

Perceptions, practices, and associated factors towards expressed breastfeeding among mothers in Jakarta, Indonesia

Wiyarni Pambudi^{1,2}, Naomi Esthernita Fauzia Dewanto², Yusra Yusra³, Retno Asti Werdhani⁴, Anang Endaryanto⁵, Umi Fahmida⁶, Fatima Safira Alatas⁷, Badriul Hegar^{7,8}

Abstract

Background Expression of breast milk is a strategy to ensure continuous breastfeeding during temporary separation of infant from the mother. Handling and storage of expressed breast milk (EBM) should be based on established recommendations because these practices can affect milk quality and safety.

Objective To describe perceptions and practices of EBM handling and storage, compare with commonly used recommendations and associated factors influencing these practices among mothers in Jakarta, Indonesia,

Methods Mothers who practiced expressed breastfeeding (EBF) to their 6-12 weeks-old infants completed questionnaires about their perceptions and practices on how they handle and store EBM. The differences in perceptions and practices about expressed breastfeeding management were analyzed using the Chi-square or Fisher's exact test.

Results Among 30 mothers, 14/30 gave EBF exclusively, 19/30 used breast pump, and 26/30 expressed ≥ 6 times/day. Infants in this study received expressed milk 5-10 times per day. Maternal age and resource of information were factors significantly associated with mother's perceptions, while maternal age, education, and parity were significantly associated with the practices of EBM handling and storage.

Conclusion This study reveals inconsistent perceptions and practices on expressed milk handling and storage by the mothers. They have good knowledge about the theoretical aspects of expressed breastfeeding, but some other techniques are poor, which can be detrimental to the health of the infants. Further study is needed to find more efficient and optimal methods of expressed milk handling and storage, necessitating thoughtful consideration of better practices and recommendations. [Paediatr Indones. 2024;64:168-75; DOI: 10.14238/pi64.2.2024.168-75].

Keywords: perception; practice; handling; storage; expressed breast milk

Breast milk feeding is usually described as breastfeeding, using expressed breast milk (EBM), or a combination that includes both approaches. Whatever the method of delivery, giving breastmilk has many advantages for both parents and infants. In recent years, there has been a growing number of mothers sharing their breastmilk, creating new challenges for nursing babies. These mothers who provide EBM need adequate information about EBM management's safety and efficiency as close as the benefit of direct breastfeeding.¹

From Doctoral Program in Medicine, Faculty of Medicine, Universitas Indonesia¹, Department of Child Health, Faculty of Medicine, Universitas Tarumanagara², Department of Clinical Pathology, Faculty of Medicine, Universitas Indonesia³, Department of Community Medicine, Faculty of Medicine, Universitas Indonesia⁴, Department of Child Health, Faculty of Medicine, Universitas Airlangga/Dr. Soetomo General Hospital, Surabaya, East Java⁵, Southeast Asian Ministers of Education Organizations Regional Centre for Food and Nutrition (SEAMEO RECFON), University of Indonesia⁶, Department of Child Health, Faculty of Medicine, Universitas Indonesia/Dr. Cipto Mangunkusumo Hospital⁷, Indonesian Medical Education and Research Institute (IMERI), Faculty of Medicine, Universitas Indonesia/Dr. Cipto Mangunkusumo Hospital⁸, Jakarta, Indonesia.

Corresponding author: Badriul Hegar, Department of Child Health/ Indonesian Medical Education and Research Institute (IMERI), Faculty of Medicine, Universitas Indonesia/Dr. Cipto Mangunkusumo Hospital. Jalan Salemba Raya No. 6, Jakarta 10430, Indonesia. Phone: +62 21 29189160 ext. 201201. E-mail: bhegars@gmail.com.

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Management of expressed milk handling and storage should be based on established recommendations because these practices can affect milk quality and safety. The handling, storing, and warming, of expressed breastmilk are the main concern, taking into consideration that EBM may become contaminated due to improper handling during expression and storage. The fact that breast milk is the most optimal supply of nutrients and immunoprotective substances, adequate knowledge and practices of EBM management are needed to avoid the loss of nutritional values or bioactive factors.²

In an online survey conducted on 217 expressed breastfeeding (EBF) mothers in 2021.³⁻⁵

29.3% of them indicated mismanagement in handling and storage their expressed milk. This study aimed to explore the perceptions, practices, and associated factors on EBM management among mothers in Jakarta, Indonesia, compared with EBM recommendations.⁶⁻⁷

Methods

This study was conducted in Palmerah, Kebon Jeruk, and Grogol Petamburan sub-district of West Jakarta, Indonesia, during December 2022 to March 2023. A community-based cross-sectional study design was used to administer breastfeeding mothers who attended the primary health centers and met the inclusion criteria: aged 20 to 40 years that giving expressed breast milk (EBM) daily to a healthy 6-12 weeks infant. Expressed breastfeeding (EBF) was defined as the practice of milk removal from the mother's breasts, usually with a breast pump or by hand expressing, and feeding the expressed breast milk (EBM) to baby via a bottle, or more suitable method, such as cup feeders. Mothers with medical conditions experiencing postpartum complications, having chronic diseases, obesity (BMI $\geq 30\%$), malnutrition (BMI $< 16.5\%$), being on a diet or abstinence from certain foods, taking drugs not compatible for breastfeeding mothers, having premature or low birthweight, twins, major congenital abnormalities infant, were excluded. Methods of infant feeding included exclusive pumping (e-ping) if mother only provided EBM intake without breastfeeding directly,

or predominant (almost exclusive) EBF if the infant still breastfed < 3 times daily by mother in addition to consuming EBM. Both methods were chosen by subjects voluntarily regardless of the mother's educational status, occupation, and income.

The required number of subjects was selected using a formula for proportionate to the size of population. A purposive non-random sampling was applied to recruit eligible subjects. Thirty mothers were enrolled as participants after given information and consented before completing the questionnaire. The participants' confidentiality were protected throughout the whole study procedure. This study was approved by the Ethical Research Committee, Faculty of Medicine, Universitas Indonesia.

A structured questionnaire consisted of identity, history of breastfeeding and 23 questions graded on a Likert scale ranging from 1 to 5 about how mothers handling and storage EBM were collected. Each subject was guided when filling out the questionnaire to describe the characteristics, perceptions, and practices regarding EBF management. Relevant items of EBF were identified through a literature search, clinical observations, and expert opinion. Protocol #8 of the Academy of Breastfeeding Medicine⁶ and CDC guidelines⁷ were adopted as recommendation for EBM storage management.

The effectiveness of the questionnaires was tested for face validity among ten mothers, obtained a Cronbach alpha score of 0.726 for perceptions and 0.736 for practices, showing that they were reliable tools for assessing perceptions, and practices regarding EBF management among mothers who practiced EBF to their infants. A score between 12 to 30 indicated low perceptions and 11 to 28 as low practices, while a score between 31 to 30 were identified as adequate perceptions and 29 to 55 as adequate practices. A part of questionnaire (history of breastfeeding and perception/practices of EBM administration) used in this study can be seen in **Appendix 1**. Descriptive statistical data were tabulated to characterize responses. Data with normal distribution was described as means and standard deviations. Bivariate analysis with the Chi-square or Fisher's exact test were used to identify significant findings ($P < 0.05$) among the associated variables for perceptions and practices of EBM handling and storage management.

Results

Thirty breastfeeding mothers were included in this study according to the inclusion criterion of providing expressed breastfeeding to their babies, which was practiced exclusively by 14 subjects and predominantly by 16 subjects (Table 1) without using infant formula as additional intake. The subjects of this study were breastfeeding mothers who lived in West Jakarta with a mean age of 27.5 (SD 2.30, range 24-31) years, 11/30 Javanese and 7/30 Sundanese, 17/30 Bachelor (S1)

educated, 14/30 working full-time with an income 18/30 equal to or more than the DKI Jakarta UMR in 2023 (IDR 4.9 million per month).

Subjects with a history of exclusive breastfeeding were 11 mothers, while 15 subjects involved in this study were breastfeeding for the first time (Table 1). The experience of early initiation of breastfeeding was reported by 10/30 of subjects, and the first time the mother felt the flow of milk or the onset of lactogenesis in two days postpartum was experienced by 17/30 of subjects. The practice of expressing was carried out

Table 1. Socio-demographic and health status of mothers

Characteristics	Exclusive pumping (n=14)	Predominant pumping (n=16)	Total (N=30)
Maternal age, n			
20-29 years	11	9	20
30-39 years	3	7	10
Ethnic group, n			
Jawa	6	5	11
Sunda	3	4	7
Betawi	1	2	3
Others	5	4	9
Educational level, n			
High school	3	2	5
High secondary	1	7	8
University	10	7	17
Occupation, n			
Housewife	3	5	8
Part-time employed	3	4	7
Full time employed	8	7	15
Monthly household income, n			
≤4,900,000 IDR	4	8	12
>4,900,000 IDR	10	8	18
Parity (number of births), n			
1	6	9	15
2	4	7	11
3	4	0	4
Previous breastfeeding experience, n			
Exclusive breastfeeding	4	7	11
Partial breastfeeding	3	1	4
Not breastfeeding	7	8	15
Expressing method, n			
Hand expressing	7	4	11
Breast pump	7	12	19
Frequency of expressing, n			
<6 times/day	2	2	4
6-8 times/day	8	12	20
>8 times/day	4	1	6
Frequency of EBM administration, n			
<6 times/day	0	6	6
6-8 times/day	5	8	13
>8 times/day	9	2	11

6-8 times per day by 20/30 of subjects, while the frequency of breastfeeding administration 6-8 times by 13/30 of subjects and more than eight times in 24 hours by 11/30 of subjects. The use of breast pumps was chosen by 19/30 of subjects, with varying brands and specifications. The preference of the expressing method followed the choice of subjects, and no intervention was carried out for study purposes.

Data on expressed breastfeeding at the beginning of the study were grouped into perceptions and practices carried out by subjects related to expressing techniques, storage methods, and how to present expressed milk. Twenty-nine subjects agreed that direct breastfeeding was better than expressed milk, 28/30 subjects also decided that breastfeeding had benefits in increasing milk production, 27/30 relieving swollen breasts, and 25/30 supporting exclusive breastfeeding. Some study subjects also admitted that they had previously expressed to rest the injured nipple 10/30, being a donor of breast milk 8/30, and deliberately throwing away breast milk 5/30 for reasons of: 'full' breasts/oversupply, being on medication, or feeling unsure of the quality of breast milk for various reasons (mother being sick, fatigue, effects of food consumed).

A concept that all breastfeeding mothers need to learn the technique of milk expression by hand, approved by 27/30 of subjects because breasts felt more comfortable with hand expression. However, in practice, only 11/30 subjects expressed by hand because it took more time than expressing with a breast pump. All subjects agreed to standard hygiene principles in the EBM processing process, and 16/30 of subjects understood the risk of germ contamination using breast pumps.

The myth about the first drops of breast milk having to be discarded is still embraced and practiced by 6/30 of subjects. Identification of the lifetime of expressed milk by writing the expressing date on the milk storage container was not routinely done by 6/30 of subjects. A total of 19/30 of subjects understood that expressed milk could be stored for four days on the bottom shelf of the refrigerator without freezing. However, in daily practice, 20/30 of subjects kept expressed milk for more than three months in the freezer.

At the beginning of the study, 23/30 of subjects had understood that the longer it was stored, the

more significant the changes in composition that affects the benefits of expressed milk on infant health. This aligned with the practiced of serving expressed milk by 11/30 of subjects who prioritize giving freshly expressed milk with a shorter storage period.

As many as 7/30 of subjects claimed to get information about expressed milk management from doctors or midwives, and 23/30 of subjects searched for it from the internet, social media, or based on friends' experiences.

Data on perceptions and practices of EBM management by 30 study subjects are presented in **Table 2**. Overall adequate perception and practice on EBF was attained by 22/30 and 16/30 of mothers. Maternal age (PR 1.07, 95%CI 1.02 to 1.13) and resource of information (PR 1.37, 95%CI 1.30 to 1.44) were factors significantly associated with adequate perceptions, while maternal age (PR 2.17, 95%CI 2.06 to 2.28), education (PR 1.68, 95%CI 1.60 to 1.77), parity (PR 1.25, 95%CI 1.19 to 1.31) were significantly associated with the adequate practices of EBM handling and storage (**Table 3**).

Discussion

This study described perceptions and practices of dairy milk storage management in 30 subjects. Exclusive breastfeeding was carried out by 14 mothers and predominantly by 16 mothers of infants aged 6-12 weeks. Any method of providing breast milk to newborns has been referred to as "breastfeeding". We use the term 'expressed breastmilk feeding' as a result of milk that is removed from the breast either by manual expression or a breast pump before it is fed to the infant and feedings that were administered straight from the breast are referred to as "direct feeding at the breast."⁸⁻⁹

Some of the subjects of this study were housewives from middle social-economic status. Half of the subjects were breastfeeding for the first time, the other already had exclusive breastfeeding experience. Almost all subjects realized the importance of direct breastfeeding, but decided to give milk because they experienced nipple sores or breast pain during breastfeeding. The health benefits of nursing for both mothers and infants are widely acknowledged by women, nevertheless, some women experienced

Table 2. Perceptions and practices of expressed breastfeeding

Mothers' perceptions	Adequate, n	EBF practices	Adequate, n
Hygiene of hands and breast pump devices is important to prevent bacterial contamination	30	I wash my hands with water and soap before expressing	30
All breastfeeding mothers need to learn hand-expressing technique	27	I use a breast pump for expressing and emptying breast	19
Hand expressing makes breasts more comfortable	19	It takes me 20-30 minutes each session to express milk	25
Expressing by hand is more at risk of contamination than using a breast pump	16	I fill the expressed milk until the container is full	25
Storing will change the composition and reduce the benefits of expressed milk	23	I discard the first few drops of milk at the beginning of expressing	6
Expressed milk can be stored for up to 4 days in a refrigerator	19	I mix fresh milk with cold/frozen expressed milk	26
Expressed milk can be stored for up to 6 months in a freezer	29	I note the date of expression on the milk container	24
Expressed milk can be warmed on the stove or in the microwave	23	I keep expressed milk for less than 3 months, then throw it away after 3 months	10
Direct breastfeeding is better than bottle-feeding	29	I give my baby expressed breast milk and also direct breastfeeding	16
Fresh milk can be mixed with previously expressed milk	8	I give the newest expressed milk first instead of the old milk that I keep in the refrigerator	11
The leftover milk can be store/ refreeze again	27	I keep and store/refreeze the leftovers from a feeding	29
Babies suck the same way at the breast and a pacifier	12		

Table 3. Associated factors of perceptions and practices of expressed breastfeeding

Variables	Perceptions			Practices		
	PR	(95%CI)	P value	PR	(95%CI)	P value
Maternal age	1.07	(1.02 to 1.13)	0.001	2.17	(2.06 to 2.28)	0.002
Education	1.34	(0.97 to 1.41)	0.303	1.68	1.60 to 1.77)	0.041
Employment	1.03	(0.98 to 1.08)	0.405	1.29	(0.82 to 1.35)	0.171
Parity	1.20	(0.94 to 1.26)	0.241	1.25	(1.19 to 1.31)	0.003
Resources of information	1.37	(1.30 to 1.44)	0.010	1.14	(0.91 to 1.20)	0.168

unexpected difficulties when nursing.¹⁰

Manual breast emptying by hands was known to be more comfortable, but the use of breast pump was preferred by mothers, with a frequency of expressing ≥ 6 times a day. No particular expressing method has proven to be more effective, although manual expressing is recommended to increase breast milk volume and reduce the risk of contamination.

Standard hygiene principles were applied with an understanding of the risk of contamination during the expressing procedures. Expressed milk storage management is recommended to inhibit the growth

of microorganisms such as *Salmonella*, *E. coli*, and others. According to protocol #8 of the *Academy of Breastfeeding Medicine*,⁶ EBM should be stored in containers or systems designed for foodstuffs (food grade) and avoided from temperature danger zones 4-60°C.

The practice of EBM storage was not fully implemented by subjects following the recommendations, such as duration for keeping EBM in the refrigerator and freezer. Proper temperature and storage duration are necessary to maintain the stability and durability of breast milk, which is

at room temperature of 16-29°C for 4-8 hours, at refrigerator temperature of 4°C for 5-8 hours, and at freezer temperature -20°C for 6-12 months.⁶ The CDC guidelines⁷ instruct that breast milk with the longest shelf life be used first, popularly known as *First In First Out* (FIFO). Frozen breast milk is thawed by placing it on a refrigerator shelf overnight, as a more recommended way to reduce the fat loss that occurs in rapid thawing by putting frozen breast milk in a container of warm water or running warm water into a container of frozen breast milk. After thawing, expressed milk should be consumed within 24 hours and should not be frozen again due to the risk of spoilage.

There were subjects in this study who still believe local myths on EBM. The most information sources were the internet, social media, or based on peers' experiences. Healthcare professionals such as doctors, midwives, nurses, and internationally certified lactation consultants are the most prevalent sources of information, alongside the internet, friends, and family. Inconsistent blushing advice is confusing for mothers, and many healthcare providers report not meeting all of their expression learning needs. Topics of interest include practical advice on how to milk, determining expressing frequency/time/duration, EBM storage guidelines, the influence of expression on milk supply, expressing product/aid information, and general support.¹¹

Factors associated with higher rates of EBF include formula supplementation, absence of prior nursing experience, scheduled cesarean delivery, and going back to work after giving birth. Exclusive EBF is linked to a higher chance of stopping nursing earlier compared to direct breastfeeding.⁸ In the newborn period, mothers are expected to empty their breasts at the same frequency as their babies suckle for feeding or about 8-12 times a day.¹ For mothers who are pumping to maintain their milk supply, regular removal of breast milk is essential to maintain milk supply. Without emptying the breast, the level of lactation feedback inhibitors increases, and the milk supply of parents will decrease. When the demand for infant milk exceeds the supply in mothers who directly breastfeed, babies can increase the frequency of their breastfeeding and provide manual stimulation to increase supply.¹²

According to the *Baby Friendly Hospital Initiative Guidelines*,¹³ mothers need assistance on how to

milk to maintain lactation if they are separated from the baby and mothers should be supported for the collection and storage of breast milk. The need for relevant information related to expressing should be part of regular lactation support at every counseling appointment. Mothers will receive nonjudgmental, factual information to help them make evidence-based decisions about expression strategies that align with their particular nursing objectives. It ought to be supplemented with reliable internet sites that offer up-to-date, correct information in addition to initiatives to link moms with peer support groups.

The alternative methods of expressing breast milk by hand, manual pump, electric pump, double electric breast pump, or perhaps hospital-grade electric double pump, are considered by mothers due to the capability of emptying the breast effectively and efficiently.¹⁴ On the other hand, drawbacks of using expressed breast milk or the expression process include possible contamination of the milk, loss or depletion of nutritional components, additional handling needed during the process, breast pain or nipple trauma, and a lack of skin-to-skin contact and bonding between the mother and her infant.⁸

Because the study is cross-sectional, it has a number of limitations, including the difficulty of determining the direction of relationship between the variables. More study is needed to find more efficient and optimal methods of expressed milk handling and storage, necessitating thoughtful consideration of better practices and recommendations.

This study concludes that the mother's perceptions and practices on expressed milk handling and storage are inconsistent, some subjects had not complied into storage techniques following recommendations. They have good knowledge about some aspects of expressed breastfeeding, but some other techniques are poor, which can be detrimental to the health of the infants. Mothers should have appropriate resources about the evidence-based lactation support to handle EBM properly to give the babies a better chance for exclusive breastfeeding. Breastfeeding education for mothers provides better results regarding the accuracy of mothers' knowledge and practice of expressed breast milk.

Conflict of interest

None declared.

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Appendix 1. History of breastfeeding and perception/practices of EBM administration

History of breastfeeding	
Breast milk intake from birth to current	<input type="checkbox"/> expressed breast milk <input type="checkbox"/> expressed breast milk and direct breastfeeding <input type="checkbox"/> expressed breast milk and infant formula
Administration of EBM	<input type="checkbox"/> 100% exclusive <input type="checkbox"/> ≥ 75% daily intake
Breast milk expression methods	<input type="checkbox"/> manual <input type="checkbox"/> pumping
Last time of breast milk expression	_____ am
Time of breast milk expression for samples	_____ am
Volume of EBM	_____ mL
Emptied side of breast	<input type="checkbox"/> right <input type="checkbox"/> left
History of previous breastfeeding	
History of early breastfeeding initiation	
History of first drop of breast milk	
Benefits of breast milk expression for you	
How do you get the information about breastmilk/breastfeeding	

Perceptions and practices of EBM administration					
<i>Please consent to the following statement (1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree)</i>	1	2	3	4	5
Direct breastfeeding is better than using a pacifier					
Breastfeeding mothers need to learn the technique of manual breast milk expression					
Manual breast milk expression brings a more comfortable feeling on my breast					
Babies sucking the same way when breastfed or bottle-fed					
In order to prevent germ contamination, when expressing breast milk, you need to keep your hand and breast pump clean					
Compared to pumping, manual expression poses a higher contamination risk					
Long term EBM storage will change its composition and reduce its benefit					
EBM can be stored for 4 days on the bottom shelf of the refrigerator					
EBM can be stored for 4 months in a 2-door refrigerator freezer					
Remaining EBM that not drunk by the baby can still be restored					
Freshly EBM can be mixed with existed EBM					
Expressed breast milk can be warmed on the stove/microwave					
<i>Please choose based on daily breastfeeding practice (1=never, 2=rare, 3=sometimes, 4=frequent, 5=always)</i>	1	2	3	4	5
I express with a breast pump					
I need about 20-30 minutes to express my breast milk					
I full-filled the container with my EBM					
I discard the first few drops of milk at the beginning of breast milk expression					
Before expressing, I washed my hands with water and soap					
I write down the expressing date on the milk storage container					
I keep EBM for less than 3 months, afterward I will discard it/not giving it to my baby					
I put the remaining EBM back to the storage					
I mix freshly EBM with cold/frozen EBM					
I give freshly EBM first instead of older EBM that I keep in the refrigerator					
In addition to expressing, I also directly breastfeed my baby					
I express with a breast pump					