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Original Research

Association between breast care knowledge and smooth breast milk production in post-caesarean mothers

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ABSTRACT

Background: Sectio caesarean (SC) is increasingly common, with significant challenges for breastfeeding due to factors like postoperative pain and mobility limitations. Proper breast care can support milk production, yet many mothers lack adequate knowledge about its importance and techniques. Understanding the relationship between breast care knowledge and breastfeeding outcomes in post-SC mothers is critical to improving maternal and child health.
Objective: This study aimed to examine the relationship between breast care knowledge and smooth breast milk production among post-SC mothers.
Method: A cross-sectional study was conducted among 30 post-SC mothers at Ibunda Mother and Child Hospitals, Tanah Laut, from September to November 2023. Participants were selected through accidental sampling. Data on breast care knowledge and milk production were collected using validated instruments and analyzed using chi-square tests.
Results: Most respondents had sufficient breast care knowledge (73%), and 90% reported smooth breast milk production. However, no significant association was found between breast care knowledge and milk production ($p = 0.78$). This indicates that while knowledge is vital, other factors such as psychological and physiological conditions also play a role.
Conclusion: Although most participants demonstrated good knowledge and milk production, this study highlights that breastfeeding success is multifactorial, requiring holistic approaches that address physical, psychological, and social dimensions. Integrating education with practical support could enhance breastfeeding outcomes.

1. Introduction

Sectio caesarean (SC) is an increasingly common surgical procedure in childbirth. The SC rate increased significantly from 4.0% in 1998 to 18.5% in 2017, with an annual growth rate

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of 10% between 2007 and 2017. Urban areas had a higher SC rate (22.9%) than rural areas (11.8%), and the richest quintile had a significantly higher SC rate (36.5%) than the poorest (12.9%). Yulianti et al. (2024) concluded that SC data from the 2018 Basic Health Research in Indonesia reached 17.6%. In Indonesia, inequalities in access are evident from the positive correlation between education, wealth, and caesarean section, as well as regional disparities that show higher rates in Western countries than in Eastern Indonesia (Islam et al., 2022; Wyatt et al., 2021; Zahroh et al., 2020). This increase poses various challenges, including postoperative care and breastfeeding initiation.

A crucial aspect of post-SC care is breast care. Effective breast care helps prevent conditions such as engorgement and swelling, which can cause pain and inhibit breastfeeding; it also plays a vital role in supporting breast milk production and ensuring that mothers can provide adequate nutrition for their babies (Agustina et al., 2024; Hindriyawati et al., 2024). Breast milk is the best source of nutrition for infants, providing a range of short- and long-term health benefits. Breast milk provides a complete source of proteins, fats, carbohydrates and vitamins essential for the first six months of life and contains bioactive factors that modulate the infant's microbiome and immune system, reducing the risk of infections and chronic diseases (Maciel et al., 2024; Masi & Stewart, 2024). However, mothers undergoing SC often face challenges in initiating and maintaining optimal milk production.

Research shows that post-SC mothers tend to experience delays in breastfeeding initiation and face more difficulties in breastfeeding than vaginally delivered mothers, with a prevalence ranging from 37.6% to 70%. This can be due to various factors, including postoperative pain, effects of anesthesia, and mobility limitations. In addition, a lack of knowledge and support for proper breast care can exacerbate this situation (Anita et al., 2022; Berra, 2024; Kusasira et al., 2023; Ogah & Kapasa, 2023).

Knowledge of breast care is an important component of supporting successful breastfeeding. Ninety% of women with good knowledge of early breastfeeding initiation successfully implemented the program, suggesting a strong association between knowledge and practice (Nurlaily Z et al., 2023). Knowledge of breast care has a significant impact on breastfeeding success, with one study showing a p-value of 0.006, suggesting a strong association between breast care knowledge and breastfeeding success (Louise et al., 2023). However, many mothers still lack understanding of the importance of breast care and the

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correct techniques to perform it, especially in the post-SC context. Techniques such as breast massage, warm compresses, and arm exercises can help increase blood flow to the breasts, which in turn can increase milk production (Anshari, 2023; Herlina & Wardani, 2024; Hutabarat et al., 2022; Yulianti et al., 2024).

The implementation of effective breast care is hampered by several factors. Maternal health issues, such as illness, hormonal disruptions, and the effects of medications, not only hinder breastfeeding ability, but can also affect breast care, such as the risk of mastitis or suboptimal milk production (Meira et al., 2008; Wagner et al., 2020). Work pressure and cultural myths about milk quality can make mothers less focused on breast care, thus worsening the physical conditions necessary for breastfeeding (Vandenplas & Basrowi, 2023). Lack of support from the family and community makes mothers feel isolated and without guidance on breast care during breastfeeding (Kamal et al., 2022; Nathalia et al., 2024). In addition, poor knowledge of proper breast care techniques worsens confidence and hinders successful breastfeeding (Vandenplas & Basrowi, 2023). This finding highlights the importance of comprehensive education and support for post-SC mothers.

Educational interventions have been shown to be effective in improving breast care knowledge and practices (Hidayah & Fariana, 2024). A randomized controlled trial showed that mothers who received structured education were more likely to believe that their milk was sufficient and breastfeed exclusively, leading to better milk intake for their infants (Sağlık & Karaçam, 2022). An increase in understanding between the pre-test and post-test was also shown in pregnant women who underwent counseling on breastfeeding techniques(Fatmawati et al., 2024). However, further research is needed to optimize educational strategies, especially in the context of post-SC care. This includes not only technical knowledge about breast care but also communication and counseling skills. Innovations in education and support methods should also be explored. However, gaps remain in the implementation of this policy at various health facilities in Indonesia.

Based on this background, the relationship between breast care knowledge of post-SC mothers and breast milk production is a critical area for further research. A deeper understanding of this relationship may assist in the development of more effective interventions to support successful breastfeeding post SC. This study aimed to explore this relationship, with the hope of making a significant contribution to improving maternal care

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practices and breastfeeding outcomes for post-SC mothers in Indonesia.

2. Method

Research design

This study employed a quantitative research design using a cross-sectional approach. This design was chosen because it allows simultaneous data collection from a population of respondents at a certain point in time, making it easier to analyze the relationship between the variables studied.

Respondent

The population in this study were post-section cesarean postpartum mothers treated at Ibunda Mother and Child Hospitals, Tanah Laut, from September to November 2023, with a total population of 52 people. Researchers used a non-probability sampling technique of accidental sampling type, where samples were selected based on chance, namely mothers who happened to meet the criteria as research subjects. The inclusion criteria were post-section cesarean delivery postpartum women who were admitted to the hospital, were on the second post-section day, had complete data, and were treated during the study period. The exclusion criteria were postpartum women who were not willing to be respondents and those who gave birth with indications of spontaneous partus. Based on these criteria, the sample used in this study was 30 respondents, in accordance with the minimum sample size suggested by (Nursalam, 2017), to ensure the validity and generalizability of the study results.

Data collection

Data collection in this study was carried out using the Guttman scale checklist to assess maternal knowledge about breast care and smooth milk production. The assessment of the mothers' knowledge of breast care was categorized into three categories based on the percentage score obtained: good (76-100%), fair (56-75%), and poor (<56%). Meanwhile, the fluency of breast milk production was categorized as fluent if the mother gave five or more positive answers and not fluent if the number of positive answers was less than five. The data collection instruments were tested for validity using the Pearson product-moment test and for reliability using Cronbach's Alpha Test, which showed that the instruments used in this study could be trusted to produce consistent and valid data.

Data Analysis

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Data analysis was carried out using descriptive analysis to describe the characteristics of respondents and the distribution of the variables studied, such as the level of knowledge of breast care and smooth milk production. A descriptive analysis was conducted to provide an overview of the frequency, percentage, and category of data obtained from the questionnaires and interviews. To analyze the relationship between breast care knowledge and smooth breast milk production, a chi-square test was used. The Chi-Square test was used to test whether there was a significant relationship between the two categorical variables, both mothers' knowledge of breast care and fluency of breast milk production. The results of the chi-square test will show whether there is a significant association between the level of breast care knowledge and fluency of breast milk production in post-section cesarean mothers. All analyses were performed using the SPSS 26 software with a significance level of $p<0.05$.

Ethical consideration

This study was approved by the Research Ethics Commission of Sari Mulia University (permit number: 131/KEP-UNISM/II/2024). In addition, permission for data collection was granted by Ibunda Mother and Kids Hospitals, Tanah Laut (No. 04.02/II/RSIA IBUNDA/2024). All research procedures were conducted in accordance with the applicable research ethics guidelines, and the research participants were given explanations regarding the objectives, procedures, and their rights, including the right to withdraw from the study at any time, without consequences. The data obtained were kept confidential and were used only for the purposes of this study.

3. Results

Respondent characteristics

Table 1 descript the characteristics of respondents, showing that the majority are over 25 years old (66%), unemployed (80%), and have completed senior high school (36%). Smaller proportions fall within the younger age groups, are employed (20%), or have other education levels, such as junior high school (30%), elementary school (17%), and college (17%). This data reflects a predominantly older, unemployed, and moderately educated population.

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Table 1. Characteristics of respondents

Characteristics	Frequency (respondent)	Percentage (%)
Ages (year)		
<20	2	7
20-25	8	27
>25	20	66
Occupations		
Unemployed	24	80
Employed	6	20
Education levels		
Elementary school	5	17
Junior High School	9	30
Senior High School	11	36
Colleges	5	17

Distribution of breast care knowledge and smooth breast milk

Table 2 presents the frequency distribution of respondents' breast care knowledge and the smoothness of their breast milk flow. Regarding breast care knowledge, 73% (22 respondents) have sufficient knowledge, while 27% (8 respondents) possess good knowledge, with no respondents falling into the poor category. For the smoothness of breast milk, the majority (90%, or 27 respondents) reported smooth breast milk flow, while only 10% (3 respondents) experienced issues. This data highlights a predominantly sufficient level of knowledge and favorable breast milk flow among respondents.

Table 2. Frequency distribution based on breast care knowledge and smooth breast milk

Categories	Frequency (respondent)	Percentage (%)
Breast care knowledge		
Good	8	27
Sufficient	22	73
Poor	0	0
Smooth Brest Milk		
Smooth	27	90
Not	3	10

Association between breast care knowledge and smooth breast milk

Table 3 displays the association between respondents' breast care knowledge and the smoothness of breast milk flow. Among those with good knowledge, 23% (7 respondents) had smooth breast milk flow, while only 3% (1 respondent) did not. For respondents with sufficient knowledge, 67% (20 respondents) experienced smooth breast milk flow, and 7% (2

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respondents) did not. No respondents were categorized as having poor knowledge. The Chi-square test yielded a p-value of 0.78, indicating no statistically significant association between breast care knowledge and smooth breast milk flow.

Table 3. Assosiation between breast care knowledge and smooth breast milk

Knowledge	Smooth Breast Milk				Total		p-value*
	Smooth		Not Smooth		n	%	
	n	%	n	%			
Good	7	23	1	3.3	8	27	
Sufficient	20	67	2	6.7	22	73	0.78
Poor	0	0	0	0	0	0	
Total	27	90	3	10	30	100	

Notes: n are respondents; * is Chi-square test.

4. Discussions

Breast care knowledge forms a critical component of maternal readiness for breastfeeding. Proper breast care practices, including cleaning the nipples, massaging the breast, and understanding lactation physiology, help maintain maternal breast health and prevent complications such as engorgement and mastitis (Dewi & Susmita, 2022; Galaupa et al., 2022; Mitchell & Johnson, 2022). Such practices also enhance milk production and flow by stimulating the milk ejection reflex mediated by oxytocin (Rahayuningsih et al., 2016; Wahyuningsih et al., 2023).

While 73% of respondents demonstrated sufficient knowledge, it is noteworthy that knowledge alone does not guarantee optimal breastfeeding outcomes. This aligns with studies indicating that breastfeeding is influenced by a combination of factors, including maternal confidence, physical health, and external support systems (Agalianou et al., 2024; Asimaki et al., 2022; Putri et al., 2023). The absence of respondents in the poor knowledge category suggests that educational interventions or health promotion efforts may already be positively impacting this population.

Smooth breast milk flow, experienced by 90% of respondents, is crucial for sustaining breastfeeding. Milk flow depends on the let-down reflex, which is regulated by oxytocin and influenced by both physiological and psychological factors. Stress, fatigue, and anxiety are well-documented inhibitors of the let-down reflex, irrespective of a mother's knowledge level (Ahmad, 2021; Dewi & Susmita, 2022; Frey et al., 2018). Furthermore, adequate nutrition and hydration are essential for milk production, emphasizing the need for comprehensive

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maternal support during the postpartum period.

The study's findings highlight that while a majority of respondents with good or sufficient knowledge reported smooth milk flow, a small subset (10%) experienced difficulties. This discrepancy may be attributed to factors such as hormonal imbalances, anatomical variations, or environmental stressors, which were not assessed in this study. Research suggests that breastfeeding challenges are often multifaceted, requiring tailored interventions that address both individual and systemic barriers (Brown et al., 2016).

The p-value of 0.78 suggests no statistically significant association between breast care knowledge and smooth breast milk flow. This aligns with the understanding that knowledge is just one of many determinants of breastfeeding success. A systematic review by Victora et al. (2016) identified social support, access to healthcare, and cultural practices as critical factors influencing breastfeeding outcomes. For instance, even mothers with extensive knowledge may struggle with milk flow if they lack family or workplace support.

This finding also raises questions about the quality and application of breast care knowledge. While the respondents may possess theoretical knowledge, its practical application could be limited by factors such as inadequate guidance from healthcare providers or insufficient hands-on training. The integration of practical breastfeeding skills into antenatal and postnatal care programs has been shown to enhance maternal confidence and breastfeeding success rates (World Health Organization & United Nations Children's Fund (UNICEF), 2018).

Implications for breastfeeding interventions

The study underscores the need for multifaceted breastfeeding interventions that go beyond knowledge dissemination. Educational programs should be complemented by practical support, such as one-on-one lactation counseling, peer support groups, and access to breastfeeding-friendly environments. As stated by Hidayah & Fariana (2024), education and training can improve breastfeeding knowledge and skills, and ultimately improve family health. Understanding the mother's breastfeeding technique is crucial for ensuring the effectiveness of breastfeeding (Fatmawati et al., 2024). Community-based interventions have proven effective in bridging the gap between knowledge and practice, particularly in resource-limited settings (Rollins et al., 2016).

Healthcare providers play a pivotal role in supporting breastfeeding mothers. Routine

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assessments of breastfeeding practices during postnatal visits can help identify and address challenges early. Additionally, creating a supportive policy environment, including paid maternity leave and breastfeeding facilities in workplaces, is essential for sustaining breastfeeding practices (United Nations Children's Fund (UNICEF), 2018).

Directions for future research

Future research should adopt a more comprehensive approach, examining the interplay of knowledge, psychological factors, and systemic support on breastfeeding outcomes. Longitudinal studies could provide deeper insights into how maternal knowledge and practices evolve over time and influence breastfeeding success. Furthermore, incorporating qualitative methods, such as interviews or focus groups, could help explore mothers' lived experiences and identify context-specific barriers and enablers.

5. Conclusion

The majority of participants had sufficient breast care knowledge (73%) and reported smooth breast milk flow (90%). However, no statistically significant association was found between the two variables ($p = 0.78$). These findings underscore the importance of understanding breastfeeding as a multifactorial process. Breast care knowledge is an important factor in breastfeeding, it is not the sole determinant of smooth breast milk flow. Effective breastfeeding promotion requires a holistic approach that addresses the physiological, psychological, and social dimensions of lactation. By integrating knowledge-based education with practical and systemic support, healthcare systems can better empower mothers to achieve their breastfeeding goals.

6. Conflict of interest

All authors declare no conflict of interest.

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