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THE EFFECT OF ANTENATAL DIAPHRAGMATIC BREATHING EXERCISE IN PREVENTING DECREASED UTERINE CONTRACTIONS IN CAESAREAN SECTION PATIENTS

Euis Tuti Haryani[1]*, Restuning Widiasih[2], Murtiningsih[1], Yayat Suryati[1], Siti Nurbayanti[1]
[1]Universitas Jenderal Achmad Yani, Jl. Terusan Jenderal Sudirman, Cimahi, West Java 40525, Indonesia
[2]Universitas Padjadjaran, Jl. Ir. Soekarno KM. 21, Jatinangor, Sumedang, West Java 45363, Indonesia
*euistuti86@gmail.com

ABSTRACT
The number of sectio caesarea (sc) deliveries has increased, the main side effect of sc is bleeding caused by inadequate contractions. Understanding the risk of atony management is very important starting from antenatal care, various education is given to mothers including doing aerobic exercises including diphragmatic breathing as a prevention of uterine atony. The aim of this study was to see the effect of antenatal diaphgramatic breathing (dbe) exercise on preventing a decrease in uterine contractions in CS patients. This research method used a quasi-experimental posttest nonequivalent design with control group design, the sample in this study were 3rd trimester pregnant women who were at risk of being elective, totaling 56 people by using incidental sampling techniques, using the uterine contraction observation sheet instrument, data analysis used the chi square test. The results of the study showed that there was a significant effect of antenatal dbe implementation on preventing a decrease in intraoperative uterine contractions after the placenta came out. However, there was no effect of antenatal dbe on preventing uterine contractions 1-2 postoperative sc.

Keywords: diaphragmatic breathing exercise; sectio caesarea; uterine contraction

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INTRODUCTION

Maternal Mortality Rate is still the main indicator in assessing the health status of a country (Astuti, 2024; Hapsari & Salim, 2023; Prafitri et al., 2025; Putri et al., 2025; Qurniasih et al., 2024). In Indonesia, maternal mortality is still relatively high, and the majority is caused by obstetric complications, one of which is postpartum hemorrhage (Febriani, 2025; Iqbal et al., 2025; Raihan & Iqbal, 2025). The most common cause of this bleeding is uterine atony, a condition in which the uterus fails to contract properly after delivery. This condition can potentially lead to massive, life-threatening bleeding. Uterine atony is known to occur more frequently in cesarean deliveries (CS) (Syaifulina, 2023), a method of childbirth whose prevalence continues to increase globally and nationally. While CS offers safety in certain cases, it carries the risk of disrupting uterine contractions due to tissue manipulation during the surgical procedure.

As part of a promotive and preventive strategy to reduce the risk of childbirth complications, antenatal care (ANC) services play a crucial role. ANC aims to prepare mothers physically and mentally for the birthing process (Al Hidayah et al., 2025). One non-pharmacological intervention that can be included in an ANC program is diaphragmatic breathing exercise (DBE). DBE is a deep breathing technique that engages the diaphragm and core muscles to improve blood circulation, reduce intra-abdominal pressure, and strengthen the pelvic and uterine muscles (Silaban et al., 2024). Physiologically, this exercise is believed to increase oxygenation to uterine tissue, which is essential for supporting strong and effective postpartum myometrial contractions.

Several previous studies have proven that DBE provides benefits in reducing anxiety (Atika & Purnamasari, 2023), increased self-control during labor (Sihotang et al., 2025), as well as improving

physiological parameters in pregnant women with metabolic disorders such as gestational diabetes (Putri et al., 2024). However, to date, no research has specifically examined the effect of DBE on uterine contraction strength, particularly in patients undergoing CS. Furthermore, uterine contractions during and after CS have not been widely used as a primary variable in breathing-based interventions, even though these contractions are crucial for preventing postpartum hemorrhage. The novelty of this study lies in the focus of the DBE intervention, which was performed antenatally and aimed at influencing uterine contraction strength after CS, an aspect that has not been widely explored in previous research. This study not only looks at DBE as a relaxation or stress management technique but also assesses its potential as a physiological approach to strengthening the myometrium and preventing uterine atony. This study was also conducted in a referral hospital with a high CS rate, making the results relevant to clinical practice in similar healthcare facilities.

This study aimed to analyze the effect of diaphragmatic breathing exercises (DBE) administered antenatally on preventing decreased uterine contractions in mothers undergoing cesarean sections at Muhammadiyah Hospital Bandung. DBE is a form of deep breathing exercise that can optimize diaphragmatic muscle function and increase intra-abdominal pressure and oxygen perfusion to various organs, including the uterus. Increased oxygenation and blood circulation to the uterus are believed to positively influence myometrial contractile activity (Shafinaz, 2023), so that postpartum uterine contractions can occur more optimally. In the context of a cesarean section, where the risk of uterine atony and bleeding is higher due to surgical manipulation and the use of anesthesia (Atikasari & Dewi, 2023; Fitriani & Wulaningsih, 2025; Jubaedah, 2023; Putri, 2025; Wajabula & Susilo, 2025), interventions such as DBE become important to evaluate their clinical effectiveness.

The primary objective of this study is to obtain empirical evidence regarding the extent to which Diaphragmatic Breathing Exercise (DBE) contributes to maintaining or enhancing uterine contraction strength during the intraoperative and early postoperative phases of a caesarean section (CS) procedure. With the expected significant results, this study aims to provide a strong scientific foundation for recommending DBE as part of a structured and integrated antenatal education program within pregnancy care, particularly for pregnant women planning an elective CS. Furthermore, this study is intended to demonstrate that the systematic implementation of DBE can serve as a cost-effective, simple, and safe non-pharmacological preventive intervention to reduce the risk of postpartum hemorrhage complications. In addition, the study seeks to contribute to the development of evidence-based clinical guidelines that incorporate DBE into the standard antenatal care (ANC) services in hospitals and other healthcare facilities.

METHOD

This study uses a quasi-experimental design with a post-test nonequivalent control group design approach (Nadirah et al., 2022; Purwono et al., 2019; Rachman et al., 2024), to analyze the effect of diaphragmatic breathing exercise (DBE) on uterine contraction strength in mothers who delivered after a cesarean section (CS). The intervention group was given DBE exercises routinely twice daily during the third trimester of pregnancy, for 1–4 weeks before the CS operation. Meanwhile, the control group only received routine antenatal care without additional intervention. Observations were made at two crucial moments: intraoperatively after placental delivery and 1–2 hours postoperatively. This method was chosen to obtain a strong empirical picture regarding the effectiveness of DBE in maintaining uterine contractions after a CS.

The independent variable in this study was the implementation of DBE, while the dependent variable was the strength of uterine contractions, which were classified as weak, moderate, and strong. The study population included all pregnant women who underwent CS at Muhammadiyah Hospital Bandung, with a population of 218 people in the past year. The sample was determined using incidental sampling and calculations using a sample size calculator application, resulting in 56

respondents, consisting of 28 people in the intervention group and 28 people in the control group by using incidental sampling techniques (Subhaktiyasa, 2024). Inclusion criteria included pregnant women in their third trimester with a risk of elective CS and willing to participate in DBE training, while exclusion criteria included unstable medical conditions such as severe preeclampsia, uncontrolled type 1 diabetes, and thyroid disorders. Data collection was conducted using a DBE implementation checklist and a uterine contraction strength observation sheet completed by nurses and researchers, both during surgery and the recovery period. Data analysis was performed using the Chi-Square test on a 2x2 cross-table to examine the relationship between DBE implementation and uterine contraction strength, with a significance level of 0.05. The results showed a significant effect (p = 0.007) between DBE and uterine contractions. This study was also conducted in accordance with research ethics principles with ethical approval from the FITKes Unjani ethics committee no 014/FITKes-UNJANI/V/2022 and informed consent from each respondent. Ethics such as data confidentiality, fairness in the treatment of respondents, and respect for the right to participate fullybe considered during the research process.

RESULT

Researchers examined the characteristics of respondents based on age, number of pregnancies, number of CS deliveries, delivery history, type of anesthesia, BMI (Body Mass Index) in the control and intervention groups, the characteristics of the research sample are presented in the following table.

Table 1.
Respondent Characteristics

Characteristics	Group					
	Intervention		Control		Total	
	f	%	f	%	f	%
Age						
20-35 years	19	43.2	25	56.8	44	100
>35 years	9	32.1	3	10.7	12	100
Pregnancy to						
1	5	38.5	8	61.5	13	100
2	7	31.8	15	68.2	22	100
3	15	88.2	2	11.8	17	100
4	0	0	2	100	2	100
>5	1	50	1	50	2	100
CS delivery to						
1	9	42.9	12	57.1	21	100
2	10	47.6	11	52.4	21	100
3	9	64.3	5	35.7	14	100
Regularity of Pregnancy Control						
Regular	28	100	28	100	56	100
Irregular	0	0	0	0	0	100
Childbirth History						
Preeclampsia	0	0	0	0	0	0
Big baby/Twins	0	0	3	100	3	100
Placenta Previa	0	0	0	0	0	0
Bleeding	1	50	1	50	2	100
Labor Induction	0	0	0	0	0	0
No complaints	27	52.9	24	47.1	51	100
Types of Anesthesia						
General/General narcosis	0	0	0	0	0	0
Spinal	28	50	28	50	56	100
Epidural	0	0	0	0	0	0
BMI						
<18	0	0	0	0	0	0
18-18.5	4	100	0	0	4	100
18.5-25	19	65.5	10	34.5	29	100
25-27	4	36.4	7	63.6	11	100
>27	1	8.3	11	91.7	12	100

Based on Based on age, respondents in the intervention group aged 20–35 years totaled 19 people (43.2%), while the control group had 25 people (56.8%). Respondents aged over 35 years were more common in the intervention group (75%) than in the control group (25%). In terms of parity, first pregnancies were more frequent in the control group (61.5%) than in the intervention group (38.5%), second pregnancies were also dominant in the control group (68.2%), and third pregnancies were almost entirely found in the control group (88.2%). Fourth pregnancies occurred only in the control group, while parity greater than five was equally distributed between the two groups (50% each). In terms of caesarean section (CS) history, first-time CS deliveries were more frequent in the control group (65.4%) than in the intervention group (34.6%), while second-time CS deliveries were relatively balanced. Third-time CS deliveries occurred only in the intervention group (100%). All respondents in both groups attended regular antenatal care (100%). Regarding delivery history, preeclampsia and placenta previa were not found in either group, large babies were found only in the control group (100%), bleeding occurred in both groups but was more frequent in the control group, and no history of labor induction was found in either group. All respondents in both groups underwent spinal anesthesia (100%). Based on body mass index (BMI), the intervention group was dominated by a BMI of 18.5–25 (65%), while the control group was dominated by a BMI >27 (91.7%). A BMI of 17–18.5 was found only in the intervention group, a BMI of 25–27 was more common in the control group (63.6%), and a BMI <17 was found in both groups.

Researchers examined the effect of antenatal Diaphragmatic Breathing Exercise (DBE) on preventingdeclineuterine contractions during intra-operative post-placental delivery in patients who underwent CS surgery in the intervention group, while in the control group no intervention was performed, are presented in the table below.

Table 2.
Distribution of Implementation RespondentsAntenatal Diaphragmatic Breathing Exercise (DBE) to Prevent Decreased Uterine Contractions During Intra-Operative Post-Placental Removal

Implementation of DBE	Intraoperative Uterine Contractions						OR (95% CI)	P value
	Not strong		Strong		Total			
	n	%	n	%	n	%		
Control	20	71.4	8	28.6	28	100	2,222	0.007
Intervention	9	32.1	19	67.9	28	100	95%CI: 1.236-3.997)	

Based on the results of the analysis showed that 67.9% of mothers in the intervention group who performed antenatal DBE had strong uterine contractions, compared to 28.6% in the control group. Statistical testing yielded a p-value of 0.007 (<0.05), indicating a significant difference between the groups. The OR value of 2.222 means that mothers who performed antenatal DBE were twice as likely to maintain strong uterine contractions during intraoperative post-placental delivery compared to those who did not. Thus, the null hypothesis was rejected, confirming a significant effect of antenatal DBE in preventing a decline in uterine contractions during caesarean section delivery.

Table 3.
Distribution of Respondents of Antenatal Diaphragmatic Breathing Exercise (DBE) Implementation to Prevent Decreased Uterine Contractions in the 1-2 Hours Postoperative Period

Implementation of DBE	Postoperative Uterine Contractions						OR (95% CI)	P value
	Not strong		Strong		Total			
	N	%	n	%	n	%		
Control	2	7.1	26	92.9	28	100	0.667	1,000
Intervention	3	10.7	25	89.3	28	100	95%CI: 1.236-3.997)	

Based on the results of the analysis of the effect of antenatal DBE implementation on uterine contractions 1-2 hours postoperatively, there were 25 people (89.3%) mothers in the antenatal DBE intervention group who had strong uterine contractions, while in the control group there were 25

people (89.3%) who had strong uterine contractions. The results of the statistical test obtained a p value = 1,000 > α 0.05, so it can be concluded that there is no significant effect between the implementation of antenatal DBE and strong uterine contractions in the 1-2 hours postoperative CS. Then from the results of the analysis obtained OR = 0.667 meaning OR is not significant. The results of the Ha hypothesis research are rejected, Ho is accepted meaning there is no difference in uterine contractions in the intervention group given diaphragmatic breathing exercise with the control group who were not given treatment during delivery with CS.

DISCUSSION

The results of this study indicate that antenatal diaphragmatic breathing exercises (DBE) significantly impact the strength of uterine contractions during the intraoperative phase after placental delivery. Pregnant women who regularly performed DBE exercises showed a higher proportion of strong uterine contractions compared to the group that did not perform the exercises (Febrianty, 2023). These findings confirm that DBE has direct physiological benefits on uterine muscles, particularly when the uterus is required to contract to prevent post-cesarean bleeding. Physiologically, DBE involves diaphragmatic and core muscle activity, which increases intra-abdominal pressure and blood circulation to pelvic organs, including the uterus. This positive pressure is believed to increase oxygen and nutrient flow to uterine tissue, strengthen myometrial muscle tone, and prepare the uterus for efficient contractions during labor. Therefore, consistent DBE implementation can improve uterine readiness for the CS process (Darmayanti, 2021), which generally suppress or weaken contractile activity.

One of the main causes of postpartum hemorrhage in CS patients is uterine atony (Mujiatun, 2022; Ramadanti et al., 2023; Salsabil et al., 2024; Sarim, 2020; Vastra et al., 2023). With increased strength of uterine contractions in the DBE intervention group, these results confirm that DBE can be an effective non-pharmacological preventive intervention for uterine atony. This exercise indirectly supports postoperative hemostasis, thereby reducing the risk of bleeding that leads to serious complications such as blood transfusion, hysterectomy, and even maternal death. Deep breathing exercises such as DBE have been shown to improve physiological parameters in pregnant women, such as fetal heart rate (Resmaniasih, 2014), maternal blood pressure (Yuliana, 2018), and oxygen saturation levels (Sadhana & Yulistiarini, 2025). However, few have directly studied its impact on uterine contractions, particularly in CS patients. Therefore, this study provides new, more specific and applicable evidence in the context of midwifery and maternity nursing practice.

Interestingly, although DBE showed significant results in the intraoperative phase, the study results did not show a significant effect on uterine contraction strength 1–2 hours after surgery. This suggests that the effects of DBE are short-term or may be offset by other factors in the postoperative phase (Widyastuti, 2024). This opens up discussion about the continued effectiveness of DBE and the need for a combination of other postoperative interventions to maintain positive outcomes. Several possible explanations exist for why DBE no longer shows a significant effect in the early postoperative phase. The use of spinal anesthesia, analgesic administration, and postoperative immobilization may inhibit the autonomic nervous system and uterine contractility (Andriyani, 2020; Handayani et al., 2022; Prasasti, 2024). In addition, the uterine response to mechanical stimulation during CS may experience decreased sensitivity (Hendarto, 2015), so that the effects of the breathing exercises performed previously do not continue after the operation is completed.

Less significant results in the postoperative phase may also be due to limitations in the method of measuring uterine contractions (Kristina et al., 2021; Listiyanawati & Noriyanto, 2018; Pragholapati, 2020; Sari et al., 2021; Wulaningsih, 2025). In this study, uterine contractions were measured manually through palpation, which tends to be subjective and highly dependent on the observer's experience. Therefore, the use of more objective tools such as a tone meter or Doppler

ultrasonography may provide more accurate results in future studies. These findings have significant clinical implications. DBE can be recommended as part of antenatal education, especially for pregnant women planning a CS. This intervention is relatively inexpensive, easy to perform, and has no side effects. With proper training by health workers, DBE can be a tool to improve the quality of ANC and support a safer delivery process for mothers.

Given the significant results in the intraoperative phase but not in the postoperative phase, further research is recommended to explore the optimal duration of DBE exercises, the frequency of DBE implementation, and the combination of supportive interventions such as early mobilization and active postoperative care. Furthermore, extending the postoperative observation period to 6–12 hours may provide a more comprehensive picture of the medium-term effects of DBE exercises on uterine contractions. Overall, this study provides novel contributions to midwifery and maternity nursing practice, particularly in the area of non-pharmacological interventions in preparation for operative delivery. DBE has been scientifically proven to strengthen uterine contractions during the critical intraoperative phase, and therefore can be considered part of evidence-based ANC standards. Thus, DBE is not only a relaxation aid (Handayani, 2021; Putri et al., 2023; Sartika et al., 2018), but also has real physiological benefits that can contribute to reducing the number of postpartum complications due to uterine atony.

CONCLUSION

Based on the research results, it can be concluded that diaphragmatic breathing exercises (DBE) performed routinely during the third trimester of pregnancy have a significant effect on the strength of uterine contractions in mothers undergoing cesarean section (CS), especially in the intraoperative phase after placental delivery. This exercise has been shown to support myometrial contractile activity by increasing intra-abdominal pressure and oxygen perfusion to uterine tissue, thereby helping the uterine involution process more effectively during the critical postpartum period. Thus, DBE has the potential to be a non-pharmacological intervention that can be utilized in antenatal care (ANC) programs to prevent serious complications such as uterine atony and postpartum hemorrhage. The results also showed that the effect of DBE was not significant on the strength of uterine contractions in the early postoperative phase (1–2 hours after CS). This may be due to several factors, such as the residual effects of anesthesia, the use of analgesics, and the lack of postoperative stimulation that affect uterine activity. In addition, the method of measuring contraction strength, which is still manual and subjective, is also a limitation that can affect the validity of the data.

Although DBE shows positive results in the intraoperative phase, its medium- and long-term effectiveness still requires further comprehensive research. Therefore, for future research, the use of more objective and quantitative instruments to measure uterine contraction strength, such as a tone meter or Doppler ultrasonography, is recommended. Research should also extend the observation period of uterine contractions to several hours or days after surgery to evaluate the sustained effectiveness of DBE exercises. Furthermore, it is important to examine the combination of DBE and postoperative interventions such as early mobilization, oxytocin massage, or other relaxation techniques to strengthen the positive impact on uterine recovery. Experimental studies with strict controls and a wider population diversity are also expected to strengthen the scientific evidence and support the integration of DBE into evidence-based antenatal care policies.

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