

# Prevalent infant feeding practices among the mothers presenting at a tertiary care hospital in Garhwal Himalayan region, Uttarakhand, India

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## ABSTRACT

**Introduction:** There is paucity of studies on infant feeding practices from the rural areas of Garhwal Himalayas of the state of Uttarakhand. The present study was designed to assess the infant feeding practices in Garhwal region. Infant feeding practices have significant implications on a child's health. Early nutritional status especially during the first year of life has been shown to have a significant effect on child health and development. Optimal infant feeding practices are crucial for nutritional status, growth, development, health, and ultimately the survival of infants and young children. The study of infant feeding practices is essential before formulation of any interventional programme. **Settings and Design:** A study was conducted in HNB Base Hospital and Teaching Institute with the aim to assess the infant feeding practices and the prevalence of malnutrition in the study population reporting at the hospital in Garhwal region of Uttarakhand. **Methods and Material:** This is an observational cross-sectional study. 275 infants were included in the study. After taking informed consent, case study forms were filled by interviewing the infants' mothers. Weight, length and head circumference of each infant was also measured. The information thus obtained was compiled, tabulated and analysed statistically. **Results:** The study findings revealed that 46.4% infants in the age group 0-5 months were breastfed within 1 hour of birth. 52.8% infants aged 0-5 months were exclusively breastfed. 33.6% infants in age group 0-5 months received prelacteal feeds. 53.12% infants in age group 6-8 months received solid, semi-solid or soft food, in addition to breast milk. 53.33% infants were partially or fully bottle fed. Age appropriate feeding was found in 56% infants. The percentage of wasting, stunting and underweight in 0-5 months was 33.6%, 30.4% and 36.8% respectively. The percentage of wasting, stunting and underweight in 6-11 months was 28%, 26.5% and 30.7% respectively. There appeared to be an association between longer duration of exclusive breastfeeding and lower prevalence of stunting and underweight at 6 months of age. **Conclusions:** This study shows that undesirable infant feeding practices are still prevalent in the community. Lower prevalence of stunting and underweight was observed in infants with longer duration of exclusive breastfeeding. A comprehensive plan to address the problems in infant feeding should be formulated. Antenatal counselling of mothers should be done. Revitalization of the Baby Friendly Hospital Initiative (BFHI) in health facilities is recommended.

**Keywords:** Bottle feeding, breastfeeding, breast milk, formula feed, prelacteal feeds

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## Introduction

Breastfeeding and complementary feeding practices have long been validated to have significant implications for maternal and child health. Healthy breastfeeding and complementary feeding practices reduce child mortality and morbidity besides being essential for their optimal growth and development.<sup>[1]</sup>

The World Health Organization (WHO) recommends exclusive breastfeeding for the first 6 months of life with early initiation and continuation of breastfeeding for 2 years or more together with nutritionally adequate, safe, age-appropriate complementary feeding starting at 6 months.<sup>[2]</sup>

Feeding practices prevalent in the community affect the nutritional status of infants.<sup>[3]</sup>

The poor feeding practices render the children more vulnerable to irreversible consequences of stunting, poor cognitive development, and significantly increased risk of infectious diseases such as diarrhea and acute respiratory infection.<sup>[4-6]</sup> Hence, the review of local infant feeding practices is indispensable. Research-based evidence is required to support area and local health priorities in relation to infant feeding practices and to guide child and family health service decisions. Although there are reports on health and nutritional aspects of hilly regions of Uttarakhand, very few studies exist on infant feeding practices from the rural areas of this state.<sup>[7]</sup>

Hence, an effort was made to study the infant feeding practices in Hemwati Nandan Bahuguna Base Hospital and Teaching Institute, Srinagar Garhwal which mainly caters to the rural areas of Garhwal region. Furthermore, this study will provide data regarding the prevalence of malnutrition in the study population and outline trends in nutritional status. Nutritional status indicators can be used to identify those infants at a higher risk of mortality<sup>[8-12]</sup> so that they can be provided with special care.

Infant feeding practices have incited interest of researchers all over the world including India.

Early nutritional status, especially during the 1<sup>st</sup> year of life, has been shown to have a significant effect on child and adult health and development. Optimal infant feeding practices are crucial for nutritional status, growth, development, health, and ultimately the survival of infants and young children.<sup>[4,13,14]</sup> Feeding practices were elicited using 24 h recall method as this method has been found appropriate in a survey of dietary intake.<sup>[15,16]</sup>

National Family Health Survey 3 (NFHS-3) (India)<sup>[17]</sup> has revealed alarming patterns of infant feeding practices in Uttarakhand. It documents a mere 31.2% children aged <6 months being exclusively breastfed with 51.65% infants in the age group of 6–9 months receiving appropriate complementary feeding. First-hour feeding rates have been shown to be as low as 21%.<sup>[7]</sup> These findings are clearly far from

satisfactory. This study sought to assess whether any progress has been made on these heads.

Marriott *et al.* analyzed WHO infant and young child feeding indicators and associations with growth measures and observed that early initiation of breastfeeding and meeting the complementary feeding guidelines was highly associated with lowered risk of stunting and underweight.<sup>[18]</sup> This study aims to find such association if it exists at this level.

Studies have shown a gradual increase in the prevalence of malnutrition throughout infancy.<sup>[19]</sup> This study will check the presence of such pattern in the selected target population. The primary objective of the study would be to assess the infant feeding practices in Garhwal region.

## Materials and Methods

A total of 275 infants attending the pediatrics clinics (outpatient department + well-baby clinics + immunization clinics) were included in the study. This study is an observational, cross-sectional study and was carried out during the months of May and June 2012.

### Exclusion criteria

1. Mother unwilling to give consent
2. Infant not accompanied by mother
3. Any illness of the infant affecting feeding as diagnosed by the attending pediatrician
4. Contraindications to breastfeeding.

Informed consent was obtained and data were collected from mothers according to two predesigned questionnaires one each for infants aged <6 months and infants aged >6 months containing questions regarding the personal details, infant's first feed, prelacteal feeding, frequency of breastfeeding, duration of breastfeeding, exclusivity of breastfeeding, age of initiation of complementary food, food items used for complementary feeding, food hygiene, etc., using interview method.

Feeding practices were elicited using 24 h recall method. Historical recall method was used for prelacteal feeds (defined as any other food offered to the young infant before the breast milk at the time of birth) and initiation of breastfeeding and complementary feeding. Seven-day diet record method was additionally used for the assessment of complementary feeding practices.

Jones *et al.* after studying the association of these feeding indicators with child anthropometry using recent Demographic and Health Survey stated that the WHO indicators are clearly valuable tools for broadly assessing the quality of child diets and for monitoring population trends in infants and young child feeding practices over time.<sup>[20]</sup> The following anthropometric measurements were taken:

1. Length – measured using an infantometer with a precision of 0.1 cm
2. Weight – measured using a digital weighing scale having a resolution of  $\pm 5$  g
3. Head circumference (HC) – measured using a nonstretchable fiber-glass tape.

The WHO classification of malnutrition was used which enables us to estimate the prevalence of undernutrition using all the three indices - underweight, stunting, and wasting. The three indices such as stunting, wasting, and underweight reflect distinct biological processes and their use is necessary for determining appropriate interventions.<sup>[21]</sup> The nationally representative NFHS-3 database also uses the WHO classification of malnutrition.<sup>[17]</sup> The current recommendation is to use the Z-score or standard deviation system to grade undernutrition.<sup>[21,22]</sup>

The nutritional survey option in WHO Anthro 2005 software (WHO, Geneva, Switzerland) for assessing growth and development was used to calculate weight-for-age, length-for-age, weight-for-length, and HC-for-age Z-scores on the basis of WHO standards. An infant was defined as stunted, wasted, or underweight if his or her length-for-age, weight-for-length, or weight-for-age Z-score, respectively, was  $< -2$ . Moderate stunting, moderate wasting, or moderate underweight corresponded to a length-for-age, weight-for-length, or weight-for-age Z-score, respectively, between  $-2$  and  $-3$ . Severe stunting, severe wasting, or severe underweight corresponded to a length-for-age, weight-for-length, or weight-for-age z-score, respectively,  $< -3$ .<sup>[21]</sup> Weight could not be adjusted for edema as its presence was not recorded.

Data were evaluated using various statistical tools such as mean, median, Chi-square test, and *t*-test.

Ethical clearance was taken from the Institutional Ethics Committee.

Table 1: Demographic characteristics of the study population			
Age (months)	Total	Males	Females
0	35	16	19
1	28	23	5
2	19	11	8
3	18	11	7
4	15	7	8
5	10	6	4
6	14	8	6
7	22	12	10
8	28	12	16
9	42	22	20
10	16	8	8
11	28	16	12

## Results

Two hundred and seventy-five infants took part in the study, of which 125 were in the age group of 0–5 months and 150 were in the age group of 6–11 months. The demographic characteristics are shown in Table 1.

As per historical recall, 58 (46.4%) infants in the age group of 0–5 months were breastfed within 1 h of birth [Figure 1].

Sex was not associated with early initiation (within 1 h of birth) of breastfeeding (Chi square symbol= 1.78,  $P = 0.181$ ).

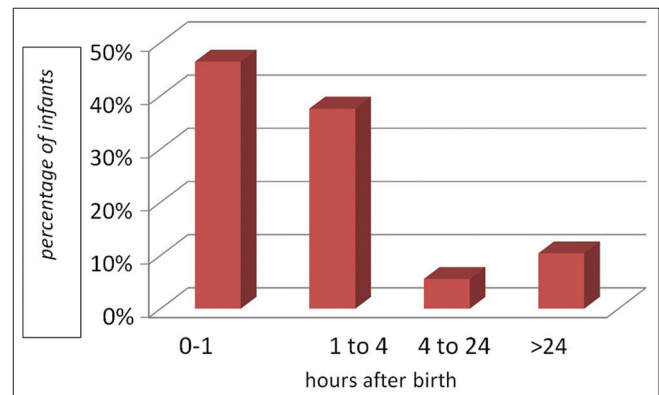


Figure 1: Initiation of breastfeeding age 0–5 months

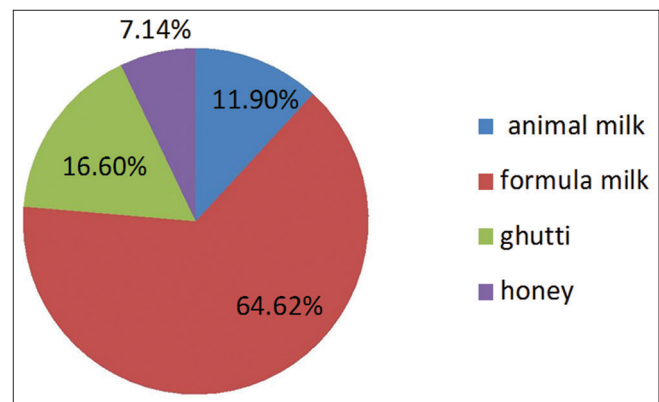


Figure 2: Type of prelacteal feed age 0–5 months

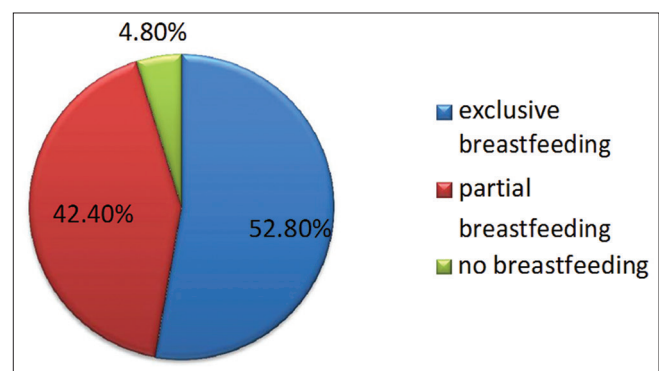


Figure 3: Feeding practices age 0–5 months

**Table 2: Anthropometric assessment, age 0-5 months**

	-2 to-3SD			<-3SD		
	Total	Male	Female	Total	Male	Female
Weight for age	26 (20.6)	14 (18.9)	12 (23.5)	20 (16)	12 (16.2)	8 (15.7)
Length for age	22 (17.6)	12 (16.2)	10 (19.6)	16 (12.8)	9 (12.2)	7 (13.7)
Weight for length	22 (17.6)	9 (12.1)	13 (25.5)	20 (16)	11 (14.9)	9 (17.6)
HC for age	11 (8.8)	6 (8.1)	5 (9.8)	8 (6.4)	7 (9.5)	1 (2)

Figures in parentheses indicate percentage. HC: Head circumference; SD: Standard deviation

Forty-two infants (33.6%) in the age group of 0–5 months received prelacteal feeds. The most common prelacteal feed was formula milk [Figure 2].

The overall prevalence of prelacteal feeding showed no significant variation among sexes ( $=0.19, P = 0.66$ ).

Only 48 infants in the age group of 0–5 months (38.4%) were breastfed eight times or more per day, the average number of feeds being 6.02 ( $\pm 3.26$ )/day.

One hundred and eight infants (86.4%) in the same age group received night feeding. Six infants (4.8%) aged 0–5 months were not breastfed at all.

The percentage of exclusively breastfed infants decreased from 42.1% ( $n = 19$ ) at 2 months to 30% ( $n = 10$ ) at 5 months.

Overall, 66 infants (52.8%) aged 0–5 months were exclusively breastfed. Water followed by animal milk was the most common form of artificial feed [Figures 3 and 4].

One hundred and sixteen infants (92.8%) aged <6 months reported passing pale yellow urine six times or more per day. Mothers of 36 infants in the age group of 0–5 months (28.8%) complained of pain during breastfeeding.

Forty-six infants in the age group of 6–11 months (30.66%) were exclusively breastfed till 6 months of age. Twenty-eight infants (18.6%) were exclusively breastfed for >6 months. Among the remaining 76 infants (50.6%), again water was found to be the most commonly used form of artificial feeding before 6 months of age. The average duration of exclusive breastfeeding was 4.41 ( $\pm 2.77$ ) months. The median duration of exclusive breastfeeding was 5 months.

Twenty eight infants (18.6%) aged 6–11 months were never exclusively breastfed [Figure 5].

The mean frequency of current breastfeeding in infants aged >6 months was found to be 3.8 ( $\pm 2.74$ ) times/day. The percentage of infants receiving continued breastfeeding decreased

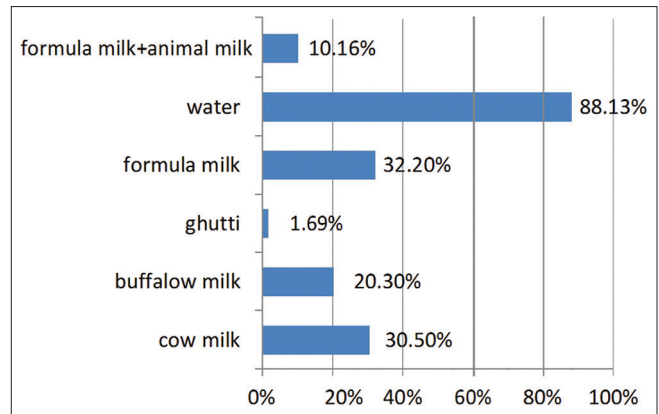


Figure 4: Type of artificial feeding age 0–5 months

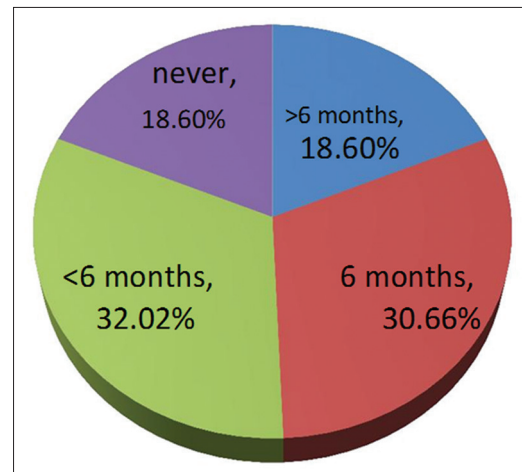


Figure 5: Duration of exclusive breastfeeding age 6–11 months

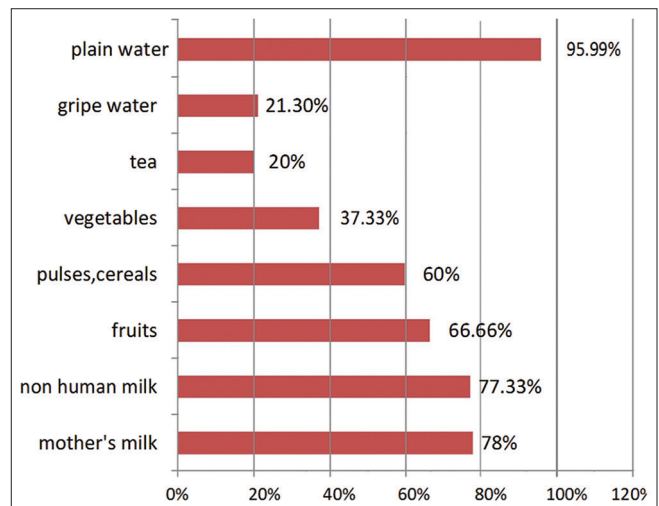


Figure 6: Complementary feeding practices age 6–11 months

from 81.81% ( $n = 22$ ) at 7 months to 62.5% ( $n = 16$ ) at 10 months. At the same time, percentage of infants receiving semisolid food increased from 63.33% at 7 months to 75% at 10 months. Overall, 34 infants in the age group of 6–8 months (53.12%) received solid, semisolid, or soft food, in addition to breast milk. The corresponding figure for the age group of 6–11 months was 88 infants (58.66%).

**Table 3: Anthropometric assessment, age 6-11 months**

	-2 to -3SD			<-3SD		
	Total	Male	Female	Total	Male	Female
Weight-for-age	24 (16)	14 (18)	10 (13.9)	22 (14.7)	14 (17.9)	8 (11.1)
Length-for-age	28 (18.7)	16 (20.5)	12 (16.6)	12 (8)	8 (10.3)	4 (5.6)
Weight-for-length	28 (18.7)	20 (25.6)	8 (11.1)	14 (9.3)	8 (10.3)	6 (8.3)
HC-for-age	8 (5.3)	6 (7.7)	2 (2.7)	6 (4)	4 (5.1)	2 (2.8)

Figures in parentheses indicate percentage. HC: Head circumference; SD: Standard deviation

The complementary feeding practices have been shown in Figure 6.

Forty-eight infants in the age group of 0–5 months (38.4%) were bottle fed out of whom 34 (71%) had bottles boiled before use. The percentage for bottle feeding increased in the age group of 6–11 months with 104 infants being bottle fed (69.3%). Overall, 53.33% infants were partially or fully bottle fed.

One hundred and eight infants aged <6 months (86.4%) and 104 infants aged >6 months (69.33%) received breast milk during night.

The overall proportion of age-appropriate feeding in the study population was 56%, with 52.8% at 0–5 months of age and 58.66% at 6–11 months of age.

The anthropometric assessment of infants is shown in Tables 2 and 3 and Figures 7 and 8.

Figure 9 shows the variation in the prevalence of wasting, stunting, and underweight in various age groups. No significant difference exists between prevalence of malnutrition among males and females.

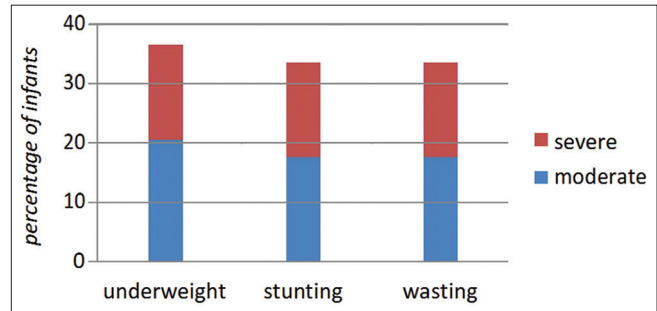
No significant difference was found between prevalence of malnutrition between the first and the second half of infancy.

The study revealed a significant association between longer duration of exclusive breastfeeding and lower prevalence of underweight (*t*-test, *P* < 0.001) and stunting (*t*-test, *P* = 0.035) in 6-month-old infants. However, adjustment for potential confounding factors could not be done. The association between longer duration of exclusive breastfeeding and lower prevalence of wasting at 6 months was not significant (*t*-test, *P* = 0.30).

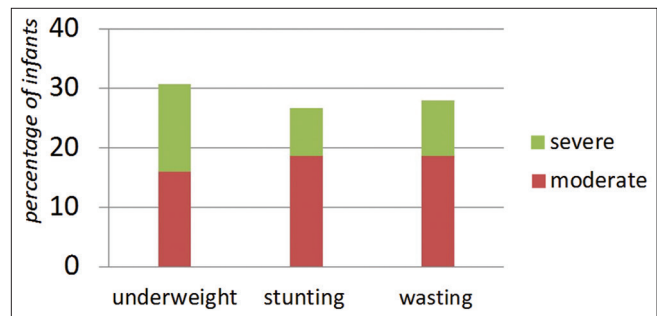
Infant’s refusal to accept food was cited as the most common difficulty faced during feeding them with mothers of 72 infants aged 6–11 months (48%) complaining about it.

## Discussion

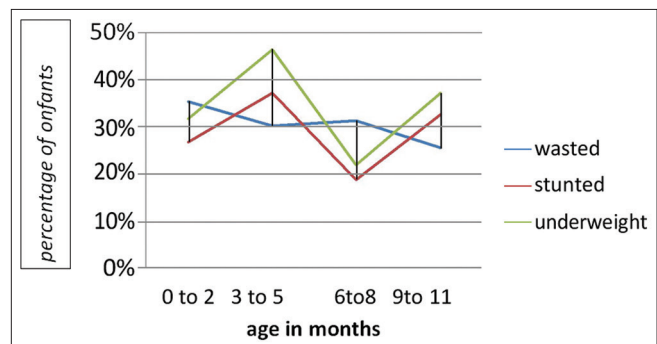
The “Millenium Development Goals” have placed infant health and well-being at the heart of development. The key interventions to achieve the Millennium Development Goal 1 and 4, which address child malnutrition are early initiation of breastfeeding, exclusive breastfeeding for 6 months, and timely introduction of age-appropriate complementary feeding.



**Figure 7:** Prevalence of malnutrition age 0–5 months



**Figure 8:** Prevalence of malnutrition age 6–11 months



**Figure 9:** Prevalence of malnutrition in various age groups

The present study revealed that initiation of breastfeeding within 1 h of birth was 46.4% which is more than the corresponding national (24.5%) and Uttarakhand (32.9%) NFHS-3 figures<sup>[17]</sup> but far short of the 11<sup>th</sup> plan target of 80%.<sup>[23]</sup> Early initiation of breastfeeding is extremely important for establishing successful lactation as well as for providing colostrum to the baby. Some studies have identified cesarean section as a hindering factor in this regard.<sup>[24,25]</sup>

Here comes the importance of the findings from Ghana study which clearly showed for the first time in the world, that ensuring initiation of breastfeeding within 1 h could cut 22% all neonatal mortality.<sup>[26]</sup> That means in India, if all mothers were enabled to initiate breastfeeding within 1<sup>st</sup> h, about 2.5 lac deaths occurring during 1<sup>st</sup> month could be saved.<sup>[27]</sup>

The use of prelacteal feeding (33.6%) was far less compared to the corresponding NFHS-3 figures for India (57.2%)<sup>[17]</sup> and findings of Vyas *et al.*<sup>[7]</sup> for rural areas of Uttarakhand (61.8%). The lower prevalence of prelacteal feeding and comparatively better figures for early initiation of breastfeeding may be due to the fact that families of a substantial proportion of infants participating in the study were sensitized to infant care as evident by their attendance of well-baby clinics. Furthermore, with increasing preference for institutional delivery, mothers have more exposure to information regarding correct feeding practices. Another interesting observation is that the study revealed formula milk as the most common form of prelacteal feeding. Previous studies have shown that honey and gripe water are the most commonly used prelacteal foods.<sup>[7,25,28]</sup> This is probably due to families trying to balance their customs and their perceptions of the current recommendations in light of their limited knowledge. It is a very common belief that child takes after the person who gives prelacteal feed to the child.<sup>[7,25]</sup> Cesarean sections, becoming increasingly common, may also have contributed to the same with infants being fed with formula milk before the mother is able to feed her baby.

Exclusive breastfeeding under 6 months (52.8%) in the present study was far short of the 11<sup>th</sup> plan target of 90%,<sup>[23]</sup> although better than all-India average of 46.4% and that of Uttarakhand (31.2%).<sup>[17]</sup> Several studies have documented that partial breastfeeding is associated with increased risk of child morbidity and mortality.<sup>[13,14,29]</sup> Studies have shown that about 25% infants in the age group of 0–6 months, who are not breastfed exclusively, remain at risk for infectious diseases and undernutrition.<sup>[14,29]</sup> This is particularly significant in a developing nation like India. Even introduction of plain water was reported to interfere with breastfeeding.<sup>[30]</sup> This study revealed water to be the most commonly used form of artificial feeding in infants under 6 months. This was probably because the study was conducted during summer months. Most families being ignorant give water to infants even during the 1<sup>st</sup> 6 months supposedly to quench their thirst.<sup>[7]</sup>

Due to associated exposure to pathogens and interference with successful breastfeeding, bottle feeding is strongly discouraged by the current recommendations.<sup>[31]</sup> The prevalence of bottle feeding in the present study (53%) is much higher as compared to the results of a study conducted by Sinhababu *et al.* (10%) in West Bengal.<sup>[32]</sup> This is probably due to easier availability of nonhuman milk and mothers working for long hours in fields in this area.

In the present study, the proportion of infants, aged 6–8 months, who received solid, semisolid, or soft food, in addition to breast

milk, was low (53.12%) when viewed against the 11<sup>th</sup> plan target of 90%<sup>[23]</sup> but slightly better compared to India (52.7%) and Uttarakhand (51.6%).<sup>[17]</sup> This low figure could be due to the increased use of nonhuman milk till 6–8 months of age, particularly the much-advertised formula milk. It is worthwhile to note that the percentage of complementary feeding improved at 10 months of age (75%). Similar findings have been documented by Saha *et al.* and Hop *et al.*<sup>[4,6]</sup>

Breastfeeding continuation during night is a good practice as this maintains the production and flow of mother's milk. This study revealed a high proportion of infants receiving breastfeeding during night comparable to the corresponding figure documented by previous studies in this region.<sup>[33]</sup>

Our study did not find any significant difference in feeding practices among male and female infants. This is probably because nowadays females are treated at par with males.

Nutritional status assessment of infants revealed high though varying proportions of malnutrition, highest proportion being of underweight infants. The study did not reveal any significant difference in the prevalence of malnutrition during the first and the second half of infancy. This was in contradiction to the belief that malnutrition peaks during second half of infancy due to faulty weaning practices.<sup>[34,35]</sup> This may be due to the reason that certain factors beyond the scope of the study are operational which are intimately related to the nutritional status both during the first and the second half of infancy. There was no preponderance of malnutrition to males or females probably because females are taken care of well in today's society. This study revealed a significant relationship between longer duration of exclusive breastfeeding and a lower prevalence of underweight and stunting in 6-month-old infants. Previous studies have also shown definite evidence that exclusively breastfed infants are nutritionally better off.<sup>[36,37]</sup> However, since the influence of confounding factors such as mother's age and education, previous child deaths, birth order, infant's sex, and illnesses in previous months couldn't be adjusted or ruled out, this relationship cannot be considered binding. Vesel *et al.* documented that the apparent association observed in their study between the duration of exclusive breastfeeding and most nutritional status indicators at 6 months was not significant after adjustment for confounding factors.<sup>[19]</sup> Further research is required to add to evidence on the relationship between the duration of exclusive breastfeeding and growth during the 1<sup>st</sup> 6 months of life.

A child's appetite is known to influence the frequency of complementary feeding.<sup>[15]</sup> In the present study, infants refusal to accept food came out as a major problem faced by mothers. This is probably due to wrong methods or timings adopted by mothers to feed their children.

## Conclusion

The study concluded that undesirable practices related to infant feeding such as late initiation of breastfeeding, low rates of exclusive breastfeeding, use of prelacteal feeding, lower frequency of breastfeeding, and inappropriate complementary feeding practices are still prevalent. Giving water and nonhuman milk to the infants were the limiting factors for exclusive breastfeeding. As for inappropriate complementary feeding practices, late introduction and discontinuation of breastfeeding turned out to be the areas of the main thrust. Increased prevalence of bottle feeding is also an area of concern. Most indicators showed improvement compared to previous studies, but the practices are still not reasonable. Community-based studies on the subject should be encouraged to generate adequate data that can be used to guide the effective planning and development of interventions. A methodological problem in studies of this nature is bias due to lack of recall.<sup>[38]</sup> Studies designed to overcome this bias should be performed. The “current status analysis method” at the time of interview has been reported to overcome these deficiencies.<sup>[39]</sup>

A comprehensive plan needs to be chalked out to address changes in hospital norms, maternal counseling, development of lactation clinics, and training of health workers. In the coming years, institutional deliveries will be greater than ever before. This provides an additional opportunity to health-care providers to educate mothers regarding the importance of correct infant feeding practices. Antenatal counseling can play an important role in this regard.<sup>[40]</sup> Revitalization of the Baby-Friendly Hospital Initiative in health facilities is recommended. Mass media should be utilized more efficiently to create awareness among the masses regarding correct infant feeding practices. Education of not only the mother but also the entire family should be considered a priority. The study revealed a high prevalence of malnutrition even during the 1<sup>st</sup> 6 months of life. More research is needed to identify the determinants of the same. The study revealed a significant association between longer duration of exclusive breastfeeding and a lower prevalence of underweight and stunting at 6 months. However, further research with a wider scope, larger sample size, and better statistical tools is required to show the relationship between duration of exclusive breastfeeding and prevalence of malnutrition.

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## Conflicts of interest

There are no conflicts of interest.

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