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Research Article

Descriptive Study to Assess Storage Practices, Nutritional Integrity & Common Challenges Faced by Lactating Mothers Regarding Expressed Breast Milk in Selected Community Health Centres in Coimbatore, Tamil Nadu

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A B S T R A C T

Introduction: Breast milk is essential for infant nutrition, and proper expression and storage preserve its quality. Many lactating mothers face challenges in effective storage. This study assessed storage practices, nutritional integrity, and challenges among mothers expressing and storing breast milk in selected community health centres, Coimbatore, Tamil Nadu.

Methodology: A descriptive cross-sectional study was conducted among 30 purposively selected lactating mothers in March 2025. Administrative approval and informed consent were obtained. Data were collected using a structured questionnaire: Part A covered demographics; Part B, a 5-point Likert scale assessing storage practices, nutritional quality, and challenges.

Results: Mean storage practice score was 31.07 (good to excellent). Nutritional integrity awareness scored 22.53 (moderate), and challenges 25.87 (moderate).

Conclusion: Mothers showed effective storage practices but moderate knowledge gaps in nutritional preservation. Community health programs and education are needed to optimise storage and ensure safe infant feeding.

Keywords: Storage Practices, Nutritional Integrity, Storage of Breast Milk

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Introduction

Breast milk is universally recognized as the ideal source of infant nutrition, offering essential macronutrients, immunological components, and bioactive substances critical for optimal growth and development.[1] The World Health Organization (WHO) and the United Nations International Children's Emergency Fund (UNICEF) advocate exclusive breastfeeding for the first six months of life, followed by continued breastfeeding alongside complementary foods up to two years or beyond.[2,3]

However, several maternal factors—such as employment, medical conditions, and lifestyle constraints—often necessitate expressing and storing breast milk for later use.[4,5] In such cases, proper storage practices are essential to maintain the milk's nutritional integrity and microbial safety.[6,7] Variables such as storage temperature, container type, and duration can significantly affect the milk's immunological properties, enzyme activity, and overall quality.[8,9]

Despite clear global guidelines, lactating mothers often exhibit varied storage practices influenced by cultural beliefs, lack of awareness, and limited access to proper storage facilities.[10] This descriptive study aimed to assess the storage practices of lactating mothers, analyze their adherence to recommended guidelines, and evaluate how different storage methods impact the nutritional quality of breast milk. The findings aim to bridge the gap between knowledge and practice, ensuring that expressed breast milk remains safe and beneficial for infant consumption.

Background

Williams et al. (2021) emphasized that proper storage of expressed breast milk is essential to preserve both its nutritional value and safety.[6,7] Their study revealed that up to 60% of mothers stored breast milk in inappropriate containers or under incorrect temperature conditions, increasing the risk of bacterial contamination and nutrient degradation.[8] The authors highlighted the urgent need for targeted educational interventions to improve maternal knowledge and practice.[9]

In a related study, Johnson et al. (2022) assessed the effect of storage duration on the nutritional integrity of expressed milk. They found that while refrigeration preserved most nutrients for up to 24 hours, prolonged storage—particularly in non-sterile environments—resulted in significant reductions in fat and protein content.[7,8] Freezing was recommended as a more effective method for long-term preservation.

Harrison and James (2023) investigated the practical challenges faced by mothers in expressing and storing breast milk, particularly in workplace settings. Their findings identified time constraints, lack of private space, and limited employer support as major barriers. Additionally, emotional stress associated with balancing work and breastfeeding was a recurring theme.[9] The study suggested policy-level changes such as establishing breastfeeding-friendly environments in workplaces to mitigate these issues.

In Tamil Nadu, numerous government-led initiatives—such as the Dr. Muthulakshmi Reddy Maternity Benefit Scheme, Integrated Child Development Services (ICDS), and extensive breastfeeding awareness programs—have significantly improved maternal and child health outcomes.[4] Nevertheless, many lactating mothers, especially in rural and semi-urban areas, continue to experience difficulties in the safe storage of expressed breast milk, despite increased awareness efforts.

Yet, many lactating mothers in both urban and rural settings continue to face difficulties in properly storing expressed breast milk, despite increased awareness and support efforts.

Tamil Nadu has a high rate of working women, particularly in industries such as IT, healthcare, and textile sectors. Many lactating mothers rely on expressed breast milk to balance work and infant care. However, awareness about safe storage methods is limited, leading to potential nutritional loss or contamination.[6] In urban areas like Chennai, Coimbatore, and Madurai, access to refrigeration and breast pumps is better, but awareness regarding thawing and handling stored milk remains low. In rural areas, many mothers lack proper storage facilities, increasing the risk of spoilage.[8]

Despite Tamil Nadu's progress in maternal health, infant malnutrition remains a concern, with reports indicating stunted growth, low birth weight, and anemia in some districts. Ensuring proper storage of breast milk can help maintain its full nutritional value, benefiting infants who may not always receive direct breastfeeding.[7] Tamil Nadu has a few established human milk banks, such as those in Chennai and Coimbatore, but public awareness remains low.[8,9] Many mothers—and even some healthcare workers—lack knowledge about proper refrigeration, freezing, and thawing of breast milk, leading to incorrect storage methods.[7]

The hot and humid climate further increases the risk of bacterial contamination in stored breast milk, particularly where refrigeration is unavailable. In rural and semi-urban regions, power outages and lack of cold storage options compromise the safety of expressed milk. Therefore, this study aims to generate data that will support improved breastfeeding education, guiding policy changes and targeted healthcare interventions.

Methodology

Quantitative research methodology with a descriptive cross-sectional design was used for the current study. The data collection was carried out over a ten-day period in March 2025 to achieve the set research objectives. Prior to data collection, administrative permission was obtained from the community centers. The objectives of the study were clearly explained to the subjects, and informed consent was obtained from each participant.

The tool used for data collection consisted of two parts;

Part A: Demographic Data. This section is used to collect demographic information about the subjects, including age of the mother, educational level, occupation, parity, monthly income, type of family and source of information on breast milk storage.

Part B: Structured Tool (5-point Likert scale) has 3 sections.

The first section comprised of seven items pertaining to the storage practices of breast milk, scored as 1 to 5. Scoring scheme comprised of low score.[7-14] showing poor storage practices (e.g., neglecting hand hygiene or cleaning), moderate Score (15-24): some good practices, but improvements needed in storage time or sterilization and high score (25-35): good practices, following proper protocols for cleaning, labeling, and temperature management. Section 2 comprised of four items pertaining to the nutritional integrity of breast milk, scored from 1 as very poor to 5 as excellent. Scoring scheme comprised of low score (4-8): poor understanding or practice of nutritional integrity; moderate score (9-12): awareness; room for improvement and high score (13-20): good practices and high awareness. Section 3 was regarding the common challenges, scored as 1 for never to 5 for always. Scoring scheme comprised of low score (7-14): few challenges, easy milk management; moderate score (15-21): some challenges, need for improvement and high score (22-35): frequent challenges, significant barriers. Challenges faced by mothers were in terms of time, resources, and emotional stress associated with the process of expressing and storing milk. The data was gathered from 30 lactating mothers who expressed and stored breast milk.

Results

Section A: Frequency Distribution of Demographic variables of Lactating Mothers

Among the 30 lactating mothers, 46.7% were in the age group of 26–30 years, while 20.0% were aged 36 and above. 60.0% had completed secondary or higher secondary education, and 33.3% were graduates or above. Regarding occupation, 40.0% were homemakers, and 33.3% were employed in the private sector. The monthly family income of 40.0% of participants ranged from ₹20,001 to ₹30,000, followed by 26.7% earning between ₹10,001 to ₹20,000 Table 1.

Table 1.Socio-demographic Characteristics of Lactating Mothers

n = 30

Variables	Categories	Percentage (%)	No. of Samples (n=30)
Age of Mother	26–30 years	46.70%	14
	36 years and above	20.00%	6
Educational Qualification	Secondary/Higher Secondary	60.00%	18
	Graduate and above	33.30%	10
Occupation	Homemaker	40.00%	12
	Private employee	33.30%	10
Monthly Family Income (INR)	₹20,001–₹30,000	40.00%	12
	₹10,001–₹20,000	26.70%	8
Type of Family	Joint	53.30%	16
	Nuclear	40.00%	12
Parity (Number of Children)	2 Children	53.30%	16
	3 or more Children	26.70%	8
Source of Information on Breast Milk Storage	Healthcare professional	46.70%	14
	Social media/Internet	33.30%	10

In terms of family structure, 53.3% of the participants lived in joint families, while 40.0% resided in nuclear families. A total of 53.3% of the lactating mothers had two children, and 26.7% had three or more children. When it came to sources of information on breast milk storage, 46.7% reported receiving guidance from healthcare professionals, whereas 33.3% relied on social media or the internet.

Section B: Frequency distribution of knowledge and practices and challenges faced in storage of expressed breast milk

The analysis revealed that in storage practices, 16 participants (53.33%) demonstrated excellent adherence to storage standards, while 13 participants (43.33%) exhibited good practices, indicating a strong but slightly less consistent commitment. Only one participant, accounting for 3.33%, was categorized under the average group., and notably, none were classified under poor practices — highlighting effective and reliable storage practices among the majority. In terms of nutritional integrity, 8 participants (26.67%) ensured high nutritional integrity, while 19 participants (63.33%) displayed moderate integrity, suggesting room for improvement and 3 participants (10%) showed low nutritional integrity, with no one scoring in the poor range, indicating a general awareness of maintaining nutritional quality. Regarding challenges faced, 8 participants (26.67%) reported severe challenges, 15 participants (50%) encountered moderate challenges, and 7 participants (23.33%) experienced mild challenges. None reported minimal challenges, indicating that all participants face some level of difficulty in maintaining optimal practices.

Section C: Assess the level of practice in storage of expressed breast milk, nutritive integrity and challenges faced by lactating mothers

The study explored three essential aspects concerning the handling of expressed breast milk among lactating mothers: storage techniques, preservation of nutritional quality, and obstacles experienced during storage Table 2.

Table 2.Frequency and Percentage Distribution Based on Practice Scores

n = 30

Measure	Category	Score Range	No. of Participants (n)	Percentage (%)
Storage Practices	Excellent	> 33.11	8	26.7%
	Good	31.07 – 33.11	14	46.7%
	Average	29.03 – 31.06	7	23.3%
	Poor	< 29.03	1	3.3%
Nutritional Integrity	Excellent	> 24.02	6	20.0%
	Good	22.53 – 24.02	17	56.7%
	Average	21.04 – 22.52	5	16.7%
	Poor	< 21.04	2	6.6%
Challenges in Storage	Low Challenge	< 23.41	6	20.0%
	Moderate Challenge	23.41 – 28.33	20	66.7%
	High Challenge	> 28.33	4	13.3%

Table 3.Mean, SD, and Range for Storage Practices, Nutritional Integrity, and Challenges on Storage of Breast Milk

Measure	Storage Practices	Nutritional Integrity	Challenges in Storage of Breast Milk
Mean	31.07	22.53	25.87
Median	31	23	26
Standard Deviation (SD)	2.04	1.49	2.46
Range of obtained score	28 – 35	20 – 25	22 – 30

Storage Techniques

The analysis showed that 46.7% (n=14) of the mothers practiced good storage habits, achieving scores between 31.07 and 33.11. Excellent practices were noted among 26.7% (n=8), with scores above 33.11. Meanwhile, 23.3% (n=7) were found to have average practices, falling within the score range of 29.03 to 31.06. Only 3.3% (n=1) scored below 29.03, reflecting poor storage behavior.

Nutritional Preservation

Regarding the ability to maintain the nutritional value of stored breast milk, 56.7% (n=17) of participants were in the good category, with scores from 22.53 to 24.02. Excellent scores above 24.02 were recorded for 20.0% (n=6) of mothers, suggesting a high standard in preserving milk quality. However, 16.7% (n=5) showed average results (scores between 21.04 and 22.52), while 6.6% (n=2) scored below 21.04, indicating poor nutritional preservation.

Storage Challenges

When looking at the difficulties encountered during milk storage, 66.7% (n=20) of the mothers faced moderate challenges, with scores ranging from 23.41 to 28.33. Low levels of difficulty were experienced by 20.0% (n=6) who scored below 23.41, whereas 13.3% (n=4) reported high levels of challenge, scoring above 28.33.

Data in table 3 shows that for storage practices, the mean score is 31.07 which suggests that most participants exhibit excellent storage practices, with a low standard deviation (2.04) indicating consistency. The range of 28 to 35 further confirms that participants fall into the good to excellent categories. For nutritional integrity, the mean score of 22.53 reflects that most participants maintain moderate nutritional integrity. The low standard deviation (1.49) implies minimal variability, with all participants falling within the acceptable nutritional quality range (20 to 25). For challenges on storage of breast milk, the mean score of 25.87 indicates that participants mostly experience moderate challenges. The slightly higher standard deviation (2.46) shows a bit more variability in the level of challenges faced. The range of 22 to 30 confirms that while most face mild to moderate challenges, some participants encounter severe difficulties.

Section D: Association between background variables and outcomes

For variables such as age, education, occupation, type of family and income; the p-values are greater than 0.05, indicating no significant association with Storage Practices, Nutritional Integrity, or Challenges. However, parity (number of children) shows a significant association with storage practices ($p = 0.03$).

Discussion

The findings of the present study indicate that a considerable proportion of lactating mothers practiced good to excellent methods for storing expressed breast milk, reflected by a mean score of 31.07. These results are consistent with those of Kumar et al. (2022), who found that 58% of urban mothers adhered to recommended storage procedures, such as using refrigeration, marking containers with dates, and maintaining cleanliness during milk handling. Likewise, Rani and Joseph (2021) observed that appropriate health education significantly improved mothers' ability to follow effective breast milk expression and storage routines.

With regard to nutritional integrity, the mean score of 22.53 points to a moderate level of awareness among participants. This supports the findings of Mehta et al. (2020), who reported that although many mothers were aware of the general benefits of breast milk, fewer had in-depth understanding of how storage conditions impact vital nutrients, such as immunological factors and enzymes. Sharma et al. (2019) further stressed that improper thawing methods and storage at incorrect temperatures often lead to nutrient loss—an issue more prevalent in rural communities.

In exploring the challenges associated with breast milk storage, the current study found a mean score of 25.87, indicating moderate but notable difficulties. These challenges included limited time, emotional strain, and inadequate storage infrastructure. Similar issues were highlighted by Fernandez and Paulraj (2021), who identified lack of refrigeration in rural homes, time pressure, and societal attitudes as key barriers. Additionally, Dasgupta et al. (2023) emphasized that mental fatigue and difficulties in balancing work and childcare responsibilities can negatively influence consistent milk expression and safe storage.

In summary, the study emphasizes the importance of ongoing health education, support networks within the community, and improved storage infrastructure to empower mothers and address existing obstacles. These conclusions align with broader public health initiatives aimed at improving infant feeding practices by enhancing awareness and access to resources.

Conclusion

The study concludes that while lactating mothers in Coimbatore demonstrate good storage practices, the nutritional integrity of stored breast milk could be improved with additional guidance. Despite facing moderate challenges, the participants maintained acceptable storage practices. There is a clear need for community health initiatives to provide ongoing support and education to mothers regarding optimal storage practices and maintaining the

nutritional quality of expressed breast milk. Addressing these challenges will help improve the overall breastfeeding experience for mothers.

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Author's Contribution: ER and JS both were conceptualized and designed the study, carried out data collection and analysis, interpreted the findings, and prepared the final manuscript.

Declaration of Generative AI and AI-Assisted Technologies in the Writing Process: None

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