

Infant feeding practices in an urban tertiary care hospital: A descriptive longitudinal study

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ABSTRACT

Background: Infant and young child feeding are the corner stone for child development. More than a third of the world's undernourished children reside in India. Inadequate infant and young child feeding practices with inadequate care and management of common illnesses contributes to malnutrition. **Objective:** To study the prevailing infant feeding practices and determine influence of factors on infant feeding in a tertiary care hospital. **Materials and Methods:** A descriptive longitudinal follow-up study was conducted in a tertiary care hospital between November 2010 and April 2012. Maternal and baby's profiles were obtained using oral questionnaire after birth by personal one-to-one interview. These cases were followed up for their infant feeding practices till 1 year of age in outpatient department and also by telephonic conversation. Continuous variables were analysed by mean and SD. For categorical variable frequency and percentage were determined. **Results:** 61.25% mothers had initiated breastfeeding within 1 h. Prelacteal feed was given to 28.6% babies. 61.5% had initiated complementary feed at 6 months. Bottle feeding was preferred mode of feeding. There was a statistically significant association between initiation of breastfeeding and parity ($p=0.022$) and type of delivery ($p<0.0001$), religion and complementary feeding introduction ($p<0.001$), religion and duration of exclusive breastfeeding (EBF) ($p=0.003$), occupation and EBF duration ($p=0.005$), education ($p=0.015$), and religion ($p=0.001$) were associated with prelacteal feeds. **Conclusions:** Infant feeding practices observed from the study include early initiation of breastfeeding, appropriate duration of EBF, and timely introduction of complementary feed. Practice of prelacteal and bottle feeding was seen. Infant feeding practices are found to be influenced by several socio-demographic factors.

Key words: *Infant feeding, Influencing factors, Prelacteal feed*

Providing optimum nutrition is essential for the survival of each child and for the quality of its survival. Breastfeeding is the natural complete optimum food during the initial 6 months of life and successful breastfeeding has to be learnt and practiced. Breastfeeding has to be continued till 2 years of age as breast milk contains factors required for brain growth and development [1]. Complementary feeding has to be started appropriately at 6 completed months to prevent malnutrition and micronutrient deficiencies [1,2]. According to National Family Health Survey-4 (NFHS-4 survey), India has less than 5 years mortality rate of 50 with infant mortality rate being 41. Children less than 5 years who are stunted and wasted are 38.4 and 21%, respectively, as compared to NFHS-3 where 42.5% of children less than 5 years were underweight [3]. Malnutrition in turn has a profound consequence on physical, mental health, development of children, and on Indian society [4]. NFHS-4 survey also showed that 21% of the mothers had full antenatal care and 68.4% women were literate [3].

Infant feeding practices have a major role in determining nutritional status of the child [5]. Human nutrition is influenced

by cultural beliefs and norms which have been identified as the determinants of breast feeding practice. There is a need for those involved in promoting breastfeeding to understand these sociocultural and environmental circumstances around breastfeeding [6]. India is one of the first countries to take the lead in harmonizing the global recommendations on infant and young child feeding in its policies [7]. India has shown a less satisfactory progress in duration of exclusive breastfeeding (EBF duration) (54.9%), introduction of complementary feed at 6-8 months (42.7%) as shown in NFHS - 4 compared to NFHS-3 survey [3]. Studies have shown that high-income countries have shorter duration of EBF when compared to low and middle-income countries where 37% children younger than 6 months are exclusively breastfed. (i.e., where 37% children younger than 6 months are exclusively breastfed) [8].

Several studies conducted on the infant feeding practices in rural, tribal, and urban areas [7,9-12] found less satisfactory feeding practices and lack of knowledge about appropriate infant feeding. Studies done abroad also showed that knowledge, awareness, social, and cultural factors influence the infant

feeding practice and appropriate intervention are required [6,13]. This study aimed to study the prevailing infant feeding practices and determine the factors influencing infant feeding in a tertiary care hospital; thereby, to improve infant feeding practices and to achieve optimal nutrition of the child.

MATERIALS AND METHODS

A descriptive longitudinal follow-up study was conducted from November 2010 to April 2012 (18 months) in a tertiary care Baby Friendly Hospital Initiative certified hospital located in an urban setting. Inborn term infants who are likely to be followed in tertiary care hospital were included from birth and were followed up till 1 year of age. Preterm infants, infants with severe illness, and infants with conditions where breastfeeding was contraindicated were excluded from the study. The sample size calculated was 207 using the formula $n = Z^2 (1-\alpha/2) \times p \times q / d^2$. Sample size worked out to be 240 after adding 15% of cases taken as lost to follow-up. Ethical committee clearance and verbal consent were taken before recruitment.

Eligible term newborn babies born in our hospital were recruited by non-probability consecutive sampling technique. Maternal profile including age, education, occupation, type of family, antenatal care received, birth details, and pro forma of the baby were obtained using oral questionnaire after birth by personal one-to-one interview. Details of baby including date of birth, gender, time of initiation of breastfeeding, prelacteal feeding and duration intended to breastfeed, and attitude of close family members toward infant feeding (reason for breastfeeding and complementary feeding, timing of introduction of complementary feed) were noted. These cases were followed up for their feeding practices till 1 year of age during their out-patient department visits at regular intervals (1.5 month, 3.5 months, 6 months, 9 months, and 1 year) and also through telephonic conversation (4-6 times in 1 year). Complementary feeding practices, mode of feeding, and weight of baby were noted at each visit. All mothers with the available family members were counseled regarding infant feeding practices based on infant and young child feeding (IYCF) guidelines in the post-natal period and also during their follow-up visits. Disadvantages of bottle feeding and alternate feeding method through paladai or cup were also explained. Lactation counseling by the lactation specialist was done.

Out of total 240 cases studied 20 cases were lost for follow-up during the study period Fig. 1.

Data Analysis and Interpretation

Data were entered into excel and analyses were done using the Statistical Package for Social Sciences (SPSS) for Windows software (version 20.0). Descriptive statistics such as mean and standard deviation (SD) for continuous variables and frequency and percentage for categorical variables were determined. The Chi-square test and fisher's exact test (when appropriate) were used to show the associations between predictor and outcome variables. The level of significance was set at 0.05.

RESULTS

Distribution of the mothers according to their biosocial characteristics is depicted in Table 1. All 240 mothers had received antenatal care. Primiparous mothers were 155 (64.6), 35% mothers had multiple birth. Although only 9 out of 240 (3.8%) had received antenatal feeding advice, 32 out of 240 (13.3%) mothers had knowledge of infant feeding practices. About, 32% of working mothers had 6 months and 36% <3 months of maternity leave, respectively. 142 (59.2%) babies were delivered by vaginal route and 98 (40.8%) by cesarean section. Sources of knowledge of mothers regarding infant feeding practices are shown in Table 2. Prelacteal feed was given to 21 (8.8%) babies as a custom and 219 (91.2%) babies had not received the same. Sugar water (76.2%) was the most common form of prelacteal feed, followed by honey (19%) and holy water (4.8%).

Breastfeeding was initiated after 1 h in 12 out of 21 babies who had received prelacteal feed as compared to 9 babies who were breastfed within 1 h of birth. All mothers had fed colostrum to the babies. 61.25% (147) mothers had initiated breastfeeding within 1 h of birth and 38.75% (93) mothers after 1 h of birth. 128 (58%) babies were given EBF for 6 months and 93 (42%)

Table 1: Distribution of mothers according to their biosocial characteristics (n=240)

Biosocial characteristics	n (%)
Age (in years)	
≤18	3 (1.3)
19-24	123 (51.3)
25-29	90 (37.5)
30-34	20 (8.3)
≥35	4 (1.7)
Mean±SD	25.0±3.33
Range	17-38
Religion	
Hindu	137 (57.1)
Muslim	38 (15.8)
Christian	65 (26.7)
Type of family	
Nuclear	89 (37.1)
Non-nuclear	151 (62.9)
Education	
Illiterate	1 (0.4)
Primary school	13 (5.4)
High school	87 (36.2)
Intermediate	41 (17)
Graduate	91 (37.9)
Postgraduate	7 (2.9)
Occupation	
Homemaker	190 (79.3)
Working	50 (20.8)
Full time	48 (96)
Part time	2 (3.8)

SD: Standard deviation

babies were EBF for <6 months. 200 (90.9%) mothers continued to breastfeed the infant at 1 year of age and 20 (9%) mothers had stopped breastfeeding at 1 year. Reasons for delay in breastfeeding initiation are shown in Fig. 2.

Respondent's opinion on infant feeding and reason to introduce complementary feeding were questioned and their response was noted in their own words. 33.3% mothers wanted to breastfeed up to 1 year, 49% between one to 2 years, 3.4% wanted to breastfeed beyond 2 years of age. 75.4% felt that breastfeeding is good for baby's health, breastfeeding provided all nutrients to 12.5% respondents, 9.6% felt that breastfeeding enhances growth, development and immunity, 2.5% were not aware about reason for breastfeeding. 68.3%, 11.3%, and 1.3% respondents believed that complementary feeding should be introduced after 5-6 months, after 3 months, and 9-12 months, respectively. 55% felt that complementary feed enhances growth, development, and provides all nutrients. 5.8% believed in starting complementary feeding as per doctor's advice.

Reasons for the introduction of complementary feeding were as follows (multiple responses were noted): 91% had introduced complementary food for better growth and development, 10.3% to resume work (working mothers), 7.2% due to insufficient

breastmilk, 5.8% based on advice from family members. Distribution of breastfeeding frequency, artificial feeding and mode of feeding, type of complementary food of infants at various age intervals is shown in Table 3. Association of time of initiation of breastfeeding with biosocial characteristics of mothers, and baby is shown in Table 4. Association of biosocial characteristics of mothers with duration of EBF, introduction of complementary food, and prelacteal feeding is shown in Table 5.

Both commercial and homemade complementary food was introduced. Commercial complementary (17.5%) food was given over homemade food (6.7%) at the time of introduction, and by 1 year of age, 50.4% were on home-based diet. Freshly prepared complementary feed was given to all the 220 infants. 88.7% of mothers wanted to continue feeding their babies during illness in mother, 96.6% wanted to continue feeding during illness in baby, and about 3% wanted to feed as per the doctor's advice. No statistically significant association has been found between duration of EBF, complementary feeding introduction and type of delivery, gender of the baby, birth weight, number of children, and number of antenatal care visits. There was no significant association between prelacteal feeding and initiation of breastfeeding ($p=0.070$).

Table 2: Sources of knowledge regarding infant feeding practices (n=32)

Source	n (%)
Previous pregnancies	10 (31.3)
Mass media	3 (9.4)
Friends	2 (6.3)
Relatives	11 (34.4)
College	3 (9.4)
Health professionals	3 (9.4)

Table 3: Distribution of breastfeeding frequency, artificial feeding, mode of feeding, and type of complementary food of infants at various age intervals

Characteristics	Age of the baby, n (%)				
	1½ months	3½ months	6 months	9 months	12 months
Frequency of breastfeeding					
On demand	157 (70.4)	139 (62.9)	85 (38.5)	10 (4.6)	6 (2.7)
Frequent 2-3 hourly	61 (27.4)	33 (14.9)	10 (4.5)	1 (0.5)	0 (0)
During day and night	5 (2.2)	44 (19.9)	111 (50.5)	181 (82.3)	150 (68.2)
During night only	0 (0)	0 (0)	2 (0.9)	5 (2.3)	44 (20)
Artificial feed					
Formula feed	11 (73.4)	27 (79.4)	49 (62)	47 (39.8)	31 (21.5)
Cow's milk	4 (26.7)	7 (20.6)	30 (38)	71 (60.2)	114 (78.6)
Mode of feeding					
Paladai	0 (0)	0 (0)	11 (14.1)	25 (21)	10 (7.2)
Bottle	15 (100)	33 (100)	67 (85.9)	93 (78.1)	102 (71.3)
Cup	0 (0)	0 (0)	0 (0)	1 (0.9)	31 (21.6)
Types of complementary food					
Liquids*	15 (6.7)	32 (14.4)	84 (38.2)	122 (55.4)	145 (66)
Semisolids	0 (0)	4 (1.8)	212 (96.3)	218 (99)	197 (89.5)
Solids	0 (0)	0 (0)	0 (0)	0 (0)	23 (10.5)

*Includes clear broth, juice, infant formula, Cow's milk, and thin porridge

DISCUSSION

Optimal IYCF practices which includes EBF, timely, adequate and safe appropriate introduction of complementary feeding provides the best start to life [4]. The present study revealed both positive and negative aspects of infant feeding. In this study, the mean age of the mothers was 25 years which has been similar to other studies like Gupta and Gupta [7]. The majority of the mothers were Hindus which is comparable to study by Gupta and

Gupta and Roy et al. [7,14]. Although the study was conducted in an urban setting, 62.9% belonged to non-nuclear families. Infant feeding practices can be affected by family type as shown by Romola et al. [15]; however, our study did not show any significant association. Our study showed majority of the mothers

being homemakers in comparison to working women. Similar findings were found by Gupta and Gupta and Roy et al. [7,14].

All mothers had received antenatal care. Antenatal feeding advice was not received by 96.2% mothers, which has been similar to 83.5% of mothers from Manipur study [15]. Gupta and Gupta had also observed that mothers had not received antenatal infant feeding advice [7]. Roy et al. study showed that 41.6% mothers had received information regarding EBF and 56.67% from health facility [14]. Several sources and different communication methods can influence mother on infant feeding as shown in the study. In our study, 8.8% babies had received prelacteal feeds as a religious custom. It has been consistent with the study (2.3%) from Manipur [15]. Higher rates of prelacteal feeding of 49% (Gupta and Gupta), 80% (Kashyap and Sethi), 29.16% (Roy et al.) has been noticed [7,14,16] from different regions. Compared to other urban studies from Kurnool (20.58%) and Shimla (44%), percentage of babies who were given prelacteal feed was less [17,18]. Incidence of prelacteal feeding was noted more among Muslim community (23.7%) as compared

Table 4: Association of time of initiation of breastfeeding with biosocial characteristics (n=240)

Biosocial characteristics	Initiation of breastfeeding, n (%)		p value
	within 1 h of birth	>1 h of birth	
Age (in years)			
<18	1 (33.3)	2 (66.7)	0.880
19-24	77 (62.6)	46 (37.3)	
25-29	55 (61.1)	35 (38.9)	
30-34	12 (60.0)	8 (40.0)	
>35	2 (50.0)	2 (50.0)	
Religion			
Hindu	88 (64.2)	49 (36.0)	0.384
Muslim	22 (55.2)	16 (42.1)	
Christian	37 (56.9)	28 (44.7)	
Type of family			
Nuclear	57 (64)	32 (35.9)	0.935
Non-nuclear	90 (60.1)	61 (40.3)	
Education of mother			
Illiterate	1 (100.0)	0 (0.0)	0.684
Primary school	7 (53.8)	6 (46.2)	
High school	58 (66.6)	29 (34.1)	
Intermediate	24 (58.5)	17 (43.6)	
Graduate	53 (58.2)	38 (41.8)	
Postgraduate	4 (57.1)	3 (42.9)	
Occupation			
Homemaker	118 (62)	72 (38)	0.185
Working	29 (58)	21 (42)	
Number of children			
0	90 (58)	65 (42)	0.022
1	53 (72.6)	20 (27.4)	
2	4 (36.4)	7 (63.6)	
3	0 (0.0)	1 (100.0)	
Number of ANC visits			
<3	2 (66.7)	1 (33.3)	0.470
4-7	73 (64.4)	39 (35.6)	
8-10	72 (56.6)	53 (43.4)	
Type of delivery			
Vaginal	111 (78.2)	31 (21.8)	<0.0001
Cesarean section	36 (36.8)	62 (63.2)	
Sex of the baby			
Male	68 (56.6)	52 (43.3)	0.173
Female	79 (65.8)	41 (34.1)	
Birth weight of baby			
<2.5 kg	21 (63.6)	12 (36.4)	0.762
>2.5 kg	126 (60.9)	81 (39.1)	

ANC: Antenatal care

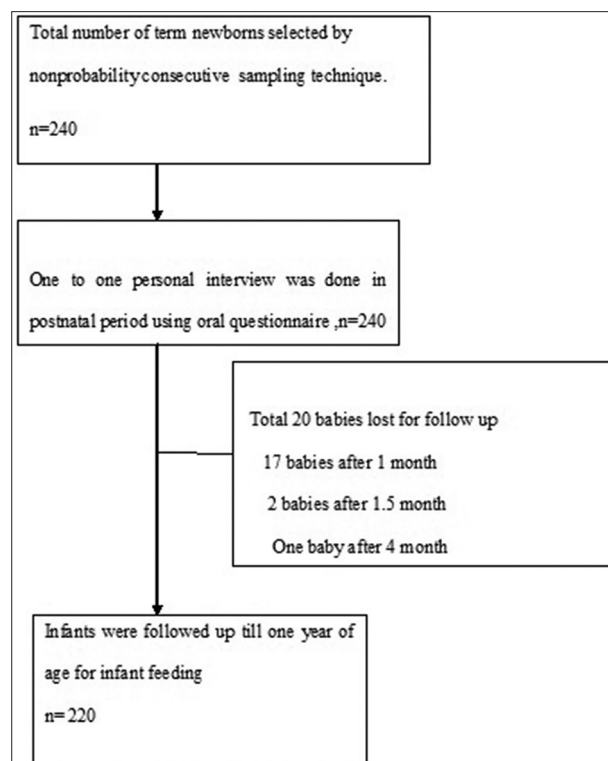


Figure 1: Study flowchart

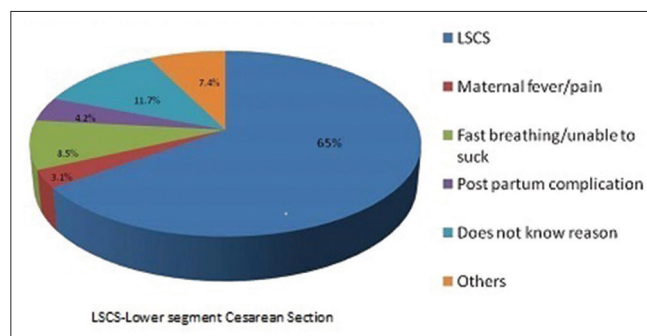


Figure 2: Reasons for delay in breast feeding initiation

Table 5: Association of biosocial characteristics of mothers with duration of exclusive breastfeeding, introduction of complementary food, and prelacteal feeding

Biosocial characteristics	Exclusive breastfeeding duration n (%)		p value	Complementary food introduction n (%)		p value	Prelacteal feed n (%)		p value
	<6 months	≥6 months		<6 months	≥6 months		Given	Not given	
Age (in years)									
<18	2 (0.9)	1 (0.45)	0.366	2 (0.9)	1 (0.45)	0.45	1 (33.3)	2 (66.7)	0.261
19-24	49 (22.17)	65 (29.4)		41 (18.6)	73 (33)		14 (11.5)	109 (88.6)	
25-29	29 (13.12)	51 (23)		22 (9.9)	58 (26.2)		5 (5.6)	85 (94.4)	
30-34	10 (4.52)	10 (4.5)		6 (2.7)	14 (6.3)		1 (5.0)	19 (95.0)	
>35	3 (1.3)	1 (0.45)		2 (0.9)	2 (0.9)		0 (0.0)	4 (100.0)	
Religion									
Hindu	41 (18.6)	83 (37.6)	0.003	33 (14.9)	91 (41.7)	<0.001	11 (8.0)	126 (92.0)	0.001
Muslim	23 (10.4)	14 (6.3)		23 (10.4)	14 (6.3)		9 (23.7)	29 (76.3)	
Christian	29 (13.1)	31 (14)		17 (7.6)	43 (19.5)		1 (1.6)	64 (98.4)	
Type of family									
Nuclear	32 (14.47)	48 (21.7)	0.63	23 (10.4)	57 (25.8)	0.308	4 (4.5)	85 (95.5)	0.071
Non-nuclear	61 (27.6)	80 (36.1)		50 (22.6)	91 (41.2)		17 (11.3)	134 (88.7)	
Education									
Illiterate	7 (3.16)	5 (2.26)	0.18	4 (1.8)	8 (3.6)	0.074	1 (100)	0 (0.0)	0.015
Primary school	37 (16.74)	38 (17.2)		32 (14.5)	43 (19.4)		2 (15.4)	11 (84.6)	
High school	11 (4.97)	28		9 (4)	30 (13.6)		11 (12.8)	76 (87.3)	
Intermediate	34 (15.38)	55 (24.8)		24 (10.8)	65 (29.4)		3 (7.5)	38 (92.5)	
Graduate	3 (1.35)	2 (0.9)		3 (1.3)	2 (0.9)		4 (4.4)	87 (95.6)	
Postgraduate	1 (0.45)	0 (0)		1 (0.45)	0 (0)		0 (0.0)	7 (100)	
Occupation									
Homemaker	65 (29.41)	110 (49.8)	0.005	56 (25.3)	119 (53.8)	0.525	20 (11)	170 (89)	0.064
Working	28 (12.66)	18 (8.14)		17 (7.69)	29 (13.1)		1 (2)	49 (98)	

to other religion. Similar practice of prelacteal feeding with holy water (42.4%) and glucose (9%) was found in Muslims in a study conducted in Kerala [19].

Education had significant association with prelacteal feeding. More educated mothers had not given prelacteal feed as compared to less educated mothers. Similar results were seen in a study by Shankar and Muthukumar [20] among rural mothers from Nepal [21]. Although there was no significant association between type of family and prelacteal feed, practice was more prevalent in non-nuclear (11.3%) families. The presence of prelacteal feeding in an institutional delivery given as a religious custom shows the influence of religious practices on prelacteal feeding. The study has also shown significance of maternal education on practice of prelacteal feeding. 38.75% babies had delay in initiation of breastfeeding. 61.25% babies were breastfed within 1 h which is consistent with a study from Gujarat where more than half of the mothers (57.5%) started breastfeeding within 1 h of child's birth [22]. It is also comparable to NFHS-4 survey (56.4%) in Karnataka [3].

All babies had received colostrum which is similar to one study from Kerala [19]. Lower segment cesarean section (LSCS) was the main reason for delay in initiation of breastfeeding according to 65% mothers suggesting that these mothers require additional support in the immediate post-partum period to initiate early breastfeeding. Our study showed significant association

between type of delivery and breastfeeding initiation which has been consistent with results from a Mauritius study [23]. The majority of the family members believed that breastfeeding has various benefits, which was similar to study by Woldegebriel [24] and from Egypt [25].

In the present study, family members believed that complementary feeding has to be started after 5-6 months. Gupta and Gupta also observed that elders have adverse influence on breastfeeding [7]. Though majority of the respondents had positive belief towards breastfeeding and complementary feeding, their knowledge regarding timely initiation and duration of breastfeeding, duration of EBF, introduction of complementary feeding was found to be less satisfactory. In our study, 58% of the babies were exclusively breastfed for 6 months, similar results are observed from the studies conducted in Gujarat (55.9%), Das et al. (58.7%) and NFHS-4 survey (54.9%) [3,22,26]. The present study also showed a statistically significant association between religion and duration of EBF. A study by Burdette and Pilkauskas showed association between religion and breastfeeding initiation and weaker association with duration of breastfeeding [27].

Occupation of the mothers was found to have an influence on duration of EBF. EBF was more among homemakers compared to working women. Only two of the 50 working mothers were employed in part-time sector. Similar significant association has

been seen in a study conducted by Al-Amoud [28]. Gupta and Gupta also observed that long working hours are detrimental for optimal feeding practices [7]. Study by Nkrumah showed that sector of employment may be an important predictor of EBF [29]. Similar findings from the UK also showed that part-time and self-employed mothers were more likely to breastfeed for longer period than those in full-time employment [30].

The present study showed that 61.5% babies were given complementary feed at 6 months in accordance with guidelines as compared to 42.7% from NFHS-4 survey. Complementary food was introduced to 84.6% infants between 4 and 6 months. Similar findings of 75.4% were found in Mauritius study [23]. 94% of the babies were on semisolids during 6-9 months which is consistent with a Nigerian (85.4%) study [31]. The use of commercial complementary food was more compared to homemade food. Similarly, 33.3% of commercial cereal food was given in a study by Paul et al. [32]. Bottle feeding was preferred at any given age as shown in the study even after counseling about ill effects and other available modes of feeding in the post-natal period. Studies from Bangladesh and Kuwait revealed that 74.2% and 41.9% babies were bottle fed, respectively [32,33]. Significant association was observed between introduction of complementary feed and religion which is consistent with another study from Kerala [19].

Maternal parity had an association with breastfeeding initiation and mothers with one live child were found to have breastfed the baby early. This has been consistent with studies from Pennsylvania [34] and Gujarat [22]. Although study showed no significant association between education and infant feeding, more educated mothers had exclusively breastfed the infants compared to mothers of lower educational status. This is consistent with study by Onah et al. which showed decreased likelihood of EBF practices among mothers of lower educational attainment [13]. Mohammed et al. showed a significant association between the education and EBF [25]. According to Webb et al., association between education, breastfeeding, and complementary feed initiation was significant [35].

Initiation of breastfeeding within 1 h of birth was more among mothers aged between 19 and 34 years, similar to the study by Vijayalakshmi et al. which showed that mothers >25 years of age had more positive attitude toward breastfeeding [36]. No significant association was found between maternal age and initiation of breastfeeding. Literature review suggested that relation between maternal age and feeding varies from place-to-place; hence, strategies should be implemented according to the region [37]. Strength of our study was that it was a hospital-based, descriptive longitudinal follow-up study. Limitations were that we have not determined the effects of socioeconomic status and maternal nutrition on infant feeding and a study on a larger cross-section of population is required.

CONCLUSIONS

Healthy infant feeding practices including timely initiation of breastfeeding, desired length of EBF and timely introduction

of complementary feeds was seen in more than half of the study population and colostrum was given to all babies. Infant feeding problems noticed were practices of prelacteal feeding, bottle feeding, and inadequate antenatal infant feeding advice. Demographic, maternal, and cultural factors such as maternal occupation, parity, type of delivery, religion, education, and prelacteal feeding have an influence on infant feeding practices.

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