Assessment of Infant and Young Child Feeding (IYCF) practices in rural areas of Dehradun, Uttarakhand

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Abstract

Introduction: The practice of infant and young child feeding (IYCF) is critical for a child’s growth and development throughout the first two years of life. Poor feeding habits in early childhood contribute to malnutrition and child mortality in India. Aim and Objective: To assess the IYCF practices in children under the age of 2 years. Material and Methods: In rural Uttarakhand, India, a cross-sectional study was undertaken from March 2021 to May 2021. A probability proportional to size (PPS) method was used to select 400 children under the age of 2 years. The World Health Organization IYCF questionnaire, was used to collect house to house data. An appropriate statistical test was used for analysing the data. Results: According to the findings, 47.5 percent of babies under the age of six months were nursed within the first hour of delivery. About 73.9 percent of babies were exclusively breastfed. Approximately 22 percent infants were given pre-lacteal feeds and 20 percent were bottle fed. In addition to breast milk, half of babies aged 6 to 8 months had solid, semi-solid, or soft meals, however minimum acceptable diet was provided to only 33.5 percent children. Odds of male child who were bottle fed in the age group of 6–23 months were 2.02 times higher to that of female child. Also the odds of male child in the age group of 6–8 months to be introduced with solids, semi-solid, or soft food were 4.91 times higher to that of female child. Similarly, odds of male child received minimum dietary diversity (2.35), minimum meal frequency (1.82), and minimum acceptable diet (2.35) in the age group of 6–23 months were found to be higher to that of female child in the similar age group. Total of six mothers reported coronavirus disease (COVID) positive status and only two of them breastfed their babies using COVID appropriate behavior. Conclusion: Exclusive breastfeeding (EBF) has been practiced in more than two-thirds of children, but early breastfeeding is practised in less than half of children. Only one third children of more than six months of age are getting minimum acceptable diet.

Keywords: Acceptable diet, dietary diversity, exclusive breastfeeding, IYCF practices, pre-lacteal feed

Introduction

Feeding is crucial for the survival of child. It is estimated that under nutrition causes 2.7 million child deaths each year, accounting for 45 percent of all child deaths.[¹] Incidence of morbidity and mortality among infants and young children could be significantly reduced by optimal feeding. In most of the formidable circumstances, breastfeeding is the desired method of infant feeding.[²]

According to the World Health Organization and United Nations Children’s Fund, breastfeeding should begin within an hour of birth, exclusive breastfeeding for six months and initiation of complementary feeding along with breastfeeding from six months of birth.[³]

In low- and middle-income countries, exclusive breastfeeding (EBF) was observed among 37 percent of the children below six months.

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months of age. EBF rates in India range from 35.8 percent in Meghalaya to 77.2 percent in Chhattisgarh. Breastfeeding could prevent 823,000 deaths of under 5 children per year. It provides protection to a child against various infections, asthma, sudden infant death syndrome, misaligned dentition and improves intelligence and reduces the risk of overweight and diabetes. The duration of EBF is inversely proportional to prevalence of underweight and stunting.

An increase in the prevalence of undernutrition is directly related to an increase in the infant mortality rate (IMR). IMR of India and Uttarakhand is 32 and 31 deaths per thousand live births, respectively. Infant mortality could be more reduced further by optimal feeding practices to the infants.

During the coronavirus disease (COVID-19) pandemic, it is critical to engage in COVID-appropriate behaviour, in order to promote optimal growth and development of children and reduce morbidity and mortality. No study has been done on IYCF practices especially during the COVID-19 pandemic in rural settings of Uttarakhand state of India and it is very crucial to know the determinants and barriers of IYCF practices during this pandemic as it affects the overall growth, development and survival of an infant and child. Hence, this study was undertaken to know the IYCF practices in rural areas of Dehradun, Uttarakhand.

Materials and Methods

Study settings
Uttarakhand is one of the hilly states of India with more than 70 percent rural population. The State has 13 districts; out of which Dehradun district was selected. The district of Dehradun is divided into six blocks, namely, Chakrata, Kalsi, Vikas Nagar, Sahaspur, Raipur, and Doiwala. Out of these six blocks, the current study was carried out in rural areas of Doiwala and Raipur block. Rural villages of PHC Raiwala and PHC Thano were selected from Doiwala and Raipur block, respectively. These villages come under Rural field practice area of the Institute.

Study procedure
A Community-based cross-sectional study was conducted for three months. A meeting was conducted with ANM and ASHA of PHC Raiwala and PHC Thano and a list of mothers having children below 2 years of age was obtained from them. After obtaining the written consent of the study participants’ mothers, an interview was conducted by a field researcher trained in the community and family medicine. Information about younger children was collected if the mother had multiple children under the age of 2 years in the family.

Sample size
The formula used to calculate the sample size was 

\[ N = \frac{Z^2 \cdot PQ}{L^2} \]

Where, \( Z^{\alpha/2} = 1.96 \), value of the standard normal variate corresponding to level of significance \( \alpha = 5 \) percent.

Prevalence (P) of children who started on breastfeeding within 1 hr of birth was taken as indicator for calculating sample size. According to National Family Health survey-4 (NFHS-4) it was 29.8 percent from Uttarakhand (rural). So, taking 5 percent as the allowable error (L), sample size came out to be 335 children. Considering 10 percent drop-outs, a total of 370 sample size was calculated which was rounded of to 400. Using probability proportional to size (PPS) sampling procedure 200 children from Raiwala villages and 200 children from Thano villages were taken as study subjects. We used a simple random sample (using the last digit of the currency) to select the first household to investigate. Next, we surveyed each household with children under 2 years of age until the desired number of children in the village was recorded.

Inclusion criteria
(i) Mothers of the participants who gave consent to participate in the study.
(ii) Children under 2 years of age who lived in the village for more than six months.

Exclusion Criteria:
(i) Children who had no parents/caregivers at the time of the survey.
(ii) Children who were very ill/sick while study had been carried out.
(iii) Research participants who were not available even after three visits.

Operational definitions
1. “Early initiation of breastfeeding”: Newborns who were started on nursing within an hour after birth.
2. “Exclusive breastfeeding (EBF) for 6 months”: For the first six months of life, no additional food or drink, including water, is allowed except breast milk, however the newborn on the other hand, is permitted to receive ORS, drops, and syrups (vitamins, minerals, and medicines).
3. “Continued breastfeeding at 2 years”: Proportion of children more than 12 months of age who fed breast milk.
4. “Introduction of solid, semi-solid or soft foods”: The proportion of infants aged 6–8 months who had solid, semi-solid, or soft foods.
5. “Minimum dietary diversity”: Children aged 6–23 months who had consumed items from four or more dietary groups in the previous 24 hrs (grains, roots and tubers, legumes and nuts, dairy products, meat foods, eggs, vitamin A-rich fruits and vegetables, other fruits, and vegetables).
6. “Minimum meal frequency”: Children aged 6–23 months who had consumed items from two or more dietary groups in the previous 24 hours.
7. “Minimum acceptable diet”: In the past 24 hrs, children aged 6–23 months had a sufficient minimum diet diversity and meal frequency.
8. “Bottle feeding”: Proportion of children aged 0–23 months who were bottle-fed.

**Study tools**

Pre-designed, pre-tested, and semi-structured questionnaire based on the standard questionnaire on IYCF practices given by WHO was used to collect information after obtaining participant’s informed written consent. For determining the status of IYCF practices core and optional indicators as suggested by WHO were used. This is a set of simple, valid and reliable indicators for assessing IYCF practices that may be measured at the population level. The research tool consisted of an interview-based questionnaire that was pre-tested and approved by the Rural Health Training Center (Cronback's alpha = 0.7). The questionnaire consisted of two parts. One part was used to obtain information about the mother's sociodemographic characteristics. The second part was used to record information on how to feed. These questions supplied the data required to compute the important IYCF indicators. In accordance with WHO recommendations, information about children’s diets was collected over the past 24 hrs, including type of food and number of meals. Few questions related with COVID-19 status of mother were also included considering COVID-19 pandemic during study period.

**Statistical analysis**

The information gathered was imported into “Microsoft Excel” and analysed with Statistical Package for the Social Sciences version 21. Data management tools were utilized to avoid duplication and error in data entry. The quantitative data were presented in the form of frequency and proportions. To compare differences, we applied the Chi-square test between groups. A logistic regression model was used to determine odds ratios (ORs) and 95 percent confidence intervals. Statistical significance was defined as $P$ value $\leq 0.05$.

**Results**

In Table 1, among 400 mothers, 77 percent belong to the age group of 21–30 years. Majority (30.5 percent) of the mothers had completed graduation followed by higher secondary education (25 percent). About 4.25 percent of mothers were found illiterate. Majority (94.7 percent) of the mothers were housewives and 54.25 percent living in a joint family. About 36.5 percent and 31.75 percent of mothers belong to middle and lower middle socioeconomic class, respectively.

Table 2 depicts that in this study, 400 children below 2 years of age were included, and 40.25 percent of them were less than 6 months old. About 50.25 percent of children were males and 49.75 percent were females. Almost 80 percent of children had both mother and father as caregiver.

Table 3 depicts the status of IYCF indicators among male and female children (0–23 months). Among all the IYCF indicators, there were no statistically significant difference in proportion of male and female children for indicators namely ever breastfed (0–23 months), early initiation of breastfeeding among children below 2 years of age, EBF, continuing breastfeeding among children (12–23 months), bottle feeding among children less than 6 months, received colostrum and given pre lactic feed (0–23 months). Whereas statistically significant difference was found in proportion of male and female children for indicators like bottle feeding among children 6–23 months of age, introduction of solids, semi-solids and soft food among children of age 6–8 months, minimum dietary diversity, minimum meal frequency, and minimum acceptable diet among children 6–23 months.

| Table 1: Sociodemographic profile of the mothers of the research participants |
|---------------------------------------------------------------|
| Variables | Frequency (n=400) | Percentage |
| Mother’s age (years) | | |
| 15-20 | 11 | 2.75 |
| 21-30 | 308 | 77 |
| 31-40 | 81 | 20.25 |
| Educational qualification | | |
| Postgraduate | 68 | 17 |
| Graduate | 122 | 30.5 |
| Higher secondary | 100 | 25 |
| High school | 36 | 9 |
| Middle school | 39 | 9.75 |
| Primary school | 18 | 4.5 |
| Illiterate | 17 | 4.25 |
| Working status of mothers | | |
| Yes | 21 | 5.25 |
| No | 379 | 94.75 |
| Type of family | | |
| Nuclear | 140 | 35 |
| Joint | 217 | 54.25 |
| 3 generation family | 43 | 10.75 |
| Socioeconomic Status* | | |
| Upper class | 25 | 6.25 |
| Upper-middle | 43 | 10.75 |
| Middle class | 146 | 36.50 |
| Lower-middle class | 127 | 31.75 |
| Lower class | 59 | 14.75 |

*As per modified BG Prasad classification 2019

| Table 2: Sociodemographic characteristics of children (0-23 months) |
|---------------------------------------------------------------|
| Variable | Frequency | Percentage |
| Gender of child | | |
| Male | 201 | 50.25 |
| Female | 199 | 49.75 |
| Child’s age | | |
| <6 months | 161 | 40.25 |
| ≥6-23 months | 239 | 59.75 |
| Caregiver to child | | |
| Mother only | 69 | 17.25 |
| Mother and Father | 320 | 80.00 |
| Grandmother | 11 | 2.75 |
It is also evident from the table that odds of male child who were bottle fed in the age group of 6–23 months were 2.02 times higher to that of female child. Also the odds of male child in the age group of 6–8 months to be introduced with solids, semi-solid, or soft foods were 4.91 times higher to that of female child. Similarly, odds of male child received minimum dietary diversity (2.35), minimum meal frequency (1.82), and minimum acceptable diet (2.35) in the age group of 6–23 months were found to be higher to that of female child in the similar age group.

Table 4 shows that when COVID status of the mother was asked, out of 400 only 6 mothers and 1 child was found COVID positive. Out of these 6 COVID positive mothers, only 2 (33 percent) breast fed their baby following COVID appropriate behavior.

**Discussion**

According to NFHS4, the percentage of breast-fed children in Uttarakhand so far is (95.1 percent),[9]which is in good agreement with our study that 96.2 percent of children had been breast-fed so far. However, positive effects and support can be helpful, and negative effects can interfere with the breastfeeding process. Kumar et al.[12] came up with similar results where 93.40 percent of babies were breastfed as their first diet.[10]

According to IYCF Guidelines,[11] the Indian Government recommends that breastfeeding should be started immediately after delivery, preferably within an hour of birth. Mother’s illiteracy, low socioeconomic status, incorrect practices and beliefs and decreased milk production can attribute to her late breastfeeding habit. This suggests that the women were not adequately motivated to start breastfeeding immediately after birth. This study revealed that delayed breastfeeding (>1 hr) is still practised in Uttarakhand’s rural districts (47.5 percent). Low rates of early onset of breastfeeding was also documented by Kumar et al.[12] & Chatterjee et al.[13] where breastfeeding initiation within 1 hr of delivery was found to be only 6.3 percent and 14.54 percent, respectively.

In our study, 79 percent babies fed colostrum which matches well with the findings of Thakur et al.[14] & Parmar et al.[15] In contrast to our results, a study done in Uttar Pradesh[16] and Madhya Pradesh[17] revealed that only 11.8 percent and 22.7 percent of mothers fed colostrum to their infants, respectively. The increased awareness of study participants for colostrum may be due to increased awareness of healthcare workers in our area.

Regarding pre-lacteal feeds our number (21.25 percent) was much lower than the corresponding NFHS-4[18] numbers (36.7 percent) and study done by Vyas et al.[19] in the rural areas of Uttarakhand (61.8 percent). The low frequency of pre-lacteal feeding might be explained by the fact that a majority of the families of newborn in the research were concerned about infant care, as seen by their attendance at well-baby clinics. In addition, as more mothers prefer to give birth in a facility, they

**Table 3: Status of IYCF Practices among children (0-23 months)**

| IYCF Indicator                                      | Status       | Male (%) | Female (%) | Total (%) | P     | O.R.   | C.I.  |
|-----------------------------------------------------|--------------|----------|------------|-----------|-------|--------|-------|
| Ever Breastfed (0-23 months)                         | Yes          | 194 (96.52) | 191 (95.98) | 385 (96.25) | 0.984 | 1.16   | 0.41-3.26 |
|                                                     | No           | 7 (3.48)  | 8 (4.02)  | 15 (3.75)  |       |        |       |
| Early initiation of breastfeeding (within 1 h of birth) among children <24 months | Yes          | 94 (46.76) | 96 (48.24) | 190 (47.50) | 0.845 | 0.94   | 0.64-1.4  |
|                                                     | No           | 107 (53.24) | 103 (51.76) | 210 (52.50) |       |        |       |
| Exclusive breastfeeding for first six months among children completed six months | Yes          | 63 (74.11) | 70 (73.68) | 133 (73.88) | 0.917 | 1.02   | 0.53-1.99 |
|                                                     | No           | 22 (25.89) | 25 (26.32) | 47 (26.12)  |       |        |       |
| Continuing breastfeeding among children (12-23 months) | Yes          | 47 (85.45) | 51 (85.00) | 98 (85.22)  | 0.845 | 1.04   | 0.37-2.91 |
|                                                     | No           | 8 (14.55)  | 9 (15.00)  | 17 (14.78)  |       |        |       |
| Bottle feeding among children <6 months             | Yes          | 15 (18.75) | 20 (20.00) | 35 (19.45)  | 0.983 | 0.92   | 0.44-1.94 |
|                                                     | No           | 65 (81.25) | 80 (80.00) | 145 (80.55) |       |        |       |
| Bottle feeding among children 6-23 months           | Yes          | 37 (38.94) | 30 (24.00) | 67 (30.45)  | 0.025 | 2.02   | 1.13-3.61 |
|                                                     | No           | 58 (61.06) | 95 (76.00) | 153 (69.55) |       |        |       |
| Received colostrum (0-23 months)                    | Yes          | 161 (80.09) | 155 (77.88) | 316 (79.00) | 0.674 | 1.14   | 0.71-1.85 |
|                                                     | No           | 40 (19.91) | 44 (22.12) | 84 (21.00)  |       |        |       |
| Given Pre lacteal feed (0-23 months)                | Yes          | 47 (23.38) | 38 (19.09) | 85 (21.25)  | 0.354 | 1.29   | 0.8-2.09  |
|                                                     | No           | 154 (76.62) | 161 (80.91) | 315 (78.75) |       |        |       |
| Introduction of solid, semisolid or soft food among children 6-8 months | Yes          | 13 (72.22) | 9 (34.62)  | 22 (50.00)  | 0.031 | 4.91   | 1.32-18.2 |
|                                                     | No           | 5 (27.78)  | 17 (65.38) | 22 (50.00)  |       |        |       |
| Introduction of solid, semisolid or soft food among children completed 8 months | Yes          | 11 (10.09) | 9 (3.48)   | 20 (9.09)   | 0.782 | 1.27   | 0.51-3.2  |
|                                                     | No           | 98 (89.91) | 102 (90.91) | 200 (90.91) |       |        |       |
| Minimum dietary diversity among children 6-23 months | Yes          | 48 (43.63) | 32 (24.81) | 80 (33.47)  | 0.003 | 2.35   | 1.36-4.06 |
|                                                     | No           | 62 (56.37) | 97 (75.19) | 159 (66.53) |       |        |       |
| Minimum meal frequency among children 6-23 months   | Yes          | 70 (60.03) | 56 (45.53) | 126 (52.72) | 0.030 | 1.82   | 1.09-3.04 |
|                                                     | No           | 46 (39.97) | 67 (54.47) | 113 (47.28) |       |        |       |
| Minimum acceptable diet among children 6-23 months  | Yes          | 48 (43.64) | 32 (24.81) | 80 (33.47)  | 0.003 | 2.35   | 1.36-4.06 |
|                                                     | No           | 62 (56.36) | 97 (75.19) | 159 (66.53) |       |        |       |
are exposed to more information about proper eating habits. Another noteworthy finding of our study is that formula milk was the most common method of pre-lacteal feeding. Previous studies have shown that honey and ghutti are the most commonly used pre-lacteal foods.\(^{18,20}\)

EBF was practiced by 73.88 percent mothers in our study which is similar to the study conducted by Benjamin et al.\(^{21}\) (57.7 percent) at Punjab & Aggarwal et al.\(^{22}\) (63.50 percent) at Delhi, whereas Saxena V et al.\(^{23}\) at Uttarakhand reported higher percentage (77.4 percent) of EBF. The difference could be attributed to the differences in the study population, study area, and sample size.

In our study continued breastfeeding was found to be 85.22 percent in 12–23 month old children. This was comparable to a study done in Karnataka,\(^{24}\) showing that 81 percent of children continued breastfeeding for 12 to 23 months.

Our study showed that among 6–8 months children, 50.00 percent were taking solid, semisolid, or soft food. This figure was found to be higher than that reported by NFHS-4\(^{9}\) at the national level (42.7 percent) and the state level (46.7 percent), however Saxena et al.\(^{25}\) in block doiwala of Dehradun district reported lesser figures (87.3 percent).

Table 4: Breastfeeding practices of COVID positive mother

| Variables | Number | Percentage |
|-----------|--------|------------|
| COVID status of mother (n=400) | | |
| Positive | 6 | 1.5 |
| Negative | 394 | 98.5 |
| COVID status of baby if mother was Covid positive (n=6) | | |
| Positive | 1 | 16.7 |
| Negative | 5 | 83.3 |
| COVID positive mother breastfed the baby (n=6) | | |
| Yes | 2 | 33.3 |
| No | 4 | 66.7 |
| COVID positive mother following COVID appropriate behavior during breastfeeding (n=2) | | |
| Yes | 2 | 100 |
| No | 0 | 0 |

Nutritional diversity refers to nutritional adequacy and nutritional diversity, two of the main components of a diet. In our study, few mothers (33.47 percent) gave their children a diet having minimum food diversity. Similar results were reported in a study conducted in New Delhi (32.6 percent).\(^{26}\) On the contrary, surveys done in Kolkata (46 percent), Bangladesh (81 percent), Nepal (82 percent), and Sri Lanka (88.3 percent) showed adequate dietary diversity.\(^{27–30}\) This indicator is of concern in this study as the literature suggests that a lack of minimal nutritional diversity can lead to stunting and underweight in children.\(^{31}\) Eating a minimally recommended diet plays a role in determining a child’s nutritional status. This important time frame ensures the proper growth and development of the child. In our study, 52.72 percent received the recommended MMF. This finding was comparable to the study conducted by Jain et al.\(^{32}\) who reported that 67.6 percent of children received MMF. Minimum acceptable diet was found to be adequate only in 34 percent of the 6–23 months old children.

In our study, we observed that 20 percent of mothers used bottles to feed their children who were under 6 months of age. This is consistent with a study conducted by Parashar et al.\(^{23}\) wherein one-fourth of mothers were reported using bottles to feed their children. Rasania et al.\(^{34}\) reported higher bottle feeding incidence in a study done in New Delhi.

In our study area only 1.5 percent of the mothers in our research area were COVID positive, and one-third of them nursed their babies according to COVID guidelines. Rest of the two-third mothers who did not breast fed the baby should be educated regarding importance of breastfeeding during COVID-19 pandemic as breastfeeding benefits outweigh possible risks and may even protect the infant and mother.

**Conclusion and Recommendation**

While EBF rates in the research group were adequate, the study clearly shows that numerous incorrect feeding behaviors must be eliminated in order to preserve the health and nutrition of young infants. The results of this study clearly underscore the importance of educating women about infant feeding practices not only in terms of diversity but also in terms of meal frequency.

It is vital to educate women and their families about correct IYCF practices, therefore the IYCF education programme should be emphasised during all interactions with eligible women and their families, and it should be done on a regular basis during prenatal and postnatal clinics, as well as when mothers come for their child’s immunization. Strengthening breastfeeding at the medical institution and community level requires in-service training for health professionals, frontline workers, and managers.

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**Conflicts of interest**

There are no conflicts of interest.
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