Introduction

The early years of life when the growth rate is maximum is a very vulnerable time. Optimal nutrition practices during infancy and early childhood can lay the foundation for children to achieve their total growth and development potential. However, early malnutrition can lead to long-lasting detrimental effects. Malnutrition is considered to be associated with nearly half of under-five mortality worldwide.[1]

The World Health Organisation (WHO) recognizes this considerable impact of early nutrition. It recommends exclusive breastfeeding for the first 6 months of life and the addition of and early childhood can lay the foundation for children to achieve their total growth and development potential. However, early malnutrition can lead to long-lasting detrimental effects. Malnutrition is considered to be associated with nearly half of under-five mortality worldwide.[1]

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Abstract

Introduction: It is essential to maintain optimal nutrition during the early years of life when the growth rate is maximum. Aims and Objectives: Our study investigated the prevalence of various feeding practices. We also explored their association with different sociodemographic, biomedical variables, and childhood morbidity. Methodology: This was a cross-sectional community-based study. Data were collected through a questionnaire-based survey of mothers of school-going children aged 2-6 years in the districts of Anand and Vadodara, Gujarat. Results: A total of 367 mothers participated in the study. About 78% of the mothers did early initiation of breastfeeding within 1 h of birth, and 68% gave colostrum to the newborn. Around 30% of the mothers practiced bottle feeding, and 25% gave prelacteal feeds. Most mothers received good family support for breastfeeding (93.73%). On univariate analysis, we found the following associations of feeding practices—breastfeeding initiation with the gender of the baby (P value—0.006) and type of delivery (P value < 0.001); the duration of exclusive breastfeeding with the time difference between two deliveries (P value—0.027) and maternal age (P value—0.004); prelacteal feeds with the type of delivery (P value—0.034); feeding difficulty with the time difference between two deliveries (P value < 0.001) and breastfeeding at night with maternal education (P value—0.002). The time of the initiation of breastfeeding was associated with cough and cold episodes. No other association was found between breastfeeding variables and health indicators. Conclusion: Maternal age, maternal education, the time difference between two deliveries, the type of delivery, and gender of the baby were significantly associated with different Infant and Young Child Feeding (IYCF) practices. Identifying these factors might help in the development of strategies for optimizing feeding practices.

Keywords: Breastfeeding, India, infant and young child feeding, malnutrition

Introduction

The early years of life when the growth rate is maximum is a very vulnerable time. Optimal nutrition practices during infancy

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complementary feeds from 6 months onward, with continued, breastfeeding till at least 2 years of age. There is also stress given on the time of introduction, content, and consistency of complementary feeds, as all are critical for optimal early nutrition.

To promote global commitment and optimal feeding practices, the WHO, in association with the UNICEF, prepared a strategy called Infant and Young Child Feeding (IYCF), along with population-based indicators to assess the practices. According to the recent National Family Health Survey (NFHS)-4 data, optimal feeding practices remain poor in the Indian population, with only 41.6% of the infants breastfed within 1 h of birth, 54.9% of the infants under 6 months exclusively breastfed, and a meager 9.6% of the children receiving adequate diet between 6 months and 2 years of age.

There is a need for more data from India on nutrition practices and their associations. It will enable the primary caregivers to provide support and counseling to the parents in an effective manner. Still, it may also lead to region/country-specific modifications in the current feeding guidelines. In this study, we looked at the prevalence of various feeding practices in two urban districts of India. We further studied their association with various sociodemographic, biomedical variables, and childhood morbidity.

Methodology

Study design

This was a community-based cross-sectional observational descriptive study. The study was approved by the Institutional Ethics Committee of the Shree Krishna Hospital, a tertiary-care teaching hospital.

Study setting

This study was conducted in two districts of Vadodara and Anand, in Gujarat, between April and October 2016. These districts are administratively subdivided into 12 and 8 talukas, respectively, with a total population of around 20 lakhs.

The schools catering to the primarily middle socioeconomic populations were selected. Both English medium and Gujarati medium schools were considered. Permission was first taken from the school authorities to question the mothers of children aged 2–6 years. The mothers were asked to complete a questionnaire-based survey of their feeding practices. All children with known non-nutritional congenital or acquired reasons (e.g., congenital heart diseases, cerebral palsy, genetic disorders, and tuberculosis) of failure to thrive were excluded.

Study tool

The survey was designed to assess feeding practices during the first 2 years of life. We also collected information on specific baseline indicators and childhood morbidity. The data collected can be subdivided into four groups:

(a) Sociodemographic variables: including maternal age, religion, maternal education, parity;
(b) Biomedical variables: including single birth or twin birth, type of delivery, birth weight, the interval between the birth of two children;
(c) Feeding practices: including early initiation of breastfeeding (within 1 h after birth), duration of exclusive breastfeeding, bottle feeding, prelacteal feeds during the first 3 days, night feeds, the child’s last breastfeed;
(d) Child health indicators including frequency of diarrhea and respiratory infections, their treatment taken, and frequency of hospital admissions.

Sampling methodology

We used a bilingual (Gujarati and English languages) paper-based self-administered questionnaire. On the first day, the mothers were briefed about the study and were asked to return the filled response sheet the next day. Reminder calls were given to the mothers to ensure their response. Informed consent was taken from the participants.

Analysis

Descriptive analysis was conducted for most variables such as frequency, percentage, or proportion. Univariate analysis was done to find any association between the observed feeding practices with childhood morbidity. We also analyzed the association between various sociodemographic variables and feeding practices. Significance was considered at a P value <0.05.

Results

Sociodemographic and biomedical variables

A total of 367 mothers participated in the study. The mean age of the mothers was found to be 30.16 (SD ± 3.99 years), and the mean age of the children was 44.79 months (SD ± 18.29 months). Most of the mothers were Hindu by religion (91.55%) and had received higher education than primary schooling (91.55%). Almost all the children were singleton pregnancies (97.51%), with more than half born through normal vaginal route (63.48%). The male: female ratio was 1.55:1. For details, refer to Table 1.

Infant and young child feeding variables

A high percentage of mothers were found to initiate breastfeeding within 1 h of birth (77.67%; n = 285), of which 251 mothers (88.07%) gave colostrum to the newborn. Most of the mothers refused to give any prelacteal feeds in the first 3 days of life (75.75%) and bottle
Association of feeding practices with biomedical and sociodemographic variables

The feeding practices that were considered included the initiation of breastfeeding, bottle feeds, giving colostrum, pre-lacteal feeds, exclusive breastfeeding, and difficulty during breastfeeding. We considered biomedical and sociodemographic variables with supposed impact on feeding practices—maternal age, maternal education, gender of the baby, type of delivery, and the time difference between two deliveries. On univariate analysis, we found that the breastfeeding initiation was significantly associated with the gender of the baby (P value—0.006) and type of delivery (P value < 0.001). We also observed that the duration of exclusive breastfeeding was associated with the time difference between the two deliveries (P value—0.027) and maternal age (P value—0.004). Other variables found associated with the feeding practices include the use of prelacteal feeds with the type of delivery, feeding difficulty with the time difference between two deliveries (P value < 0.001), and breastfeeding at night with the level of maternal education (P value—0.002).

Association of feeding practices with childhood morbidity

Univariate analysis was done between the feeding practices and indicators of childhood morbidity. For feeding practices the following indicators were included—breastfeeding in the first hour, colostrum, initiation of breastfeeding, bottle feeds, prelacteal feeds, and exclusive breastfeeding. Similarly, episodes of diarrhea, cough/cold, fever, and hospital admissions were included as indicators of childhood mortality. We only found a significant association between the time of initiation of breastfeeding and cough/cold episodes (P value—0.039).

Discussion

According to the recent National Family Health Survey-4 (NFHS) data, the percentage of children who were breastfed within 1 h of birth were 49.9 and 41.6% for the state of Gujarat and India.[3,7] The previous studies have also found less than ideal breastfeeding initiation rates in different parts of the country.[8,9] The higher percentage (77.66%) found in our study can be attributed to the demographic variations in the study population. However, it can also reflect an actual improvement in breastfeeding practices.
observed that breastfeeding initiation was associated with the type of delivery and gender of the baby. Cesarean section is one of the commonest reasons for delayed initiation of breastfeeding worldwide. As after cesarean section, mothers may need to be monitored for several hours, usually separated from the baby. Interestingly, we observed that breastfeeding was initiated later than the first 6 h of life, predominantly more in the male babies. In our society, where there is still a preference for a male child, such a finding reflecting better care of female babies looks out of context. This finding can be specific to the region studied. Moreover, it can be a reflection of a large discrepancy in the number of males and females in the study sample. Further, there is some evidence that delayed initiation of breastfeeding is associated with prelacteal feeds. We also observed that giving of prelacteal feeds was more common following operative delivery.

A recent national survey data suggest low rates of exclusive breastfeeding in India and Gujarat (54.9 and 55.8%, respectively). These numbers have improved in the past decade; however, they are still far from ideal. The previous Indian studies have shown wide variations in the rates of exclusive breastfeeding ranging from 16.5 to 85.6%. In the present study, we observed that most of the mothers refused to give any prelacteal feeds (75.7%). Such wide variations can be explained by regional, cultural, educational, and socioeconomic differences between different study populations. Studies have shown that

| Variables                        | n  | Categories                  | Frequency (%) |
|----------------------------------|----|-----------------------------|---------------|
| BF initiated within 1 h          | 367| Yes                         | 285 (77.66)   |
|                                  |    | No                          | 76 (20.71)    |
|                                  |    | I don’t know                | 6 (1.63)      |
| Colostrum given                  | 285| Yes                         | 251 (88.07)   |
|                                  |    | No                          | 26 (9.12)     |
|                                  |    | I don’t know                | 8 (2.81)      |
| When was BF initiated?           | 76 | Within 6 h                  | 25 (32.89)    |
|                                  |    | 7-12 h                      | 16 (21.05)    |
|                                  |    | 13-24 h                     | 9 (11.84)     |
|                                  |    | 24-48 h                     | 10 (13.16)    |
|                                  |    | After 48 h                  | 13 (17.11)    |
|                                  |    | Don’t know                  | 3 (3.95)      |
| Was the child ever breastfed?    | 122| Yes                         | 113 (92.62)   |
|                                  |    | No                          | 9 (7.38)      |
| Reasons of failure to initiate BF within 1 h | 72 | Doctors’ advice             | 22 (30.56)    |
|                                  |    | Maternal ill health         | 26 (36.11)    |
|                                  |    | Childs ill health           | 11 (15.28)    |
|                                  |    | Others                      | 13 (18.06)    |
| Bottle feeding practiced         | 367| Yes                         | 111 (30.25)   |
|                                  |    | No                          | 255 (69.48)   |
|                                  |    | Don’t know                  | 1 (0.27)      |
| Any fluid given in the first 3 days? | 367| Yes                         | 88 (23.98)    |
|                                  |    | No                          | 278 (75.75)   |
|                                  |    | Don’t know                  | 1 (0.27)      |
| Frequency of BF                  | 117| 6 times or less             | 26 (22.22)    |
|                                  |    | 6-8 times                   | 48 (41.03)    |
|                                  |    | 8 times or more             | 43 (36.75)    |
| Any difficulty during feeding?   | 367| Yes                         | 45 (12.26)    |
|                                  |    | No                          | 322 (87.74)   |
| Whom did you contact?            | 32 | Relatives                   | 3 (9.38)      |
|                                  |    | Non-MBBS doctors            | 8 (25.00)     |
|                                  |    | Pediatric                    | 16 (50.00)    |
|                                  |    | SKH pediatric                | 3 (9.38)      |
|                                  |    | Others                      | 2 (6.25)      |
| Family support during BF         | 367| Yes                         | 344 (93.73)   |
|                                  |    | No                          | 23 (6.27)     |
| At what age did you stop BF at night? | 367| Before 6 months             | 40 (10.90)    |
|                                  |    | During 6-12 months          | 140 (38.15)   |
|                                  |    | After 1 year (during 13-24 months) | 126 (34.33) |
|                                  |    | After 2 years               | 48 (13.08)    |
|                                  |    | Still                       | 13 (3.54)     |
socioeconomic status, maternal age, maternal education, and occupation, family size, gender of the baby, parity, proper antenatal care, hospital delivery, and breastfeeding counseling are to be associated with exclusive breastfeeding.\textsuperscript{20,21}

We observed that older mothers (>30 years) are less likely to exclusively breastfeed than the younger ones (<30 years). This finding is supported by recent studies from Japan and Italy.\textsuperscript{22,23} However, there are also studies suggesting that younger maternal age is associated with early cessation of exclusive breastfeeding\textsuperscript{24,25} and favor older age for initiation of exclusive breastfeeding.\textsuperscript{26,27} It is difficult to conclude the effect of maternal age on exclusive breastfeeding with different studies using different cut-offs for old maternal age. Moreover, the findings can be specific to the population studied.

On univariate analysis, we observed that the time difference between two deliveries was found to be significantly associated with exclusive breastfeeding and difficulty in breastfeeding. We observed better feeding practices when the duration was between 9 and 12 months. This finding reflects the gain in experience, knowledge, and confidence of the mothers in the subsequent deliveries. It is well-known that the gap between the two pregnancies lowers the risks in the latter pregnancy. Our study adds that it can also lead to better feeding practices.

Feeding bottles are the source of infection and interfere with breastfeeding, which further decreases the innate immunity of the baby. Common associations of bottle feeds include higher socioeconomic status, maternal employment, higher maternal education, urban residence, and higher media exposure.\textsuperscript{28} The rate of bottle feeds in our study was 30.52% which is higher than that from the previous studies of the urban population.\textsuperscript{19,29} This reflects an increasing prevalence of bottle feeds, probably secondary to its easy availability, ease of use, and lack of community awareness about its various harmful effects.

Some previous studies from the Southeast Asian region have found maternal education to be associated with appropriate feeding practices.\textsuperscript{30,31} The data from India are more variable. Although many of the trials have shown a positive association between maternal education and breastfeeding practices, there are some data suggesting maternal education to be negatively associated with exclusive breastfeeding.\textsuperscript{32} In our study, we found it negatively associated with nighttime feeds. This may again be a region-specific finding.

Family members and husbands can provide strong emotional and physical support to the new mother. Studies have shown a positive impact of supportive families on breastfeeding practices.\textsuperscript{33-35} In our study, we observed that almost all the mothers felt supported by their families. The high rate of exclusive breastfeeding found in this study cohort can reflect it. However, the authors cannot rule out bias as this was a cross-sectional interview-based study.

It is well-established that optimal breastfeeding practices improve childhood morbidity and mortality.\textsuperscript{16,37} However, we only observed a significant association between the time of initiation of breastfeeding and cough and cold episodes. This can be a reflection of the recall bias or a result of a small sample size.

**Conclusion**

There are wide cultural, economic, and regional variations in the feeding practices. Maternal age, maternal education, the time difference between two deliveries, type of delivery, and gender of the baby were found to be significantly associated with some of the feeding practices in the two urban districts. Studies from different geographical regions and socioeconomic clusters are needed to help the policymakers formulate behavior change strategies and make region/country-specific modifications to the existing guidelines.

**Authors’ contribution**

Savitk Bansal designed the study, collected the data, wrote the paper, and approved the final manuscript. Somashekhar Nimballkar conceived the study, designed the study, wrote the paper, and approved the final manuscript. Rahul Odedra collected data, wrote the first draft, gave inputs to the paper, and approved the final manuscript. Kandarp Talati designed the study, collected data, analyzed the data, wrote the first draft, and approved the final manuscript. Vallaree Morgaonkar designed the study, gave important intellectual inputs to the manuscript and approved the final manuscript. Satvik Bansal will be the guarantor for the paper.

**Declaration of patient consent**

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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**Conflicts of interest**

There are no conflicts of interest.

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