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Complementary feeding practices of children aged six months to two years

Wasim Yousuf Thoker*, Syed Tariq, Aijaz Ahmad Bhat

Department of Pediatrics, Government Medical College Srinagar, Jammu and Kshmir, India

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*Correspondence:

Dr. Wasim Yousuf Thoker,

E-mail: wasimyousuf27@gmail.com

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ABSTRACT

Background: As infants grow and become more active following the first 6 months of life, breast milk alone falls short of providing the full nutritional requirements. This is a very vulnerable period. It is the time when malnutrition starts in many infants contributing to the high prevalence of malnutrition in this age group. Complementary feeding plays critical role in bridging these gaps.

Methods: This hospital based cross sectional study was conducted in Department of Pediatrics GMC Srinagar, over 2 years from November 2019 to November 2021. The study participants were infants and young children, aged 6 to 24 months. Mothers/caregivers were the primary target as respondents. Total sample size was 400.

Results: The median age of the mothers was 24 years. 90% children consumed foods made from grains, roots and tubers. Vitamin-A rich foods were consumed by 45%, dairy products by 32%, legumes and nuts by 18 % of the children aged 6 months-23 months. Consumption of animal origin foods was low, barely 5% and 13% children consumed eggs and flesh foods respectively. The mean dietary diversity score was 2.4.

Conclusions: The results of this review indicate that effectively implemented provision of complementary feeding and education on complementary feeding have a potential to prevent undernutrition in children. Despite clear evidence of the disastrous consequences of childhood nutritional deprivation in the short and long terms, nutritional health remains a low priority. Therefore, enhanced and rigorous actions are needed to deliver and scale up nutritional education and complementary feeding interventions.

Keywords: Vitamin-A, Complementary feeding, Children

INTRODUCTION

Exclusive breastfeeding of infants from birth through initial 6 months using breast milk (the ideal food during this period) is important for optimal health, growth and development.¹ As infants grow and become more active following the first 6 months of life, breast milk alone falls short of providing the full nutritional requirements where the gap keeps expanding with the increasing age of the infants and young children.^{2,3}

Complementary feeding plays critical role in bridging these gaps. World Health Organization (WHO) defines complementary feeding as "a process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants and therefore other foods and liquids are needed, along with breast milk".

The target age range for complementary feeding is between the age of 6 and 23 months (with continued breastfeeding), where most infants reach a general and neurological stage of development (chewing, swallowing, digestion and excretion) that enables them to be fed other foods rather than breast milk.^{2,6,7}

In several parts of the developing world, complementary feeding continues as a challenge to good nutrition in children of 6–23 months.⁸ The challenges during

complementary feeding are context specific, but many are common across settings. They are often characterized by poor feeding practices and poor dietary quality of homemade complementary foods. 11-13

According to pediatric nutrition authorities, developmental readiness in most infants and the ability to tolerate foods consumed would occur around 4 and 6 months of age.⁵

During this period, the intestinal tract will have well-developed defense system that minimizes or averts risk of allergic reaction in infants following intake of foods containing foreign proteins, while its ability to utilize proteins, fats and carbohydrates improves.

Similarly, the infant's kidney develops to a state where it can successfully eliminate waste products emanating from foods such as meat with characteristic high renal load. Furthermore, their neuromuscular system matures enough leading into development of abilities for recognizing food, accepting spoons, masticating and swallowing foods and, even, distinguishing and appreciating varieties in food tastes and colors.⁵

Recommendations for complementary food introduction should follow assessment of infant's developmental readiness, nutritional status and health status the family's economic and sociocultural issues toward diet and food preferences; and other findings viewed important for consideration.⁵

Starting at 6 months, infants can eat pureed, mashed and semi-solid foods prepared from infant cereal, vegetables, fruits, meat and other protein-rich foods.

By 8 months, most infants will become capable of eating "finger foods." In line with the changing oral skills and emerging new abilities (such as munching, chewing, etc.) the thickness and lumpiness of the foods can gradually change from pureed to ground, fork mashed and eventually diced foods.⁴

Introduction of lumpy solid foods should occur around a critical age window of 10 months so as to avoid latent risk of feeding difficulty associated with late introduction.

Evidences suggest that most infants are able to consume solid consistency "family foods" by 12 months, even if they frequently are still served semi-solid foods.

Aims and objectives

The aims and objectives of this study were to determine the complementary feeding practices among children 6-24 months. To find out the factors affecting complementary feeding Practices in children 6-24 months.

METHODS

Study design

Hospital based cross sectional study.

Study place

Postgraduate Department of Pediatrics, G.B Pant Hospital, an associated hospital of Government Medical College Srinagar.

Study duration

A hospital based cross-sectional study conducted over a two (2) year period between November 2018 and November 2020.

Study population

The study participants were infants and young children, age 6 to 24 months residing in Kashmir. Mothers/caregivers were the primary target as respondents because they spend more time with children and are therefore most likely to be involved in breastfeeding and complementary feeding.

Sample size

Children in the age group of 6 months to 24 months attending pediatric outpatient department of G.B. Pant Hospital with minor illnesses.

Selection of sample

Four subjects will be selected on every Saturday of week by the order of arrival to the outpatient department during the study period. Total sample size is 400 patients

Inclusion criteria

Children between six months and two years of age attending pediatric outpatient department.

Exclusion criteria

Children with known anomalies. Children who are very sick, needing emergency care.

Data collection

Data was collected using a semi-structured questionnaire administered by the authors to the mothers after getting written informed consent. The questionnaire consisted of 36 items. It elicited information about demographic profile, breast feeding, initiation and adequacy of complementary feeding.

The questionnaire was pretested and was revised to enhance its clarity and comprehension. Socio-economic status was assessed using modified Kuppuswamy scale. Quantity of food will be assessed by showing a standard 5 ml, 15 ml teaspoon and 150 ml katori to get the next exact dietary details of the child.

Statistical analysis

All the collected data was recorded in Microsoft Excel and analyzed using SPSS v23. Categorical variables were described as frequencies and percentages. Discrete variables were described in terms of median and interquartile range.

Continuous variables were summarized as mean and standard deviation and finally the appropriate statistical tests were applied for data analysis. Statistical test chi square was used to find out the association of various demographic factors with initiation and adequacy of complementary feeding. P value<0.05 was taken as statistically significant.

RESULTS

Median age of mothers was 24years. Majority (85%) were Muslims followed by Sikhs (10%). 90% mothers were married, 5% widowed, 5% separated. 60% mothers had primary education while 30% had secondary education as depicted in table above.

The main source of income is farming and casual labor followed by formal employment and lastly small-scale business (16.1%). Nearly all (90 %) households obtained food through purchasing from the market.

Nearly half (45%) of the households estimated to allocate medium percentage (30%-65%) of their income to food while (40%) allocated the largest percentage (>65%) of their income to food and only (15%) allocated the smallest percentage (<30%) of their income to food. Almost half of the study participants belonged to upper middle socioeconomic class (Table 2).

Nearly all the children (90%) consumed foods made from grains, roots and tubers. Vitamin A rich fruits and vegetables were consumed by 45%, dairy products by 32%, other fruits and vegetables by 31 % and finally legumes and nuts by 18 % of the children aged 6 months-23 months old.

Consumption of animal origin foods was low, barely 5% of the children consumed eggs while consumption of dairy products and flesh foods was at 32% and 13 %, respectively.

The mean dietary diversity score for children aged 6 months - 23 months old was 2.4, $(\pm 1.3, 95\%$ CI 2.3-2.6) and the scores ranged from 1 to 7. Slightly over one-tenth

(13%) of the children aged 6 months-23 months old consumed iron-rich and iron fortified foods.

The percentage of those who consumed iron-rich foods was more or less the same in the other age categories with 10% in 6 months-11 months, 15 % in 12 months-17 months and 16 % in 18 months-23 months old (Table 4).

The mean meal frequency for all the aged children 6 months-23 months old was 3.6 (± 1.1) (95% CI 3.3-3.6). The number of meals consumed by the children in all the age categories ranged from 1 to 6.

The minimum meal frequency was achieved by most (88.25%, 95% CI 84.3-91.4) of the children 6-23 months old with the same trend in the 6-11 months (86.67%), 12 months-17 months (92.2%) and 18 months-23 months (87%) old age categories.

The percentage of breastfed and non-breastfed children who attained minimum meal frequency in the different age categories was 88.4% and 87.5% in 6 months-23 months old, 87.5% and 80.0% in 6 months-11 months old; 91.2% and 94.4% in 12 months-17 months old and 84.8% and 91.2% in 18 months-24 months old respectively (Table 5).

Knowledge on complementary feeding practices

In the current study, most of the mothers (85%) knew that semi-solid, solid and soft foods should be introduced at 6 months. Slightly less than three quarters of the mothers (70%) did not know the risks of starting complementary feeding late.

Malnutrition was the main consequence pointed out by mothers who knew the risk of introducing complementary feeding too late. With regards to dietary diversity, mothers who stated that a child should consume a diverse diet were 65%.

Almost about 75% of the mothers were aware that a 6 months-23 months old child should consume 2 meals or more in a day in addition to breast milk.

Mothers' knowledge with regards to the importance of animal foods in complementary diet was low with only 18% of them pointing out that animal source foods are rich in nutrients and should form part of the complementary diet.

Slightly more than a third (35%) of the respondents stated that enriching complementary food (through adding other foods like milk, fruit juices and fat to the main dish) makes it more nutrient dense/diverse and adequate to meet the dietary needs of the children especially as they grow. Just one-tenth (7.5%) of mothers knew that child's porridge should be made of one type of flour. In addition to that mother reported using mixed flour to prepare children's porridge.

Table 1: Socio-demographic characteristics of the study population.

| Socio-demographic characteristics | | No. of patients (n=400) | % |
|-----------------------------------|----------------------------|-------------------------|----|
| Metamol and (in mans) | Median (range) | 24 (16-40) | · |
| | <25 | 240 | 60 |
| Maternal age (in years) | 25-34 | 120 | 30 |
| | 35 years and above | 40 | 10 |
| | Muslim | 340 | 85 |
| Religion | Sikh | 40 | 10 |
| | Hindu | 20 | 5 |
| | Married | 360 | 90 |
| Marital status | Separated | 20 | 5 |
| | Widowed | 20 | 5 |
| | No formal education | 20 | 5 |
| Education | Primary school education | 240 | 60 |
| | Secondary school education | 120 | 30 |
| | Tertiary level | 20 | 5 |
| Parity (Median range) | | 2 (1-7) | |
| House hold size (Mean range) | | 5 (1-9) | |

Table 2: Socio-economic characteristics of the of the study population.

| Socioeconomic characteristics | | No. of patients (N) | % |
|-------------------------------|-----------------------------|---------------------|----|
| | Formal employment | 80 | 20 |
| Main source of family | Farmers | 140 | 35 |
| income | Casual labor | 120 | 30 |
| | Small scale business | 60 | 15 |
| Estimated % household | Largest percentage (>65%) | 160 | 40 |
| of income allocated to | Medium percentage (30%-65%) | 180 | 45 |
| foods | Smallest percentage (<30%) | 60 | 15 |
| | Farming | 32 | 8 |
| How food is obtained | Purchase | 360 | 90 |
| | Food aid/ donation | 4 | 1 |
| | Others | 4 | 1 |
| | Father /husband | 300 | 75 |
| Provider of food in a | Mother | 80 | 20 |
| house hold | Grand parents | 12 | 3 |
| | Relatives | 8 | 2 |
| | Upper lower | 100 | 25 |
| Socioeconomic status as | Lower middle | 80 | 20 |
| per Kuppuswamy scale | Upper middle | 200 | 50 |
| | Upper | 20 | 5 |

Table 3: Types of food given to children aged 6 months - 23 months.

| Type of food | No. of patients | % |
|--------------------------------------|-----------------|----|
| Grains, roots and tubers | 360 | 90 |
| Legumes and nuts | 72 | 18 |
| Dairy product | 128 | 32 |
| Flesh foods | 52 | 13 |
| Eggs | 10 | 5 |
| Vitamin A rich fruits and vegetables | 180 | 45 |
| Other fruits and vegetables | 124 | 31 |

Table 4: Foods consumed and dietary diversity.

| Mean dietary diversity | Mean±SD (95% CI) | Range |
|---|--------------------|-------|
| 6.22 months (n=400) | 2.4±1.2 | 1-7 |
| 6-23 months (n=400) | (2.3-2.6) | 1-7 |
| 6-11 months (n=180) | 2.2±1.2 | 1-6 |
| 12-17 months (n=120) | 2.6±1.3 | 1-7 |
| 18-23 months (n=100) | 2.5±1.2 | 1-7 |
| Consumption of Iron rich and iron fortified foods | Number of patients | % |
| 6-23 months (n=400) | 60 | 15 |
| 6-11 months (n=180) | 18 | 10 |
| 12-17 months (n=120) | 22 | 18.3 |
| 18-23 months (n=100) | 20 | 20 |
| Minimum dietary diversity | Number of patients | 0/0 |
| 6-23 months (n=400) | 72 | 18 |
| Breast fed (n=328) | 58 | 17.7 |
| Non-breast fed (n=72) | 14 | 19.4 |
| 6-11 months (n=180) | 29 | 16.1 |
| Breast fed (n=160) | 25 | 15.6 |
| Non-breast fed (n=20) | 4 | 20 |
| 12-17 months (n=120) | 24 | 20 |
| Breast fed (n=102) | 22 | 21.6 |
| Non-breast fed (n=18) | 2 | 11.1 |
| 18-23 months (n=100) | 19 | 19 |
| Breast fed (n=66) | 12 | 18.2 |
| Non-breast fed (n=34) | 7 | 20.6 |

Table 5: Meal frequency.

| Meal frequency | Mean±SD (95% CI) | Range | |
|------------------------------|------------------------|-------|--|
| Children 6-23 months (n=400) | 3.6±1.1 | 1-6 | |
| Children 0-23 months (n=400) | (3.3-3.6) | 1-0 | |
| 6-11 months (n=180) | 3.3±1.2 | 1-6 | |
| 12-17 months (n=120) | 3.6±1.0 | 1-6 | |
| 18-23 months (n=100) | 3.4±1.2 | 1-6 | |
| Minimum meal frequency | Number of patients (N) | % | |
| 6-23 months (n=400) | 353 | 88.25 | |
| Breast fed (n=328) | 290 | 88.4 | |
| Non-breast fed (n=72) | 63 | 87.5 | |
| 6-11 months (n=180) | 156 | 86.67 | |
| Breast fed (n=160) | 140 | 87.5 | |
| Non-breast fed (n=20) | 16 | 80 | |
| 12-17 months (n=120) | 110 | 92.2 | |
| Breast fed (n=102) | 93 | 91.2 | |
| Non-breast fed (n=18) | 17 | 94.4 | |
| 18-23 months (n=100) | 87 | 87 | |
| Breast fed (n=66) | 56 | 84.8 | |
| Non-breast fed (n=34) | 31 | 91.2 | |

Table 6: Significant relationship between demographic and socio-economic factors and complementary feeding practices.

| Characteristics | Complementary feeding practice | | | | | | P value |
|---------------------|--------------------------------|--------------|------|---|-------|---|---------|
| Mothous one | Minimu | m meal frequ | ency | | | | |
| Mothers age (n=400) | Yes | | No | | Total | | 0.024 |
| (II-400) | N | % | N | % | N | % | |

Continued.

| Characteristics | Complementary feeding practice | | | | | P value | |
|--------------------|--------------------------------|-------------------------------------|--------------|-------|-------|---------|-------------|
| <25 years | 222 | 92.5 | 18 | 7.5 | 240 | 60 | |
| 25-35 years | 101 | 84.2 | 19 | 15.8 | 120 | 30 | |
| >35 years | 31 | 77.5 | 9 | 22.5 | 40 | 10 | |
| | Consum | ption of vitami | n A rich foo | ds | | | |
| Occupation | Yes | | No | | Total | | |
| | N | % | N | % | N | % | |
| Not employed | 142 | 49.8 | 143 | 50.18 | 285 | 71.25 | 0.046 |
| Employed | 50 | 43.48 | 65 | 56.52 | 115 | 28.75 | 0.046 |
| Percentage of | Minimu | Minimum dietary diversity | | | | | |
| income allotted to | Yes | | No | | Total | | |
| food | N | % | N | % | N | % | |
| Largest (>65%) | 34 | 21.25 | 126 | 78.75 | 160 | 40 | |
| Medium (30-65%) | 34 | 18.9 | 146 | 81.1 | 180 | 45 | 0.048 |
| Smallest (<30) | 4 | 6.7 | 56 | 93.3 | 60 | 15 | |
| Decision maker on | Consum | Consumption of vitamin A rich foods | | | | | |
| how family income | Yes | | No | | Total | | |
| is used | N | % | N | % | N | % | |
| Husband/partner | 14 | 37.8 | 23 | 62.2 | 37 | 9.25 | 0.047 |
| Wife / mother | 168 | 46.2 | 195 | 53.8 | 363 | 90.75 | 0.047 |

DISCUSSION

This study was conducted in the Postgraduate Department of Pediatrics, GB Pant Hospital an associated hospital of Government Medical College Srinagar. In this study, four hundred (400) participant mothers were included. The median age of the mothers was 24 years with the youngest and oldest mothers being 16 years and 40 years old respectively. Majority (90%) of the mothers were married and more than half (60%) of the mothers had primary school education. The findings on marital status are in agreement with those conducted by Gebru S et al.¹⁵

On the whole, most of the husbands were farmers and casual laborers while most of the mothers were unemployed and dependent on their spouses for provision of food and other necessities. In our study, nearly all (90%) households obtained food through purchasing from the market. Nearly half (45 %) of the households estimated to allocate medium percentage (30%-65%) of their income to food while (40 %) allocated the largest percentage (>65%) of their income to food and only (15%) allocated the smallest percentage (<30%) of their income to food. High levels of poverty, low purchasing power and lack of own production of food may have had a negative effect on the attainment of minimum acceptable diet by children aged 6 months-23 months old in many households.

In our study, almost half of the study participants belonged to lower middle socioeconomic class. Previous nationwide studies conducted in India that utilized the 2005–2006 India Demographic and Health Survey (DHS) reported that limited access to health services, low socioeconomic status and no or low maternal education

were associated with inappropriate complementary feeding practices. The minority of the mothers who did not initiate breastfeeding in this study reported that the main reason for not doing so was lack of breast milk.

These findings agree with those of studies in other settings. A high percentage of the children who are one year old were still being breastfed. At 2 years of age, the rate of breastfeeding dropped to about two-thirds, indicating that one-third of the children had prematurely stopped breastfeeding and therefore missing on the benefits of the practice. A similar trend was noted in all the studies conducted by Sawadogo et al, with the rate of breastfeeding decreasing from 100% at 6 months to 61% at 24 months. 18

All the children (aged 6 months-8 months old) in this study had appropriately been introduced to complementary feeding. Nonetheless, some of the children had been introduced to complementary foods as early as 2 months as reported by mothers. Aggarwal et al, in a prospective study of 200 parents observed that only 17.5% of mothers had started complementary feeding at the recommended time. In a study done by Sethi et al, from the slums of Delhi, 16.6% of the parents had initiated extra feeds at the right time. In our study, nearly all the children (90%) consumed foods made from grains, roots and tubers.

Vitamin A rich fruits and vegetables were consumed by 45%, dairy products by 32%, other fruits and vegetables by 31% and finally legumes and nuts by 18% of the children aged 6 months-23 months old. Consumption of animal origin foods was low and consumption of dairy products and flesh foods was at 32% and 13%, respectively. These findings compare with those of

studies conducted in Nepal by Joshi et al.²¹ The low consumption of vitamin A-rich foods may have been contributed by the high poverty level in the town and therefore limited income to purchase foods.

The findings of this study showed that complementary feeding was low in dietary diversity. The mean dietary diversity was (2.4 ± 1.3) , implying that many children ate foods from only 2 out of the 7 recommended groups 62 with the number of food groups consumed increasing with the age of the child. These findings are in agreement with those from various studies, Sawadogo et al, Faso et al and Joshi et al.²¹ The study established that most children aged 6 months–23 months old received one to three meals a day with a mean meal frequency of 3.5 (±1.1) .²³

In conclusion, complementary feeding, in this study was sufficient in terms of meal frequency. Overall, mothers demonstrated a high knowledge on breastfeeding compared to complementary feeding practices. The aspects on which mothers demonstrated high knowledge included: the importance of breastfeeding and in particular the correct duration of exclusive breastfeeding; age of introduction of complementary foods and correct meal frequency. The mean maternal knowledge score on complementary feeding was 6.5±1.6 out of a possible total score of 12.

The average maternal knowledge, poverty and being away from home may have been some of the factors contributing to the relatively low adherence to appropriate complementary feeding. Several studies have established different maternal factors related to complementary feeding practices. In the present study, younger mothers and those who were not employed were significantly more likely to feed their children at the required minimum meal frequency and also to feed them on vitamin A rich foods respectively. The hypothesis that there is no significant association between maternal demographic and socioeconomic characteristics and complementary feeding practices among children aged 6 months-23 months in town is thus rejected.

Significantly, more children from households which allocated more than two-thirds of their income to food consumed a diverse diet compared to those from households in which less than two-thirds of the income was allocated to food. Maternal nutritional knowledge about appropriate food and feeding practices significantly influences complementary feeding practices and is often a greater determinant of malnutrition than the lack of food.

Mothers should therefore be equipped with the necessary knowledge on complementary feeding practices. Mothers who were aware of the importance of a diverse diet were more likely to feed their children on a diverse diet. The findings on the positive association between maternal knowledge and complementary feeding practices agree with those conducted in northern Ethiopia by Belete Y et al, which showed that mothers with greater knowledge of healthy eating habits choose to give nutritious foods to their children. The study could have been better if the sample size were larger, which could not be accomplished due to limitation of time. Short follow up period.

CONCLUSION

The scarcity of available studies and their heterogeneity as well as the variety in complementary feeding interventions make it difficult to determine one particular type of complementary feeding intervention as the most effective. Nonetheless, the results of this review indicate that effectively implemented provision of complementary feeding and education on complementary feeding have a potential to prevent under nutrition in children. However, further high-quality studies need to be conducted which report consistent outcome measures and similar interventions in order to accurately map out which interventions, if scaled up, can be effective.

Moreover, these trials should consider using standardized types of food in the intervention so that evidence can be formulated on which type of food is most effective. It is ideal to keep the duration of intervention for at least six months since anthropometric improvements are gradual. Trials should report consistent outcomes and also include morbidity outcomes. Despite clear evidence of the disastrous consequences of childhood nutritional deprivation in the short and long terms, nutritional health remains a low priority. Therefore, enhanced and rigorous actions are needed to deliver and scale up nutritional education and complementary feeding interventions.

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Institutional Ethics Committee

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