

Original Research Article

A cross-sectional study of breastfeeding device use and its determinants in mothers attending immunization outpatient department of an urban health training centre attached to a teaching medical institute

Amit A. Wanjare, Sujata S. Pol*, Seema S. Bansode-Gokhe

Department of Community Medicine, Lokmanya Tilak Municipal Medical College, Sion Mumbai, Maharashtra, India

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*Correspondence:

Dr. Sujata S. Pol,

E-mail: sspol2004@gmail.com

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ABSTRACT

Background: Breastfeeding as a practice was recommended by World Health Organization. Breastfeeding devices are used to feed the expressed breastmilk to infants, it is one determinant which is linked with both favourable and unfavourable outcomes in exclusive breastfeeding practices among term and pre-term infants.

Methods: This was a cross sectional, observational study carried at an urban health training centre. The study subjects were mother and their infants residing in the urban slum. Objectives of the research were to determine the proportion of exclusive breastfeeding, to find various breastfeeding devices used by mothers and the factors associated with it. A total of 230 mother-infant dyads were included in the study.

Results: Majority of mothers belonged to 21-30-year age group, housewives (93%) and Hindu by religion (68%). Majority received education till secondary school (57%) and 3.5% were illiterate. Majority had their first child before they turned 30 and most of the infants were female (55%). Over 3/4th of the infants were being exclusively breastfed, initiated on breastfeeding within first hour of birth (41%) and 1/5th received pre-lacteal feed. Breastfeeding device use was noted in 15 participants (6.5%), in which majority were using spoon followed by bottle. Mothers using breastfeeding devices showed higher proportion of exclusive breastfeeding.

Conclusions: Use of breastfeeding device showed association with mother's occupation, lower age of mother at the time of marriage and first delivery while religion and parity of mothers were not significantly associated with it.

Keywords: Exclusive breastfeeding, Breastfeeding devices, Infant nutrition, Expressed breast milk

INTRODUCTION

Breastfeeding has a universal acceptance in Indian society. In recent times the practices have evolved and seen many changes. The rapid urbanization, increased standard of living and bombardments of advertising had reduced the overall rates of breastfeeding and moved the needle towards the commercial formulas, cow or other animal milk. Breastfeeding is a process by which the infant receives milk from maternal breast. It is the process that helps in; not just the infant nutrition and health but also the mother-child bonding. Breastfeeding as a practice was recommended by World Health Organization (WHO)

(2001), for optimal feeding (i.e., exclusive breast feeding for the first 6 months and continued breastfeeding for up to 2 years, with the introduction of other foods).¹ Exclusive breastfeeding means feeding the infants only breast milk without giving any other food, not even water. It allows for prescribed medicines, immunizations, vitamins and mineral supplements.

The problems in breastfeeding like child-mother separation, maternal breast pathology, and infant's inability to suck can be overcome by using expressed breast milk (EBM) to feed the infant with the help of appropriate feeding devices. The evidence suggests that,

the use of breastfeeding devices dates back to thousands of years BC. Vessels of all size shape and make are found in the different eras of humanity that were used to feed the babies. It included modern equivalents of a cup, spoon, bottle with pointed ends, and *Paladai*. These devices were used as an alternative for wet nurses and to feed animal milk.²

Breastfeeding devices is one determinant which is linked with both favourable and unfavourable outcomes in EBF practices among term and pre-term infants. There is a real dearth in studies done on pattern of devices used like bottle, cup, spoon, and syringe, to feed the EBM to infants especially in first 6 months of life.

The rapid urbanization has led to acculturation due to the populations migrating from different cultures and walks of life towards the metros in search of a better tomorrow. This has made the cities a bustling centre for trade and opportunities. The changes in levels of education and standard of living in urban areas has largely influenced the infant feeding practices. The usage of such devices has some benefits for breastfeeding practices. However, there is little research on breastfeeding devices and equipment resulting in lacunae in knowledge about the subject. Thus this study was planned.

METHODS

It was a cross sectional, observational study conducted at an immunization outpatient department (OPD) of an Urban Health Training Centre of a Teaching Medical Institution.

Aim was to study the pattern of breastfeeding devices used by mothers to feed their infants (during first 6 months) and its determinants at an immunization OPD of UHTC attached to a teaching medical institute.

Objective

Objectives of the study were: to determine prevalence of mother who exclusively breastfed or are breastfeeding their infants, to find out various devices/equipment used by mothers to feed their breast milk to their infants and factors associated with it, and to assess the effects of these devices on breastfeeding.

Sample size

As per the records available at urban health training center, for the year total population of infants under 6 months in field practice area of urban health training center was 570. The prevalence of exclusive breastfeeding in the population was found by another study as 64.4%.³ So the sample size was calculated by using the following formula.

$$n = [DEFF \times Np(1 - p)] / [(d^2/Z^2(1 - \alpha/2) \times (N - 1) + p \times (1 - p))]$$

Here, population size (N): 570, hypothesized % of exclusive breastfeeding in the population (p): 64%±5, confidence limits as % of 100 (d): 5%, design effect (for cluster surveys-DEFF): 1, and at 95% CI the sample size came to be 219.

Sampling method

A simple random sampling method was used.

Inclusion criteria

All the mothers with an infant up to 9 months of age attending the immunization OPD at an UHTC attached to a Teaching Medical Institute; mothers who were resident of urban field practice area of the Teaching Medical Institute; and the mothers who were willing to participate in the study were included

Exclusion criteria

Mothers or infants seriously ill at the time of study were excluded.

Study period

This study was conducted between December 2020 and January 2022.

Study tools

A structured, pre-tested and pre-validated questionnaire was administered to study the breastfeeding practices of the participants.

Methodology

Protocol was presented in the departmental review board and approval was received. Institutional ethics committee and Board of Research Studies committee approval was then received. Then consent was obtained from study subjects. This was followed by data collection using a pretested questionnaire by taking interviews, data compilation and data entry into excel 2016. Finally, analysis and interpretation was done.

RESULTS

A total of 230 mother-infant dyads were included in the study. Majority of mothers were between 21-30-year age group (76%) followed by those in the 31-40 years (15%) age group. Most study subjects were housewives (93%) and belonged to Hindu religion (68%) followed by Muslims (30%). It was observed that more than half of the study participants had studied at least till Secondary school (57%) and only a small minority were illiterate (3.5%). It was noted that over half of the participant were multipara (54%) and more than a third were primiparas (36%). Most of the participants had their first child before they turned 30 and only a small minority had first delivery after the age

of 30 years (5%). In this study the gender of the infants enrolled was female (55%) followed by males (45%) (Table 1).

Table 1: Sociodemographic profile of participants.

Parameter	Frequency	Percentage
Mother's occupation		
Full time employee	16	7.0
Housewife	214	93.0
Total	230	100
Gender of the baby		
Male	103	44.8
Female	127	55.2
Total	230	100
Religion		
Hindu	157	68.3
Muslim	69	30.0
Christian	3	1.3
Sikh	1	0.4
Total	230	100
Education		
Illiterate	8	3.5
Primary school	35	15.2
Secondary school	131	57.0
Higher secondary school	35	15.2
Graduation	13	5.6
Post-graduation	8	3.5
Total	230	100
Age group (years)		
Below 20	20	8.7
21-30	175	76.1
31-40	35	15.2
Total	230	100
Mothers age at the time of first delivery (in years)		
Below 20	43	18.70
21-25	120	52.17
26-30	56	24.35
31-40	11	4.78
Total	230	100
Obstetric history		
Primi-para	83	36.1
Multi-para	125	54.3
Grand multi para	22	9.6
Total	230	100

The study revealed that more than 3/4th of the infants were being exclusively breastfed while the rest were not being breastfed exclusively. Most of the newborns were initiated on breastfeeding within first hour of birth (41%) followed by 1-4 hours (20%). About 1/5th of the infants received pre-lacteal feed, a feeding practice which is not recommended in newborns. Breastfeeding device use was noted in 15 participants (6.5%), in which majority were using spoon (10) for feeding the breastmilk and rest were using a bottle with nipple (05) (Table 2).

Table 2: Infant feeding practices observed in the study.

Parameter	Frequency	Percentage
Exclusive breastfeeding		
Yes	175	76
No	55	24
Pre-lacteal feeding		
Yes	50	21.74
No	180	78.26
Total	230	100
Breastfeeding initiation time (hours)		
<1	95	41.30
1-4	47	20.43
4-12	34	14.78
12-24	11	4.78
>24	43	18.70
Total	230	100
Breastfeeding device use		
Yes	15	6.5
No	215	93.5
Total	230	100
Type of feeding device		
Spoon	10	66.6
Bottle	5	33.4
Total	15	100

It was observed that 12 out of 15 (80%) of mothers who were using breastfeeding devices were practicing EBF at the time of study. On the other hand, 163 out of 215 (75.81%) mothers who never used breastfeeding devices were practicing EBF. Fisher's exact test was used to determine if there was a significant association between device use and EBF practice. P value was >0.05 i.e. there was no statistically significant association between the two (Table 3).

Table 3: Association between exposure of infants to the breastfeeding devices and the practice of exclusive breastfeeding (N=230).

Feeding devices used	Exclusive breastfeeding (%)		
	Yes	No	Total
Yes (n₁)	12 (80)	3 (20)	15 (100)
No (n₂)	163 (75.8)	52 (24.2)	215 (100)

Not significant, P value >0.05

Breastfeeding device use was seen in over 2/3rd of the full-time working mothers (68.75%) were using meanwhile; just a small fraction of housewives (1.8%) were using Breastfeeding devices (odds ratio 115.5). The difference was statistically significant. Breastfeeding device use was noted among 7% of Hindus and 5.8% of Muslims and the odds were 1.2 times higher in Hindus compared to Muslims. P value was >0.05. Primi or multipara status was not found to be associated with use of breastfeeding device. Both primi and multi paras had around 6% of

prevalence of breastfeeding device use in this study (Table 4).

Table 4: Factors associated with feeding device use (using Chi square test).

Factors and variable	Feeding devices		Statistical significance (p value)
	Yes (n ₁)	No (n ₂)	
Occupation of mother			
Full time employee	11	5	<0.05**
Housewife	4	210	
Total	15	215	
Religion			
Hindu	11	146	>0.05
Muslim	4	65	
Total	15	211	
Parity of mother			
Primi-para	5	78	>0.05
Multi-para	10	137	
Total	15	215	

**Statistically significant

There were 15 mothers who used breastfeeding devices with mean age of marriage 19.93 years (SD=2.71) and 215 mothers who did not use breastfeeding device had mean age of marriage 21.87 years (SD=3.19). Two sample t test was applied and p value was <0.05 and significant statistically. Mothers using breastfeeding device had their first child earlier at the mean age of 21.66 years (SD=3.10) compared non user group which had had it at the mean age of 23.66 years (SD=3.69). P value was <0.05 significant statistically (Table 5).

Table 5: Factors associated with feeding device use (using t test).

Factors	Feeding devices		Statistical significance (p value)
	Yes (n ₁)	No (n ₂)	
Mothers age at the time of marriage			
Sample size	15	215	<0.05**
Mean age of mothers at the time of marriage (years)	19.93	21.87	
Standard deviation	2.71	3.19	
Mothers age at the time of first delivery			
Sample size	15	215	<0.05**
Mean age of mothers at the time of first delivery (years)	21.66	23.77	
Standard deviation	3.10	3.69	

**Statistically significant

DISCUSSION

This study was a cross sectional, observational research study carried out in urban health training centre attached to a teaching medical institute. The study subjects were mother and their infants residing in the urban slum of a metropolitan city attending the immunization OPD at the said UHTC.

A total of 230 mother-infant dyads (units) were studied in which majority of the mothers in this 175 (76%) belonged to the age group of 21-30 years. Similar findings were observed by Subbiah et al when they studied factors influencing breastfeeding practices in a Delhi slum; they observed the maximum mothers from the same group were 78%.⁴ Randhawa et al reported to have 58% mothers to be 21-30 years in a Patiala city slum while studying EBF factors.⁵

In this study, over 95% mothers were literate and over half of them (57%) had completed at least secondary school. A similar population studied in a Kolkata slum by Roy et al had reported that 81.36% were literate in their study.⁶ Mothers h/o working 6 months prior to pregnancy to the day of study was taken. It was found that the 93% of the participants were housewives and just 7% were working in a full-time job. Majority of the working mothers were working as a clerk. Similar findings were reported by Randhawa et al where they found that about 95% of the mothers were housewives.⁵ Chanani et al reported that among the mothers with infants less than 6 months 96% were housewives in the same community.⁷ Subbiah et al and Roy et al, however found that only 74.6% 69.1% respectively were housewives in their study.^{4,6} 68% of the participants were Hindus in this study and 30% were Muslims. similar findings were reported by Subbiah et al.⁴

It was observed that over half of the mothers in the study were married in their twenties and also a considerable number (43.5%) were married off before the age of 20. Mean age of marriage was found to be 21.75 years (SD=3.1 years). Since the legal age of marriage in India was 18 years for females (recently changed to 21 years) it seems logical the majority of mothers would be in their twenties. Kumar et found similar pattern in their study where they observed that mean age of marriage was 21.16 years (SD=2.6 years).⁸ Yadavannavar et al observed that mean age of marriage in their study was 16 years which is much lower than this study.⁹ Over half the participants had their first childbirth between the ages of 21-25. and about 1/4th had it in 26-30 years. A sizeable proportion (18.70%) gave birth to the children by the age of 20 years. Mean age at the first delivery was observed to be 23.63 years (SD=3.69). This study observed that more than half of the mothers in the were multipara and over 1/3rd were primipara. Vasanthkumar et al studied 3 birth cohorts in South India and observed that 67% i.e. over 2/3rd were multiparas and 1/3rd were primi mothers.¹⁰ Majority of infants were females in this study (55%) and rest were males (45%). Recent NFHS-5 data suggests that the sex

ratio has been improving (currently at 1019 females per 1000 males) in the district at which this study was conducted, which maybe the reason why the female preponderance is seen more here.¹¹ Bansal et al observed that 60% of subjects in their study were males while the rest 40% were females.¹²

The cumulative practice of exclusive breastfeeding for all the age groups was at 76% in this study meanwhile, 24% did not follow the practice of EBF. This was much higher than national average of 63.7% NFHS-5 but on par with the Maharashtra state average 71% as per the NFHS-5.^{11,13} Kulkarni et al found that in urban slum of Navi Mumbai the EBF rate was 70.2%, Chanani et al had done a study in the similar population and observed that EBF rate was 64% in infants up to 6-months age.^{3,14} Over a fifth of the infants were given pre-lacteal feeding in this study. Which is much lower than the findings of Kulkarni et al and Tiwari et al which was 36.1% and 63.8% respectively.^{14,15} This may be due to the prenatal counselling received by mothers at the centre regarding ideal breastfeeding practices. Over 40% mothers had initiated breastfeeding within the recommended 1 hour of birth. Another 40% started feeding within 12 hours and rest had delayed the breastfeeding initiation. This again can be regarded as an impact of activities done by health care workers of UHTC in this population. Kulkarni et al and Tiwari et al noticed a much lower percentages of early initiation in their study.^{14,15}

This study observed that 6.5% of mothers (n=15) were using some breastfeeding devices for feeding infants their expressed breastmilk (EBM). Spoon and bottle are the only two devices that were observed to been used in this study. Majority of mothers used spoon (67%) and rest were using bottle (33%). Developed countries have seen increasing trend of using expressed breastmilk to feed the infants. However, the literature describing the devices used to feed this EBM is sparse. Many studies have compared the use of devices in hospital setup for feeding infants like *Paladai* feeding, cup feeding, nifty cup, while many others studied the bottle feeding.¹⁸⁻²¹ Core curriculum for interdisciplinary lactation care by LEAARC has described some other devices and methods like dropper feeding, finger feeding, syringe feeding, Haberman's feeder to be used in cases of special needs infants like cleft palate.²²

Pang et al found in Singapore that 43.4% were doing direct breastfeeding, 40% were doing mixed feeding and 16.6% were doing EBM feeding only.²³ This study too doesn't explore the devices used for EBM feeding. Labiner-Wolfe et al found in the USA infants between ages of 1.5-4.5 months 85% had successfully expressed their breastmilk for feeding and over a 2/3rd of them were doing it occasionally or regularly.²⁴ A prospective cohort in Shanghai city, China recruited 389 mothers and studied the infant feeding pattern at 6 weeks. They noticed that over 60% of mothers were using either mixed (EBM + at breast) feeding or exclusively expressed BM feeding method. Jiang et al.²⁵ Studies done in Indian context were lacking so the comparisons could not be made. Nevertheless, the

low numbers of EBF feeding in this study compared to the once mentioned above could be because of the socio-cultural factors and also, the overall female literacy and workforce participation is still low in India compared to developed countries.

This study found that those using breastfeeding devices had 80% EBF rate and others who did not have EBF rate of 75%. Odds of EBF were 1.2 times high in breastfeeding device user group than non-user group. However, there was no statistically significant association between exposure to the feeding devices and EBF rate p value >0.05. Bream et al noticed that in an Inner-city population of African-Americans the EBF rates at 1.5-3.5 months were not significantly different in groups that either used or did not use EBM feeding.²⁶ Pang et al found that mothers feeding their infants expressed breastmilk had higher chance of early weaning (i.e. cessation of EBF) than the mothers feeding infants directly/at breast.²³

Over 2/3rd of the full-time working mothers were using breastfeeding device (68.75%) and just a small fraction of housewives (1.8%) were using breastfeeding devices (odds ratio 115.5). The difference was highly significant. In US, working mothers who were employed in past 4 weeks were highly likely to use EBM to feed their infants especially in 1.5 to 4.5 months age group (odds ratio 2.09; p value<0.05) Labiner-Wolfe et al.²⁴ Fan et al recruited 821 mothers from 2 public hospitals in Hongkong and observed that adjusted odds ratio for mothers returning work were 1.8, 8.7 and 13.5 (p value <0.001) at 1.5, 3 and 6 months respectively; compared to those not returning to work.²⁷ Jiang et al concluded that mothers who had maternity leave of 6 months or less (81%) had high chances of using EBM than those with >6 months maternity leave (18.8%) and was statistically significant (p=0.01).²⁵

This study did not find any association between religion and breastfeeding device use. 7% of Hindus and 5.8% of Muslims were using breastfeeding devices and odds were 1.2 times in Hindus compared to Muslims. P value was >0.05. Parity of mother was also found to be not associated with use of breastfeeding device. Both primi and multiparas had around 6% of prevalence of breastfeeding device use in this study. Jiang et al observed similar findings and concluded that parity had no effect on EBM feeding in their study population.²⁵ However, Pang et al and Fan et al noticed that primi mothers were more likely to feed EBM to their infants compared to multiparas and the difference was statistically significant (p<0.001).^{23,27} This difference is perhaps because of the lack of confidence in primi mothers regarding establishing proper breastfeeding.

Mean age of mothers using breastfeeding devices (19.93 years) was lower than those feeding at breast (21.87 years). The difference was statistically significant which suggests that early age at marriage was associated with breastfeeding device use in this study. It was also found that early age of first delivery resulted in significantly

higher chances of breastfeeding device use. This maybe because marrying/first delivery at an early age could result in lack of knowledge and maturity to establish optimum breastfeeding. This was a novel finding as previous studies evaluating this variable were not found.

Limitations

As this was a healthcare facility-based research study the scope of the results was limited to population with access to healthcare. Due to operational constraints, reasons for use of breastfeeding device in individual cases were not elaborated in this study which may be taken up in future research studies.

CONCLUSION

The changing landscape of breastfeeding practice in the socioeconomically dynamic population presents a challenge. This study presented a unique perspective in this field. Use of breastfeeding device was determined by occupation, lower age of mother at the time of marriage and the first delivery while religion and parity of mothers were not significantly associated with it. Present study underscores the need to shift the more focus towards the non-traditional methods of breastfeeding.

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