how to use various breathing methods to keep things under control and to calm their muscles instead of crying, can lead to better contraction (5). Taking a breath as a non-pharmacological treatment, approaches, or complementary therapies are included in the standard prenatal childbirth education framework, women may have a satisfying labor experience with fewer labor interventions. But in this instance, health education at the prenatal clinic level seems to be lacking (1).

According to the World Health Organization, 49.5% of pregnant women who sought prenatal care did not get the recommended number of visits (6). During labor, pain and emotional anguish may impede the process and negatively impact the physiological contraction process (7). People who experience stress involuntarily extend the expiratory phase of the respiratory cycle, which is a normal change in breathing patterns (8, 9). Breathing is one of the simple and reasonably priced non-pharmacological ways to connect the mind and body. In addition to decreasing blood pressure and heart rate, breathing exercises may help with anxiety, depression, pain perception, cancer, chronic obstructive pulmonary disease, asthma, insomnia, stress, and post-traumatic stress disorder (PTSD). Nonetheless, several studies have shown that breathing exercises may successfully reduce heart rate and blood pressure (10). By taking the focus off of the pain, breathing enables the expecting woman to give birth awake and cognizant (1). Amiri et al conducted a study on this topic using breathing exercises as a distraction is one cognitive-behavioral method for handling emotions. This technique may distract from feelings of unease, anger, and fear (11).

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The treatment of labor pain is essential to reducing the incidence of rising elective cesarean sections (12). Severe anxiety during labor raises the risk of elective cesarean sections and may cause more problems for the mother and the baby. These problems increase hospital bed occupancy, prolong hospital stays, and place a financial burden on the state and families (11). Medical professionals advise cesarean delivery over vaginal delivery when a woman is afraid of the pain and outcomes of childbirth. According to the World Health Organization, cesarean sections should happen 10% to 15% of the time, but in Iraq, the percentage is far higher. Although rates are higher in the Kurdistan Region, the country as a whole showed a notable increase between 2011 and 2018 (13). One of the factors influencing perineal injuries during delivery is the way the woman pushes and breathes during the second stage of labor (15). Extreme pain during labor makes a woman more sensitive to pain. Additionally, stress hormones, which in turn cause the release of cortisol into the circulation, are triggered by worry. Reduced uterine artery blood flow from high cortisol levels causes contractions to stop or stall, which lengthens labor since uterine contractions are less efficient. Prolonged labor can lead to additional issues for both the mother and the baby (14). The study aims toevaluate the effect of breathing exercise during labour on delivery outcomes.

Methods

Study Design

A quasi-experimental study design was used with an adopted post-test only approach for both study and controlled groups, to estimate the causal effect of an intervention on the target population (pregnant women) without random assignment.

Setting of the Study

In order to obtain valid and comprehensive data, the study is conducted at Maternity Teaching Hospital/ delivery room in Erbil Province was the designated site for data collection. The implementation was carried out throughout the period from November 26th, 2024 to February 27th, 2025.

Sample of study

A non-probability "purposive" sample had been consisted of (118) Pregnant women have been selected to obtained represent and accurate data. The size of sample is (118) subjects divided into two groups reach one consists of (59) Pregnant women as study group and (59) Pregnant women as control group. The study group is exposed to the study intervention program deals with Lamaze method, while the control group has not been exposed to the intervention and chose only for comparison.

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Inclusion Criteria:

1- Primigravida women

2- 20-35 years of age

3- 38-40 weeks pregnant (term)

4- Without any pregnancy complications

5- Vertex presentation, undergoing normal vaginal birth,

6- Ready to participate in the study

7- Clearly speak in Kurdish language

Exclusion Criteria:

1- Multiple pregnancies.

2- Pregnancy with a dead fetus.

3- Analgesic use.

4- Inability to cooperate with breathing exercises.

5- Don't have any medical and pregnancy complications.

Steps of the Study

During the early first stage of labor, a personal information form was administered to collect sociodemographic characteristics and assess knowledge regarding breathing techniques using an 11-item questionnaire developed based on a literature review. The score for knowledge ranged from (0-3) Low level of knowledge (4-7) Moderate level of knowledge (8-11) High level of knowledge. The Lamaze technique was then practiced jointly with the women in the study group throughout the first and second stages of labor, in accordance with the intervention program. The researcher possessed certification in breathing techniques.

The Perceived Stress Scale, consisting of 10 items, was used to evaluate stress levels and was recorded on a labor observation form for both groups. The score ranged from 0-13 - low stress, from 14-26 - moderate stress, from 27-40 - high perceived stress. During the second stage of labor, data were collected and documented regarding perineal injuries, 1st and 5th minute APGAR scores, and the duration of the second stage of labor for all participants. No additional interventions were applied to the control group apart from routine hospital care. Throughout data collection, the daily clinical procedures of the hospital remained unchanged, allowing all pregnant women to continue receiving standard care and treatment.

Validity of the Questionnaire

To establish content validity, the questionnaire was presented to 15 experts from various specialties. Experts were asked to assess each item for linguistic clarity, relevance to the study variables, and appropriateness for the target population. Based on their feedback, minor revisions were made, and the final version of the questionnaire was completed for use in the main study.

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Pilot Study

A pilot study, involving approximately 10% of the total sample size, was conducted to evaluate the reliability and clarity of the questionnaire. The pilot confirmed that the tool was reliable, the time required to complete it was sufficient, and the items were clearly understood by participants.

Ethical Considerations

Ethical approval was obtained from the Ethical committee of the College of Nursing of Hawler Medical University No. (2518) on 1 September 2024. Before data collection, the researcher provided a brief explanation of the scientific background and the purpose of the study to give participants a complete and clear understanding of the research to be conducted. Additionally, the researcher emphasized that all participating pregnant women retained the right to discontinue their participation at any stage of the study. They were informed that they could withdraw if they felt uncomfortable or dissatisfied with any part of the questionnaire, the data collection procedures, or any other aspect related to the study process.

Statistical Analysis

In order to statistically analyze the data collected from the study sample to arrive at the results, the researcher used the SPSS-26 package to analyze this data and deal with it statistically, to obtain the final results of the research based on a statistical test. Chi- square test was used to determine whether there are statistically significant differences. P-value of ≤0.05 was considered statistically significant.

Results

Under the objectives of the current study findings, the descriptive and inferential statistic approach is organized in tables and figures that include the followings:

Table 1 shows distribution of Study Sample according to their Socio-Demographic and obstetric Variables. The study included 118 women, equally split into a study group and a control group (59 participants each). The average age of women in the study group was higher (25.3 years) compared to those in the control group (22.6 years), with most participants falling within the 24–27 age range. Younger women (20–23) made up the majority in the control group, while older age groups were sparsely represented. Regarding residence, the majority came from sub-rural (52) and urban areas (48), with only 18 from rural regions. The control group had more rural participants, whereas the study group was more represented in sub-rural areas. However, most women had at least completed secondary school or college, with only 6 women classified as illiterate, four participants were postgraduates, all from the study group.

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Occupationally, the sample included 72 housewives and 46 employed women (government or private sector), with a fairly even distribution across groups. Family type was also nearly balanced: 62 women lived in nuclear families and 56 in extended ones. Notably, more nuclear families were in the study group, while extended families were more common in the control group. Smoking status showed that only 2 participants were active smokers, both in the control group. Passive smoking was reported by 39 women, mostly from the study group, while the majority (77) reported no smoking exposure at all. Age at marriage was significantly different between groups, the study group had a higher average (24.2 years) than the control group (21.2 years). Early marriage (17–20 years) was much more common in the control group, while later marriage (25–28 and 29–32 years) was more typical among the study participants. Menarche occurred between ages 11–13 for most women in both groups, with an average age of about 12 years. When it came to antenatal classes, only 10 participants completed the full series and all were from the control group. A total of 49 women had attended a class once, and 55 had incomplete attendance. Four women, all from the control group, had never attended any antenatal class at all. When asked more generally about receiving antenatal education, 108 out of 118 participants said “No.” Only 10 women confirmed having received antenatal classes, and the majority of these were in the study group. Additionally, very few women had exposure to physical exercise education, only one participant had attended an exercise class prior to pregnancy.

Table 1. Distribution of Study Sample according to their Socio-Demographic and obstetric Variables

SDVs	Classification	Study		Control		total
		Freq.	%	Freq.	%	
Age	20-23 years old	17	32.1	36	67.9	53
	24-27 years old	31	52.5	21	35.6	52
	28-31 years old	8	13.6	2	3.4	10
	32-35 years old	3	5.1			3
	M± SD	25.305±3.0357		22.644±2.4478		
Residence	Rural	7	38.9	11	61.1	18
	Sub-rural	32	61.5	20	38.5	52
	Urban	20	41.7	28	58.3	48
Education level	Illiterate	1	16.7	5	83.3	6
	Able to read and write	3	27.3	8	72.7	11
	Primary school graduated	7	50	7	50	14
	Secondary school graduated	24	60	16	40	40

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	Institute and College Graduated	20	46.5	23	53.5	43
	Postgraduates	4	100			4
Occupation	Housewife	35	48.6	37	51.4	72
	Employee (government and private)	24	52.2	22	47.8	46
Family type	Nucleus	33	53.2	29	46.8	62
	Extended	26	46.4	30	53.6	56
Smoking	Yes			2	100	2
	Passive smoker	22	56.4	17	43.6	39
	No	37	48.1	40	51.9	77
Age of Marriage	17-20	7	20.6	27	79.4	34
	21-24	22	47.8	24	52.2	46
	25-28	26	76.5	8	23.5	34
	29-32	4	100			4
	M± SD	24.19± 2.915			21.22± 2.513	
Age of Menarche	10			3	100	3
	11	17	53.1	15	46.9	32
	12	27	57.4	20	42.6	47
	13	10	40	15	60	25
	14	5	45.5	6	54.5	11
	M± SD	12.05 ± .899			12.10 ± 1.062	
Did you receive any antenatal class?	Never			4	100	4
	Once	21	42.9	28	57.1	49
	Incompletely	38	69.1	17	30.9	55
	Complete (8-10)			10	100	10
Did you receive any antenatal class?	No	51	47.2	57	52.8	108
	Yes	8	80	2	20	10
Did you attend any exercise class previous?	No	58	49.6	59	50.4	117
	Yes but, Before pregnancy	1	100			1
	Total	59		59		118

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Table 2 assesses the knowledge of pregnant women regarding exercises during labor among two equally sized groups—study and control. The table classifies knowledge into three levels: low (scores 0–3), moderate (scores 4–7), and high (scores 8–11). In the low knowledge category, there were 95 participants, representing 80.5% of the total sample. This includes 48 individuals from the study group (81.4%) and 47 from the control group (79.7%). The moderate knowledge category included 23 participants, accounting for 19.5% of the total, with 11 from the study group (18.6%) and 12 from the control group (20.3%). Notably, the high knowledge category remains unpopulated; no participants from either group attained scores between 8 and 11, resulting in 0 entries for that classification.

Table 2. Assess the knowledge of the study groups about breathing exercises during labor

Classification	Study group		Control group		Total
	Freq.	%	Freq.	%	
(0-3) low level of knowledge	48	81.4	47	79.7	95
(4-7) Moderate level of knowledge	11	18.6	12	20.3	23
(8-11) High level of knowledge	—	—	—	—	—
Total	59		59		118

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Table 3 shows the comparison in maternal and fetal outcome between the intervention and control groups. In terms of mode of delivery, the majority of both control and study groups underwent a normal vaginal delivery with episiotomy, accounting for 98.3% and 88.1% respectively, resulting in a total of 93.2% across both groups. Notably, the study group had a slightly higher rate of normal vaginal delivery without episiotomy (10.2%) compared to the control group (1.7%), indicating a potential reduction in episiotomy rates among the study group. However, the occurrence of laceration 2nd degree was minimal, with only one case recorded in the study group (1.7%). Regarding stress levels, a significant difference (P = 0.000) was observed between the control and study groups. A substantial 78.0% of the control group experienced high perceived stress, while none of the study group reported high stress levels. Conversely, the study group had a higher representation in the low stress category (66.1%), contrasting with 0% in the control group. This indicates a potentially significant reduction in stress levels among the study group. The length of labor in the second stage also showed a significant difference (P = 0.000). The majority of the control group (89.8%) experienced labor lasting 30-60 minutes, while the study group had a higher percentage of labor lasting less than 30 minutes (59.3%). In assessing the First Minute APGAR Score, there was a statistically significant difference (P = 0.000) between the two groups. Severe asphyxia was more prevalent in the control group (3.4%), whereas the study group recorded no cases of severe asphyxia. Additionally, the study group had a higher percentage of newborns classified as normal (93.2%) compared to the control group (61.0%), indicating potentially improved neonatal outcomes. The Fifth Minute APGAR Score, however, did not show a statistically significant difference (P = 0.362). Both groups had a majority of newborns categorized as normal, with 96.6% in the control group and 100% in the study group, indicating overall stable neonatal outcomes at five minutes. For newborn weight, there were no statistically significant differences (P = 0.703) between the groups. The majority of newborns in both groups were classified as having normal weight (88.1%). The occurrence of macrosomia (6.8%) and low weight (5.1%) was similar across both groups. In terms of newborn admission to intensive care, the rates were low and not significantly different (P = 0.248) between the groups. Only two newborns (3.4%) from the control group required intensive care admission, while none from the study group did, suggesting potentially improved neonatal stability in the study group. Regarding maternal complications, no significant differences were observed (P = 0.500). Only one maternal complication (1.7%) was recorded in

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the control group, with none in the study group, indicating overall minimal maternal complications.

Table 3. The comparison in maternal and fetal outcome between the intervention and control groups

Mode of Delivery	Control Group		Study Group		Total		P-value
	Freq.	%	Freq.	%	Freq.	%	
Mode of Delivery							
Laceration 2nd Degree	0	0.0	1	1.7	1	0.8	0.086
Normal Vaginal Delivery with Episiotomy	58	98.3	52	88.1	110	93.2	
Normal Vaginal Delivery without Episiotomy	1	1.7	6	10.2	7	5.9	
Total	59	100.0	59	100.0	118	100.0	
Stress Level							0.000
High Perceived Stress	46	78.0	0	0.0	46	39.0	
Moderate Stress	13	22.0	20	33.9	33	28.0	
Low Stress	0	0.0	39	66.1	39	33.1	
Total	59	100.0	59	100.0	118	100.0	
Length of Labor (2nd Stage)							0.000
>60 minutes	—	—	—	—	—	—	
30-60 Minutes	53	89.8	24	40.7	77	65.3	
< 30 Minutes	6	10.2	35	59.3	41	34.7	
Total	59	100.0	59	100.0	118	100.0	
First Minute APGAR Score							0.000
Severe Asphyxia	2	3.4	0	0.0	2	1.7	
Mild to Moderate Asphyxia	21	35.6	4	6.8	25	21.2	
Normal	36	61.0	55	93.2	91	77.1	
Total	59	100.0	59	100.0	118	100.0	
Fifth Minute APGAR Score							0.362
Severe Asphyxia	1	1.7	0	0.0	1	0.8	
Mild to Moderate Asphyxia	1	1.7	0	0.0	1	0.8	
Normal	57	96.6	59	100.0	116	98.3	

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Discussion

This study, which was quasi experimental, looked at how Lamaze breathing techniques affected the health of mothers and their babies, as well as how much pregnant women know about exercises for labor. The results indicated that practicing Lamaze breathing had a positive effect on several aspects, such as decreasing stress, shortening the second stage of labor, and increasing APGAR scores.

The results indicate that a significant concern is the lack of awareness among people regarding breathing exercises during labor. Among the participants, 80.5% demonstrated low knowledge of Lamaze breathing techniques, and none achieved a high knowledge score. This data supports the findings of Nagvanshi&Linson (2021), which indicated that only 10% of primi-gravidas women were knowledgeable about Lamaze breathing techniques. Additionally, a result of a study that done in Erbil noted that many primi-gravidas women lacked adequate education and preparation for labor, leading to feelings of anxiety and unpreparedness (4, 7).

Lamaze breathing significantly impacted the stress levels of primi gravidas women. 78.0% of the control group said they felt a lot of stress, while 66.1% of the study group said they felt little stress (P = 0.000). These results are in line with what Nattah& Abbas (2015) found: Lamaze breathing helps people concentrate and relax during contractions. Deep, rhythmic breathing has psychological benefits that help mothers feel more in charge during labor (19). The duration of the second stage of labor was also a significant finding. In the study group, 59.3% of women gave birth in less than 30 minutes, while 89.8% of women in the control group took 30 to 60 minutes (P = 0.000). This result supports what Yuksel et al. (2017) and Upendra (2018) found: Lamaze breathing lowers physical tension, the need for forceful pushing, and makes labor shorter (12, 21).

In the study group, 10.2% of women had a normal vaginal delivery without an episiotomy, while only 1.7% of women in the control group. In addition, only one woman in the study group had a second-degree laceration. Ahmadi et al. (2017) support these results by saying that Lamaze breathing lowers the risk of perineal trauma (15). There was also an immense difference in the first-minute APGAR scores (P = 0.000). In the study group, 93.2% of newborn's APGAR score were normal, while only 61.0% of newborn's APGAR score in the control group were normal. These results support what Arti (2024) and Padmaja et al. (2017) found: mothers who took Lamaze classes had better outcomes for their newborns. The fifth-minute APGAR scores were not significantly different (P = 0.362), but all of the newborns in the study group had normal scores,

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while only 96.6% of the control group (17, 23).

Only 3.4% of newborns in the control group were admitted to the NICU, while none in the study group were, but the difference was not statistically significant (P = .248). This trend support what Ramdan et al. (2022) said: that practicing Lamaze makes the fetus more stable (18). There were no significant differences in birth weight (P = 0.703), but 89.8% of the study group had normal-weight babies, while only 86.4% of the control group did. But depend on Upendra (2018) less stressful labor may improve fetal growth outcomes (21). There weren't many problems with the mothers, and they weren't statistically different (P = 0.500). However, the only case happened in the control group. This result is in line with what Arti (2024) and Anjum (2022) found: women who practice Lamaze have better health and fewer problems during pregnancy and labour (16, 23). In terms of how mothers felt about giving birth, previous studies like Lakshmi et al. (2018) found that 87.1% of Lamaze-trained mothers said they were "managing well" during labor, compared to only 58.3% of mothers who were not trained in Lamaze. The current study supports these results, especially since the stress levels were lower and the labor times were shorter. (20).

Ultimately, this study shows that occupation, how often pregnant women go to antenatal visits, and how often they go to antenatal class are the most important things that help them learn more about Lamaze breathing. These results are in line with what other research has said about the need for comprehensive antenatal education to give women more power during childbirth (22).

Limitation: Currently, maternity teaching hospital treats episiotomy as a routine procedure for primigravida women, so the study had no effect on it.

Conclusion

The findings of this study confirm that Lamaze breathing exercises during labor have a beneficial effect on maternal and neonatal outcomes. Women who practiced breathing techniques experienced significantly reduced stress levels, a shorter second stage of labor, and better first-minute APGAR scores compared to those who did not. Importantly, most participants lacked adequate knowledge of breathing techniques, underscoring the need for improved antenatal education. Given the current overuse of episiotomy and limited childbirth preparation, integrating Lamaze techniques in prenatal programs is essential. Promoting such practices can lead to safer, more positive birth experiences.

Competing interest

The authors declare that they have no competing interests.

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