

## Review Article:

# Status of complementary feeding practices of infants and young children (0-23 months) in India

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## Abstract

Background: India alone is responsible for one third of the global burden of low birth weight even after excluding 66 per cent of infants in the country who are not weighed at birth. Adequate nutrition during infancy and early childhood is fundamental to the development of each child's full human potential. Inadequate and inappropriate complementary feeding practices such as untimely introduction (too early or too late) of complementary foods, improper feeding frequency, low dietary diversity and less nutrient dense complementary foods and unhygienic feeding practices can have severe detrimental threats to the health and nutritional status of the children. Objective: The objective of the present review is to assess the current status of complementary feeding practices in India. Methods: Appropriate studies were identified from online databases viz. PubMed, Google Scholar, Medindia, WHOint, Research Gate, UNICEF.org, EMBASE, World Wide Scienceusing appropriate keywords. Results: The status of complementary feeding practices in India remains poor even after the formulation and implementation of various policies and programs. The time of initiation of complementary feeding is either too early or too late. Also, the minimum meal frequency, minimum dietary diversity and minimum acceptable diet is not achieved in

majority of the infants aged six months to two years. Conclusion: It can be concluded that the complementary feeding practices in India are not up to the mark and necessary measures needs to be taken to improve this pernicious situation.

**Key words :** *Complementary feeding, dietary diversity, infants, minimum acceptable diet, minimum dietary diversity, minimum meal frequency*

## Introduction

Adequate nutrition during early years of life plays an important role in achieving each child's full human potential. The first two years of life are considered as the "critical window" for the optimum growth and development of a child.<sup>1-3</sup> Therefore, complementary feeding which is recommended by WHO to be initiated at six months of age is a major determinant of short- and long-term health outcomes in individuals.<sup>4</sup> Inadequate and inappropriate complementary feeding practices can have severe detrimental threats to the health and nutritional status of young children. Most data show that occurrence of stunting at six months of age coincides with the introduction of complementary foods, implying that faulty feeding practices maybe responsible for malnutrition setting in during this period. While tremendous attention has been focussed on improving

breastfeeding practices in the last several years, complementary feeding still remains in the shadow. Thus, the purpose of the present review is to assess the current status of complementary feeding practices in India.

### Material and method

Appropriate studies were identified from online databases viz. PubMed, Google Scholar, Medindia, WHOint, ResearchGate, UNICEF.org, EMBASE, World Wide Science using the following keywords: “infant and young child feeding practices in India”, “complementary feeding practices” “factors affecting complementary feeding” “under five nutrition”, “determinants of complementary feeding”, “maternal education and feeding of infants”, “influence of family on infant feeding practices”, “dietary diversity”, “minimum meal frequency” and “minimum acceptable diet”. The studies prior to the year 2000 were not included in the review. References from the identified research articles were cross examined for relevant studies which were not included in the databases mentioned. All the full text articles and abstracts were analysed and the most suitable ones were selected to be included in the review.

### Results

#### Status of Complementary Feeding Practices in India

Complementary feeding is one of the three basic recommendations of Infant and Young Child Feeding Practices (IYCF) which needs to be initiated at the age of six months. Delayed or inappropriate complementary feeding severely affects the physical, cognitive and economical development of a child and the nation as a whole. Thus, it is cardinal to be aware of the status of complementary practices prevailing in India.

#### (a) Children receiving complementary feeding at six months:

The recent NFHS-4 (2015-16) report highlighted that instead of improvement in

complementary feeding practices, there has been a decline in the past ten years while breastfeeding rates have dramatically increased. The percentage of children age 6-8 months receiving solid or semi-solid food and breastmilk in India has decreased from 52.6 per cent in NFHS-3 (2005-06) to 42.7 per cent in NFHS-4 (2015-16). The NFHS-4 data also shows state-wise variation in the initiation of complementary feeding between the age of 6-8 months. The states with more than 60 per cent children fed complementary foods at 6 to 8 months includes Manipur (78.8%) followed by Nagaland (70.7%), Mizoram (67.9%), Tamil Nadu (67.5%), Meghalaya (67.4%), Kerala (63.1%) and Sikkim (61.8%). Other states where 50 to 60 per cent children were initiated with complementary feeding at 6-8 months are Arunachal Pradesh (56.1%), Odisha (54.9%), Chhattisgarh (53.8%), Arunachal Pradesh (53.6%), Himachal Pradesh (52.7%), West Bengal (52.0%) and Jammu & Kashmir (50.0%). In the remaining states, this percentage is below 50 per cent with Tripura being the lowest at 13.6 per cent. However, majority of these states have experienced a drastic reduction when compared to NFHS-3 (2005-06) [Fig 1]. It is extremely appalling that only four states i.e. Manipur, Nagaland, Chhattisgarh and West Bengal have shown an improvement in the initiation of the complementary feeding at an appropriate age.<sup>5</sup>

In India, at the age of 6-8 months only 54 percent of breast fed and 75 per cent of non-breast fed infants are initiated into complimentary feeds.<sup>6</sup> Gaddapa and Behera (2016) examined 125 children in the age group of 0-24 months, of which only 38 per cent children received complementary feeding between 6 to 9 months of age, as compared to 48.8 per cent children who were started on complementary feeding before six months of age, in some cases on day one of life. Among the children who received complementary feeding at nine months of age and beyond, 60 per cent of them developed severe acute malnutrition. The correlation between age of starting complementary feeding and malnutrition was found to be statistically significant.<sup>7</sup>

Infant and young child feeding practices were assessed among 120 mothers having children of zero to 23 months of age belonging to lower socio-economic strata in West Bengal and the results reported that 46.67 per cent infants were given solid, semisolid or soft foods at the age of 6-8 months. Proportion of children aged six to nine months who were given complementary feeding was much less than as found in rural areas of West Bengal by NFHS-3 (55.3%).<sup>8</sup> In a community based study, Saxena and Kumar estimated the complementary feeding practices among mothers of children below two years of age (n= 336) in Dehradun. It was found that 87.3 per cent children over six months of age were on complementary feeding at the time of study, although timely complementary feeding was initiated only in 70.1 per cent of them.<sup>9</sup> Another cross sectional hospital based study was undertaken to assess the Infant and Young Child Feeding (IYCF) practices among 100 caregivers of children aged less than five years and it was found that 25 per cent mothers started complementary feeding late varying from seven to 13 months.<sup>10</sup> In Madhya Pradesh, a study was undertaken to estimate the current complementary feeding practices and food beliefs in young mothers of infants aged six to 12 months. The results evinced that out of 100 infants, 14 per cent were never started with complementary foods and only 40 per cent received complementary feeding at six months of age.<sup>11</sup>

The knowledge, attitude and practices of parents of 100 children (six months to two years) regarding complementary feeding practices in Karnataka were assessed and it was revealed that 82 per cent parents knew the correct age to initiate complementary feeds but only 67 per cent initiated it at six months.<sup>12</sup> In another community based study done on 680 children from Jammu, 512 children from Kashmir and 101 children from Ladakh to assess the complementary feeding practices, it was found that complementary foods were introduced among 76.5 per cent of Ladakhi children quite early whereas almost equal number of children from Kashmir (19.5%) and Jammu

(20.2%) were weaned before 6 months. Late weaning was more prominent in Jammu as 52.5 per cent followed by Kashmir (40.2%) and Ladakh with only 1.3 per cent.<sup>13</sup> The results of a study conducted on IYCF practices amongst mothers of 374 children less than 24 months of age, attending an urban health centre in East Delhi showed that out of the 66 children aged between six and nine months, about 72.7 per cent had complementary feeding.<sup>14</sup> Similar results were found in a cross-sectional household study to assess feeding practices of infants and young children amongst 805 mother-child pair in rural areas of Andhra Pradesh, where complementary feeding in addition to breast milk was given to 82 per cent of infants between six and 11 months of age.<sup>15</sup> In a hospital based study, carried out amongst 200 mothers of children between the ages of six months to two years in Mangalore evaluated the complementary feeding practices and reported 77.5 per cent mothers started complementary feeding at the recommended age of six months. But only 32 per cent of mothers were giving an adequate quantity of complementary feeds.<sup>16</sup> A study done in six villages of Ghaziabad district, Uttar Pradesh revealed that out of the 151 mothers' interviewed, only nine introduced semi-solid/solid foods, along with breastfeeding at six months of age.<sup>17</sup> On contrary to this, in a study conducted in Chandigarh to investigate the infant feeding practices among mothers of infants it was reported that out of 300 mothers, 81.7 per cent started complementary feeding between six to eight months of age of infant.<sup>18</sup>

As reported by the NFHS-4 data, in most states of India, the percentage of children receiving complementary foods at an appropriate age has decreased over a time period of ten years. However, other studies done in different parts of India recorded that infants received complementary feeding at the recommended age of six months with exceptions in Ladakh, West Bengal and Uttar Pradesh where initiation of complementary feeding was either too early or too late.

**(b) Types and consistency of complementary foods commonly given:**

WHO recommends that when starting complementary feeding, infants should be given feeds with appropriate consistency i.e. beginning with liquid diet followed by semi-solid and solid foods as well as comprising a balanced diet along with continued breastfeeding. As the infants have small stomach size, the foods should be made energy dense by adding sugar/jaggery and/or ghee/butter/oil. Also the complementary foods prepared should be safe and hygienic.<sup>19</sup>

In a study done amongst 100 children under five years of age in Pune, foods like mashed daal and rice, mashed seasonal fruits, vegetables and biscuit with milk were given to most of the children. Milk was given to 73 per cent infants whereas rest could not be given milk either because of not being able to afford (15%) or because the child refused to drink (11%).<sup>10</sup> Liquid diets (63%) were mostly preferred initially followed by semisolid (32%) and solid (5%) foods by the parents of 100 children (six months to two years) in Madhya Pradesh. Rice water (72%) and top milk (67%) were the feeds considered ideal. Ghee/oil was added by 62 per cent parents to the child's food.<sup>11</sup> Amongst 336 children below two years of age in Dehradun, there were 36.4 per cent of the children who were given complementary food in liquid consistency and only 17.2 per cent children were given green leafy vegetables.<sup>9</sup> Similarly in another study done on 805 mother-infant pairs, the most commonly used complementary food was cow/buffalo milk (43.5%) followed by homemade semi-solids (23.1%). Use of commercial food was more among literate mothers.<sup>15</sup>

In a community based study undertaken by Garg and Chadha amongst 151 infants in the age group of six to 12 months in Uttar Pradesh, the results unveiled that cereals and diluted animal milk were the major food groups fed to the infants. The usual foods being given to the infants included a piece of roti or biscuit with diluted animal milk.

Despite all the vegetables being cooked in the households, they were not fed to the child, thinking he/she would not be able to digest it as the food was prepared by adding chilies and other spices.<sup>17</sup> In the urban slums of Karnataka, 100 infants between the age group of nine to 12 months were studied to find out the prevailing complementary feeding practices and analyse their impact on infant growth. The results highlighted that 28 per cent of infants were given thin complementary foods (less energy dense), 46 per cent were given semisolid and 26 per cent were given solid complementary foods.<sup>20</sup>

Zahiruddin et al. also observed that water was given to baby at as early as two months in dry and hot months followed by liquid foods, such as soup of rice or daal (pulses) and cow milk was given at four to five months. At five to six month of age infants were given soft and semi-solid such as khichadi, daal and rice, satu, sooji, etc. At seven to nine months of age solid food such as chapati, vegetables, boiled potato, boiled eggs etc. were introduced. Solid foods were generally mashed and a thick paste was prepared for feeding. Cookies / biscuit were given to infants at an early age of four to five months.<sup>21</sup> In another study by Pradhan and Arora in Chandigarh, it was observed that home made weaning foods were most commonly fed to the infants and out of 300 mothers, only 25 per cent included spinach in the complementary foods prepared while 81.7 per cent mothers included fat and sugar to make the food more energy dense.<sup>18</sup>

Based on the data from different studies it may be assumed that animal milk is considered as an ideal food for initiating complementary feeding by majority of the mothers/caregivers in India. In most of the studies, complementary feeding was started initially by giving liquid diets such as diluted animal milk and rice water followed by semi-solid foods home made foods like daal, khichdi, rice and other locally available foods. Solid foods such as chapatti, eggs, vegetables in mashed form were fed later at the age of nine months. Most of the infants were not given green leafy vegetables.



### (c) Minimum Dietary Diversity, Minimum Meal Frequency and Minimum Acceptable Diet:

Dietary diversity is an important component of dietary quality. It refers to consumption of a higher number of food items and food groups which is associated with improved nutritional adequacy of the diet.<sup>14</sup> For the average healthy breastfed infant, meals of complementary foods should be provided two to three times per day at six to eight months of age and three to four times per day at nine to 11 and 12-24 months of age, with additional nutritious snacks (such as a piece of fruit or bread or chapatti) offered one to two times per day, as desired maintain the minimum meal frequency. The minimum acceptable diet measures both the minimum feeding frequency and minimum dietary diversity (Minimum dietary diversity refers to child receiving 4+ of the food groups viz. grains, roots and tubers, legumes and nuts/dairy products (milk, yogurt, cheese), flesh foods (meat, fish, poultry and liver/organ meats), eggs, vitamin A rich fruits and vegetables, other fruits and vegetables).<sup>1, 22</sup>

NFHS-4 (2015-16) data highlights that in India, only 9.6 per cent of the total children age 6-23 months received an adequate diet (Breastfed children receiving 4 or more food groups and a minimum meal frequency, non-breastfed children fed with a minimum of three Infant and Young Child Feeding Practices i.e. fed with other milk or milk products at least twice a day, a minimum meal frequency that is receiving solid or semi-solid food at least twice a day for breastfed infants 6-8 months and at least three times a day for breastfed children 9-23 months, and solid or semi-solid foods from at least four food groups not including the ,milk or milk products food group). Only 8.7 per cent breastfed children and 14.3 per cent non-breastfed children, 6 to 23 months, in urban and rural areas combined, received an adequate diet. Adequacy of the diet also shows state-wise differences. States with highest percentage of children 6-23 months receiving an adequate diet are Tamil Nadu (30.7%) followed by Meghalaya (23.6%) and Jammu & Kashmir (23.5%), Sikkim (23.1%) and Kerala

(21.4%). But unfortunately these states too have less than 40 per cent diet adequacy. The states with lowest diet adequacy for children 6-23 months are Rajasthan (3.4%), Gujarat (5.2%), Uttar Pradesh (5.3%), NCT Delhi (5.8%), Punjab (5.9%) and Tripura (5.9%). The remaining states reported the percentage of children 6-23 months receiving an adequate diet from six per cent to 20 per cent only.<sup>5</sup>

Studies have shown that only about 42 per cent of infants received the recommended appropriate foods at appropriate frequency at the start of the second year of life.<sup>6</sup> In a study carried out to assess infant and young child feeding practices among 120 mothers having children of 0-23 months of age in West Bengal, it was found that only 30.85 per cent mothers maintained minimum dietary diversity while 41.49 per cent mothers maintained minimum meal frequency.<sup>8</sup> Out of 150 children (0-24 months) studied in Pune, minimum dietary diversity score ( $\leq 4$  food groups) was noted in 47.2 per cent. Of these children, 42.4 per cent were malnourished. There was no correlation found between minimum dietary diversity and malnutrition.<sup>7</sup>

A secondary analysis of National Family Health Survey -3, 2005-2006 observed that among children aged six to 23 months, minimum dietary diversity rate was 15.2 per cent, minimum meal frequency was 41.5 per cent and minimum acceptable diet was 9.2 per cent.<sup>23</sup> Similar findings were reported in a study using the Complementary Food Index. It was identified that infants (n=151) aged six to 12 months in Ghaziabad district had poor dietary diversity, with only 31 per cent and 18 per cent of the infants reportedly being fed the recommended number of food-groups during six to eight and nine to 12 months respectively.<sup>17</sup>

In another study undertaken by Sreedhara and Banapurmath in urban slums of Karnataka including 100 infants between nine to 12 months, 29 per cent of infants were given complementary feeding less than three times a day, 61 per cent were fed three to five times per day and only five per cent were fed more than five times per day.<sup>20</sup> The results

of a study conducted to assess the feeding practices of infants and young children less than three years of age (n=805) in rural areas in Andhra Pradesh revealed that most (79.6%) children received complementary feeding at least three times a day and 69 per cent were fed by their mothers.<sup>15</sup> Minimum dietary diversity, minimum meal frequency, and minimum acceptable diet were seen adequate in 32.6 per cent, 48.6 per cent, and 19.7 per cent of 374 children between six months and two years of age, respectively in East Delhi.<sup>14</sup>

In a study carried out to compare the complementary feeding indicators and associated factors in children aged six to 23 months across five South Asian countries (Bangladesh, India, Nepal, Pakistan and Sri Lanka) it was seen that Minimum dietary diversity among children aged six to 23 months ranged from 15 per cent in India to 71 per cent in Sri Lanka, with Nepal (34%) and Bangladesh (42%) in between. Minimum acceptable diet among breastfed children was nine per cent in India, 32 per cent in Nepal, 40 per cent in Bangladesh and 68 per cent in Sri Lanka.<sup>24</sup>

As per the NFHS-4 data, the diet adequacy of 6-23 months' children is not maintained in most parts of the country. All the states have highlighted a diet adequacy of less than 40 per cent. Some of the states even had poorest conditions with diet adequacy less than five per cent.

## Discussion

The transition from breast milk to complementary foods along with breast milk is recommended at the age of six months which is a crucial and vulnerable time as most of the growth faltering occurs during this period due to inappropriate complementary feeding and repeated infections leading to malnutrition.

The incidence of stunting is the highest in the period of 6-23 months as children have high demand for nutrients and the quality and quantity of available foods is often compromised, especially after exclusive breastfeeding.<sup>25-26</sup>[Fig 2] Stunting which occurs at this age is difficult to be addressed

during later years of life. Study in Karnataka on 500 mother-infant pair highlighted that when complementary feeding was started after 6 months of age, 48.85 per cent, 46.05 per cent and 33.10 per cent of infants were under weight, stunted and wasted, respectively. These figures increased to 71.9 per cent, 75.1 per cent and 29.3 per cent respectively, for infants who were given complementary foods after 12 months of age.<sup>27</sup>

Introduction of complementary foods to infants before the age of six months can replace breast feeding and thus increases risk of infections such as diarrhoea, which further results in weight loss and malnutrition.<sup>28</sup>In a study conducted in Bangladesh, it was found that partially breastfed infants of age 0-6 months had a higher prevalence of diarrhoea than the exclusive breastfed infants.<sup>29</sup> It indicates that introduction of complementary foods before 6 months of age increases the risk of diarrhoea as the infants has an immature gastrointestinal system. Diarrhoea resulted due to improper and unsafe complementary feeding, can be followed by months of growth retardation leading to kwashiorkor, marasmus and immunodeficiency manifested by repetitive infections which may culminate into infant mortality.<sup>30</sup>There is an association between early introduction of milk substitutes and too late or inadequate complementary with increased risk of infection.<sup>31</sup>

Microbial contamination of complementary foods and unhygienic feeding practices are the other factors responsible for the infectious diseases. The greatest incidence of diarrhoea occurs at 6 months because infants are exposed to food-borne pathogens during the initiation of complementary feeds. Poor environmental sanitation and poor personal hygiene of mothers/caregivers remains a leading etiological factor for diarrhoea. Studies have documented feeding leftover and overnight foods, not washing hands prior to cooking and feeding, consumption of the spilled food from the floor, use of dirty cloth for wiping hands and utensils and the use of unsterilized and dirty feeding bottles for the

children as the potential risk factors leading to diarrhoea in young children.<sup>32</sup>

### Conclusion

Complementary feeding is one of the most important aspect of infant and young child feeding practices as the chances of growth faltering among infants increases due to inappropriate complementary feeding practices. Therefore, the complementary foods should be introduced to infants timely at six months of age in appropriate and adequate amounts taking care of safety and hygiene. As per NFHS-4 data, it can be concluded that in most states of India, the introduction of complementary foods is not age appropriate. The adequacy of the diet is poor in almost all the states of the country reflecting an abysmal status of complementary feeding. Diluted animal milk is the most preferred food for beginning complementary feeding among infants. Complementary feeding is generally started by giving less energy dense liquid diets such as diluted animal milk and rice water. Green leafy vegetables are not given to most of the infants. In India, the status of complementary feeding practices is sinking down even after a number of policies and programmes framed, implemented and undergoing at present. This situation seems to be more depressing when on one hand the number of institutional deliveries in India has increased tremendously with drastic surge in the breastfeeding rates and on the other hand complementary feeding rates have gone down. There has been so much focussed work done to improve and uplift the breastfeeding status in India but a little attention has been given to complementary feeding when it is one of the most important component of IYCF having an effect on growth and development of a child. Therefore, there is a desperate need for complementary feeding sensitization and skill building of all the stakeholders involved in IYCF and to plan education and counselling campaign for the caregivers so as to improve the poor complementary feeding status in country.

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Complementary feeding practices in India are not up to the mark. Necessary measures need to be taken to improve solve problem of malnutrition.

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