



Awareness of Exclusive Breast Feeding and its Association with Maternal and Infant Characteristics

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**ABSTRACT**

Background: Exclusive breastfeeding (EBF) provides optimal nutrition during the first six months of life and is important for infant growth, development, and health. This study assessed awareness and practice of EBF and examined their relationship with maternal and infant characteristics.

Methodology: A hospital-based cross-sectional study with retrospective assessment of breastfeeding history was conducted at the Pediatric Department of Al-Shifa Trust Eye Hospital, Rawalpindi, from November 2024 to June 2025. A total of 953 breastfeeding mothers were recruited through non-probability judgmental sampling. Data were collected using a structured questionnaire covering maternal and infant demographics, EBF awareness and practice, colostrum practices, breastfeeding-related knowledge, antenatal care, maternal health, and infant characteristics. Data were analyzed using SPSS version 26 with descriptive statistics and binary logistic regression.

Results: Among 953 mothers, 29.2% had secondary education, 13.7% were illiterate, 94.9% belonged to the middle economic category, and 64.4% lived in rural areas. The mean maternal age was 27.61 ± 4.69 years and mean infant age was 7.50 ± 1.40 months. EBF for the first six months was reported by 75.1% of mothers, while 89.1% were aware of EBF. Colostrum was discarded by 32.7%. Breastfeeding difficulties included perceived insufficient milk supply (37.8%), pain during breastfeeding (25.6%), and difficulty initiating breastfeeding (24.8%). In logistic regression, awareness regarding EBF (OR = 55.878, $p < 0.001$), awareness of diet during breastfeeding (OR = 4.678, $p < 0.001$), and knowledge of the breastfeeding procedure (OR = 2.374, $p = 0.001$) were positively associated with EBF practice. Overall classification accuracy was 85.8%.

Conclusion: EBF practice and awareness were high in the study population; however, colostrum discarding and breastfeeding difficulties remained common. Awareness of EBF, diet during breastfeeding, and correct breastfeeding procedures were significantly associated with EBF practice, supporting continued maternal breastfeeding education and counselling.

Keywords	Colostrum, Exclusive Breastfeeding, Infant Health, Maternal Health, Breastfeeding Awareness.
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Fatema A et al. Short Title	Exclusive Breastfeeding and Maternal Factors



INTRODUCTION

Exclusive breastfeeding (EBF) means feeding an infant only breast milk, without additional food or drink, including water, except oral rehydration solution or drops/syrups of vitamins, minerals, or medicines when required. The World Health Organization (WHO) recommends initiation of breastfeeding within the first hour after birth, exclusive breastfeeding for the first six months, introduction of safe complementary foods at six months, and continued breastfeeding up to two years of age or beyond (1,18). Global breastfeeding indicators have improved, but EBF coverage remains below international targets in many settings (2). Breastfeeding is associated with important nutritional and health benefits for infants and mothers, and early initiation and sustained EBF remain central components of infant nutrition strategies (1,3). Breastfeeding practice is influenced by maternal knowledge, confidence, support, health-care contact, employment, and perceived milk supply. Educational and virtual interventions can improve breastfeeding self-efficacy and planned breastfeeding behaviours (4), while maternal and infant circumstances can influence breastfeeding cessation and breast-milk expression (5). Studies from Pakistan and other low- and middle-income settings have identified maternal education, antenatal care, delivery-related factors, occupation, social support, and breastfeeding knowledge as important correlates of EBF (6,10–12,16,17). Self-efficacy and perception of milk sufficiency are also closely related to breastfeeding continuation (7,9), and early initiation may support EBF among working mothers (8).

A persistent challenge is the gap between awareness and actual breastfeeding practice. Studies have shown that mothers may report favourable knowledge or attitudes while still introducing other feeds before six months (13,14). In Pakistan, sociocultural beliefs, perceived insufficient milk, maternal workload, family influence, and limited knowledge of correct breastfeeding technique have been reported as barriers to EBF (12). Breastfeeding duration and exclusivity may also contribute to child developmental outcomes, although these relationships are influenced by several maternal and socioeconomic factors (15). Maternal age, education, parity, socioeconomic circumstances, antenatal support, mode of delivery, and early breastfeeding experiences can therefore interact with knowledge and attitudes to shape EBF practice (16,17). Understanding these factors in local clinical populations is important for strengthening counselling and maternal support strategies.

Accordingly, this study aimed to assess awareness, knowledge, and practice of exclusive breastfeeding among mothers attending a pediatric department in Rawalpindi, describe relevant maternal and infant characteristics, determine the frequency of EBF, and evaluate knowledge- and practice-related factors associated with EBF. The study hypothesis was that mothers with greater breastfeeding awareness and knowledge would be more likely to report EBF during the first six months of their infants' lives.

METHODOLOGY

A hospital-based cross-sectional study with retrospective assessment of breastfeeding history was conducted from November 2024 to June 2025 at the Pediatric Department of Al-Shifa Trust Eye Hospital, Rawalpindi. Ethical approval was obtained from the Ethical Review Board of Al-Shifa School of Public Health (Ref. No. 7-03/IERC-ASOPH/2025). The sample size was calculated using the formula $n = Z^2 \times P \times (1 - P) / d^2$, resulting in 953 participants at a 95% confidence level. A non-probability judgmental sampling technique was used, and the study population comprised breastfeeding mothers. A pilot study of 300 participants was conducted to validate the questionnaire. EBF was defined according to WHO criteria as feeding the infant only breast milk for the first six months, with the exception of prescribed medicines and vitamin/mineral supplements (1). Data were collected using a self-developed online questionnaire administered through Google Forms. Content validity was assessed using the Content Validity Index (CVI). The questionnaire included sociodemographic characteristics, maternal clinical information, infant characteristics, EBF awareness and practice, colostrum practices, diet-related awareness, breastfeeding procedure knowledge, breastfeeding difficulties, antenatal care, and selected maternal health factors. Informed consent was obtained from all participants, and confidentiality was maintained in accordance with the Declaration of Helsinki.

Mothers of infants with full-term gestational age (37–42 weeks), birth weight between 2.5 and 3.7 kg, and infant age of 6–11 months were included. Infants with congenital anomalies or sucking abnormalities were excluded. Reported EBF practice during the first six months (yes/no) was treated as the primary outcome for the logistic regression model. Awareness regarding EBF, colostrum practice, knowledge of EBF benefits, awareness of diet during breastfeeding, knowledge of the breastfeeding procedure, and knowledge of breast massage were evaluated as explanatory variables in the reported model. Data were analyzed using SPSS version 26. Categorical variables were summarized as frequencies and percentages, while maternal age, infant age, and infant birth weight were summarized as mean $\pm$ standard deviation, standard error, and range. Binary logistic regression was used to assess factors associated with EBF practice. Regression coefficients (B), odds ratios [Exp(B)], and p-values were reported, with statistical significance set at $p < 0.05$. Model performance was summarized using overall and group-specific classification accuracy. Reporting was guided by the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) recommendations for cross-sectional studies. This study was approved by the Ethical Review Board of Al-Shifa School of Public Health, Rawalpindi, Pakistan (Ref. No. 7-03/IERC-ASOPH/2025).

RESULTS

Table 1: Demographic and Clinical Profile of Breastfeeding Mothers

Characteristic / Category		Frequency (%)
Education	Illiterate	131 (13.7)





Characteristic / Category		Frequency (%)
	Primary	190 (19.9)
	Secondary	278 (29.2)
	Higher Secondary	187 (19.6)
	Bachelor	109 (11.4)
	M.Phil.	55 (5.8)
	PhD	3 (0.3)
Economic status	Low	31 (3.3)
	Middle	904 (94.9)
	High	18 (1.9)
Residency	Rural	614 (64.4)
	Urban	339 (35.6)
Parity	Primiparous	462 (48.5)
	Multiparous	491 (51.5)
Mode of delivery	Cesarean section	470 (49.3)
	Normal vaginal delivery	483 (50.7)
Body mass index	Underweight	31 (3.3)
	Normal	868 (91.1)
	Overweight	48 (5.0)
	Obese	6 (0.6)

Table 1 shows that secondary education was the most common educational level (29.2%), while 13.7% of participants were illiterate. Most mothers belonged to the middle economic category (94.9%) and lived in rural areas (64.4%). Primiparous and multiparous mothers accounted for 48.5% and 51.5%, respectively. Mode of delivery was nearly equally distributed between cesarean section (49.3%) and normal vaginal delivery (50.7%). Most participants were in the normal BMI category (91.1%).

Table 2: Maternal and Infant Continuous Characteristics

Variable (n = 953)	Mean (SD)	SE	Range (min–max)
Maternal age (years)	27.61 (4.685)	0.152	16–36
Infant age (months)	7.497 (1.4026)	0.0454	6.0–11.0
Infant birth weight (kg)	2.983 (0.3920)	0.0127	2.5–3.7

The mean maternal age was 27.61 ± 4.69 years (range 16–36 years), while the mean infant age was 7.50 ± 1.40 months (range 6–11 months). Mean infant birth weight was 2.983 ± 0.392 kg, with a range of 2.5–3.7 kg. These values describe the maternal age and infant characteristics of the included study population.

Table 3: Maternal and Infant Characteristics Related to Breastfeeding Practice

Variable (n = 953)	No, n (%)	Yes, n (%)
Baby exclusively breastfed for first six months	237 (24.9)	716 (75.1)
Experienced insufficient milk supply	593 (62.2)	360 (37.8)
Awareness regarding exclusive breastfeeding	104 (10.9)	849 (89.1)
Waste/discarding of colostrum	641 (67.3)	312 (32.7)
Benefits of exclusive breastfeeding	887 (93.1)	66 (6.9)
Awareness of diet during breastfeeding	124 (13.0)	829 (87.0)



Variable (n = 953)	No, n (%)	Yes, n (%)
Received proper antenatal care	41 (4.3)	912 (95.7)
Trouble initiating breastfeeding	717 (75.2)	236 (24.8)
Pain during breastfeeding	709 (74.4)	244 (25.6)
Knowledge regarding breastfeeding procedure	170 (17.8)	783 (82.2)
Knowledge regarding breast massage procedure	359 (37.7)	594 (62.3)
Medicine advised by doctor for breast milk	885 (92.9)	68 (7.1)
Mastitis during breastfeeding	928 (97.4)	25 (2.6)
Any maternal health issue	809 (84.9)	144 (15.1)
Mother employed	893 (93.7)	60 (6.3)
Baby feeds enough	268 (28.1)	685 (71.9)
Baby satisfied by breastfeeding	361 (37.9)	592 (62.1)
Baby gained enough weight	109 (11.4)	844 (88.6)
Multiple pregnancy	899 (94.3)	54 (5.7)
Mother conceived early	384 (40.3)	569 (59.7)
Eclampsia during pregnancy	655 (68.7)	298 (31.3)
Essential hypertension during pregnancy	608 (63.8)	345 (36.2)
Gestational diabetes	857 (89.9)	96 (10.1)
Postpartum hemorrhage	400 (42.0)	553 (58.0)
Postpartum depression	643 (67.5)	310 (32.5)
History of abortion	770 (80.8)	183 (19.2)

Among the 953 mothers, 716 (75.1%) reported EBF for the first six months and 849 (89.1%) reported awareness regarding EBF. Colostrum was discarded by 312 (32.7%) mothers. Awareness of diet during breastfeeding was reported by 829 (87.0%), knowledge of the breastfeeding procedure by 783 (82.2%), and knowledge of breast massage by 594 (62.3%). Proper antenatal care was reported by 912 (95.7%) participants. Perceived insufficient milk supply was reported by 360 (37.8%) mothers, difficulty initiating breastfeeding by 236 (24.8%), pain during breastfeeding by 244 (25.6%), and mastitis by 25 (2.6%). A total of 685 (71.9%) mothers reported that their babies fed enough, 592 (62.1%) reported that their babies were satisfied with breastfeeding, and 844 (88.6%) reported adequate infant weight gain. Maternal and pregnancy-related characteristics were also recorded, including employment, multiple pregnancy, early conception, eclampsia, essential hypertension, gestational diabetes, postpartum hemorrhage, postpartum depression, and history of abortion.

Table 4: Logistic Regression Analysis of Factors Associated with Exclusive Breastfeeding Practice

Variable	B	Exp(B)	p-value	Classification accuracy (%)
Awareness regarding exclusive breastfeeding	4.023	55.878	<0.001	
Waste of colostrum	-0.009	0.991	0.657	
Benefits of exclusive breastfeeding	0.441	1.555	0.206	
Awareness of diet during breastfeeding	1.543	4.678	<0.001	
Knowledge regarding breastfeeding procedure	0.864	2.374	0.001	
Knowledge regarding breast massage procedure	-0.343	0.710	0.147	
Constant	-3.877	0.021	<0.001	
Overall classification accuracy				85.8
Accuracy: not exclusively breastfeeding				55.7
Accuracy: exclusively breastfeeding				95.8





Table 4 presents the binary logistic regression model for EBF practice. Awareness regarding EBF was strongly and positively associated with EBF practice ($B = 4.023$, $OR = 55.878$, $p < 0.001$). Awareness of diet during breastfeeding ($B = 1.543$, $OR = 4.678$, $p < 0.001$) and knowledge of the breastfeeding procedure ($B = 0.864$, $OR = 2.374$, $p = 0.001$) were also significant positive factors. Waste of colostrum, reported benefits of EBF, and knowledge of breast massage were not statistically significant in the model ($p > 0.05$). Overall classification accuracy was 85.8%, with 95.8% accuracy for mothers classified as practicing EBF and 55.7% accuracy for mothers classified as not practicing EBF.

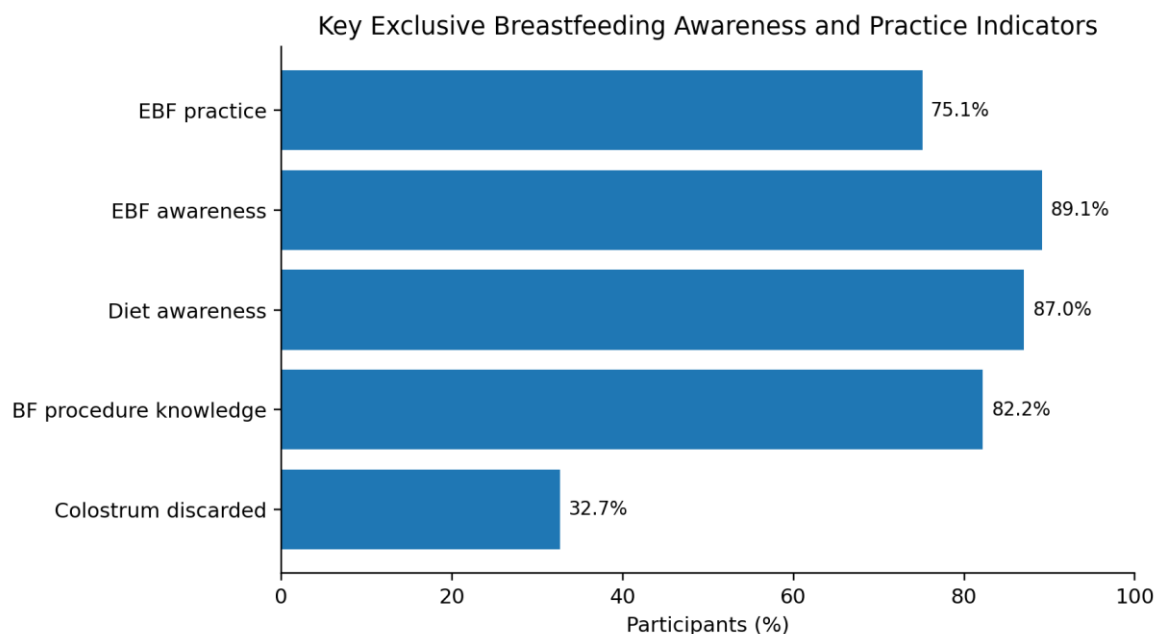


Figure 1. Key exclusive breastfeeding awareness and practice indicators ($n = 953$).

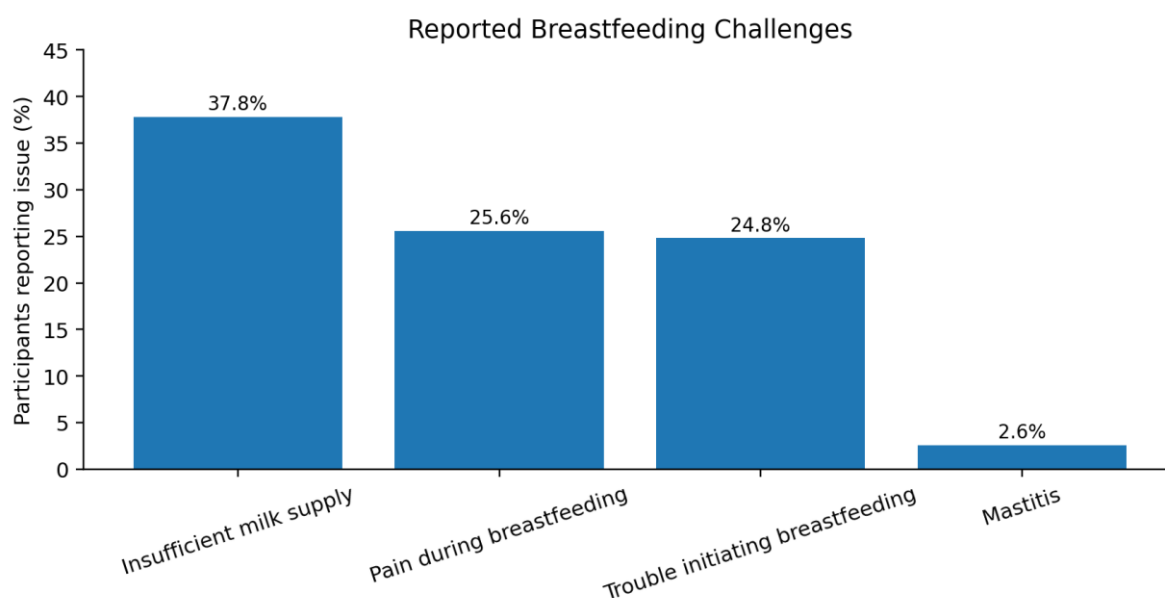


Figure 2. Reported breastfeeding challenges among participating mothers ($n = 953$).

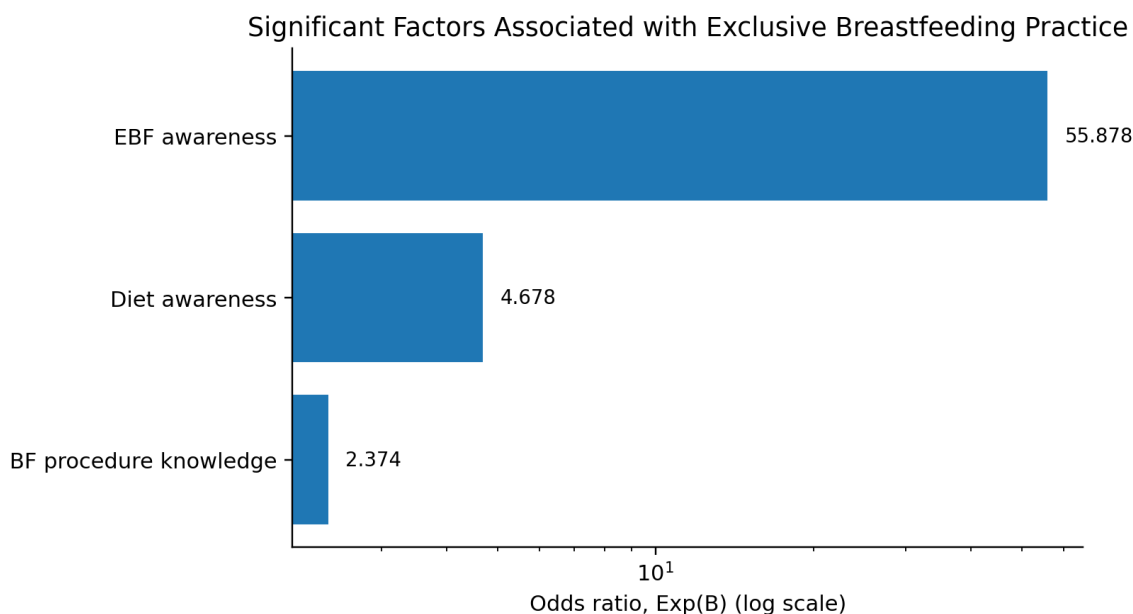


Figure 3. Significant factors associated with EBF practice in the logistic regression model. Odds ratios are displayed on a logarithmic scale.

DISCUSSION

This study included 953 breastfeeding mothers with a mean age of 27.61 ± 4.69 years and infants with a mean age of 7.50 ± 1.40 months. Mode of delivery was nearly evenly distributed between cesarean section (49.3%) and normal vaginal delivery (50.7%). EBF during the first six months was reported by 75.1% of mothers, while 95.7% reported receiving proper antenatal care. The EBF proportion observed in the present study is relatively high. Mekebo et al. reported EBF in approximately 83% of mothers and identified maternal education, residence, antenatal visits, family size, and mode of delivery as relevant factors (19). Prospective evidence has also shown that maternal age, health, knowledge, attitudes, latching difficulties, and early formula introduction may influence continuation of EBF (20). Knowledge and practice do not always correspond directly. Rana et al. reported limited knowledge and EBF practice among mothers in rural Bangladesh and found that socioeconomic and demographic characteristics were related to breastfeeding behaviours (21). Yu et al. similarly demonstrated that maternal feeding attitudes and early feeding choices can influence subsequent feeding patterns (22). In Saudi Arabia, Alyousefi reported that antenatal intention and social acceptance were important determinants of successful EBF (23). Gebretsadik et al. found that maternal education, parity, breastfeeding information, knowledge, and attitude were associated with EBF practice (24). In Pakistan, longitudinal data on infant and young-child feeding have also demonstrated important relationships with maternal education, employment, and child age (25). These findings reinforce the need to consider both knowledge and the broader maternal context when interpreting breastfeeding behaviour.

In the present study, 82.2% of mothers reported knowledge of the correct breastfeeding procedure and 62.3% reported knowledge of breast massage, while 32.7% reported discarding colostrum. Hasan et al. found that maternal knowledge and positive attitudes were associated with EBF practice in Bangladesh (26). Karcz et al. reported that maternal dietary knowledge was related to breastfeeding practices and beliefs about dietary restrictions during lactation (27). A local study by Abid and colleagues also emphasized the role of maternal knowledge and education in breastfeeding knowledge, attitudes, and practices (28). Together, these findings support the importance of practical counselling that addresses both breastfeeding technique and maternal understanding.

The regression model identified three statistically significant positive factors associated with EBF practice: awareness regarding EBF (OR = 55.878, $p < 0.001$), awareness of diet during breastfeeding (OR = 4.678, $p < 0.001$), and knowledge of the breastfeeding procedure (OR = 2.374, $p = 0.001$). Waste of colostrum, reported benefits of EBF, and knowledge of breast massage were not statistically significant in the model. The overall classification accuracy was 85.8%, although classification was stronger for mothers practicing EBF (95.8%) than for those not practicing EBF (55.7%). The large odds ratio for EBF awareness indicates a strong association in this sample and should be interpreted within the cross-sectional design rather than as evidence of causation.



Colostrum avoidance remains an important breastfeeding concern in several developing-country settings. A recent literature review identified delayed initiation, cesarean delivery, inadequate antenatal or postnatal counselling, limited breastfeeding knowledge, and cultural beliefs as factors linked with colostrum avoidance (29). Gebretsadik et al. also reported substantial colostrum avoidance in Ethiopia and highlighted the importance of early breastfeeding support, maternal nutrition discussions, and trusted health-care counselling (30). The 32.7% prevalence of colostrum discarding in the current study therefore represents a clinically relevant target for maternal education and counselling.

This study has several limitations. Recruitment from a single hospital and use of non-probability judgmental sampling limit the generalizability of the findings. The cross-sectional design does not establish temporal or causal relationships. Because mothers of infants aged 6–11 months reported breastfeeding during the first six months, recall bias is possible. The questionnaire was self-reported, which may also introduce reporting or social-desirability bias. In addition, inclusion was restricted to full-term infants with birth weight between 2.5 and 3.7 kg, so the findings may not represent preterm, low-birth-weight, or higher-birth-weight infants. Despite these limitations, the study provides a large descriptive dataset on EBF awareness, practice, and maternal breastfeeding-related factors in the study setting.

CONCLUSION

Exclusive breastfeeding for the first six months was reported by 75.1% of mothers, and awareness regarding EBF was high. Nevertheless, colostrum discarding and breastfeeding difficulties such as perceived insufficient milk supply, pain, and problems initiating breastfeeding were still reported. Awareness regarding EBF, awareness of diet during breastfeeding, and knowledge of the breastfeeding procedure were significantly associated with EBF practice. These findings support continued antenatal and postnatal counselling focused on practical breastfeeding technique, maternal diet, early breastfeeding support, and the value of colostrum.

DATA AVAILABILITY

Data supporting the findings of this study are available upon reasonable request.

AUTHORS' CONTRIBUTION:

AF, SU, MF, ABK: Concept and design of the study, data collection, interpretation of results, drafting of the manuscript.

SU, MF: Data analysis and revision.

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