

Status, development and standardization of supplementary foods

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ABSTRACT

The present study was conducted on development and assessment of supplementary food preparations. Infant and young child feeding practices were observed among 0-3 years old children of Jain community of Udaipur city of Rajasthan. Fifty Jain families were randomly selected to collect the information. Data were collected through interview method. It was found that supplementary foods were fed to the children at the age of 4 months. Jaggery water (50%), honey (33%) and Janamghuti (17%) were introduced as the pre-lacteals to the newly born baby. Among liquid foods, maximum mothers fed Dal soup (84%) to their children and among solid foods, maximum mothers fed Khichadi and Dalia (84% each). Among processed foods, biscuits were fed by maximum number of mothers (84%). Instant vegetable gruel mix, instant semolina mix, instant cereal mix, instant corn mix and instant Boor mix were developed and standardized using indigenous foods. Products were acceptable on nine-point hedonic scale. As per nutrient composition, vegetable gruel mix, instant semolina mix, instant cereal mix, instant corn mix and instant Boor mix contained 13.7, 9.2, 9.7, 5.4 and 2.0 g protein; 4.2, 8.4, 9.9, 28.6 and 6.5 g fat; 251.0, 572.0, 517.0, 473.0 and 190.5 Kcal energy; 39.8, 115.0, 99.0, 18.2 and 31.0 g carbohydrate and 2.5, 1.0, 1.7, 1.0 and 0.1 mg of iron content per kg respectively. Developed products can be used at household level and can be recommended for feeding programmes to combat deficiency diseases in children.

Keywords: Supplementary foods; feeding; children; mothers, nutrient composition

INTRODUCTION

Protein energy malnutrition is global dilemma. Pulses and whole grains are considered staple foods that provide a significant amount of calories, fibre and protein, making them key food sources in a nutritionally balanced diet (Bouchard et al 2022). The protein quality of the cereal-based diet can be improved by fortification. According to FAO standards suggestion, to meet the recommended dietary allowances of infants, pre-school children, adolescent girls, pregnant and lactating women, low-cost supplementary foods could be processed domestically by simple, inexpensive processing technology. The use of protein-calorie sources of vegetables or other origins as a supplementation on regular diet has been proposed a possible solution to this problem (<https://www.fao.org/3/w2840E/w2840e0d.htm>). Malting and roasting is such a processing technology, which not only enhances the acceptability but also improves the nutritional quality of the grains.

Detrimental and often undetected until severe, under-nutrition undermines the survival, growth and development of children and women and diminishes the strength and capacity of nations (Anon 2009b). Developing world's chronically under-nourished (stunted) children are living in Asia and Africa (Anon 2009a). With persistently high levels of under-nutrition in the developing world, vital opportunities to save millions of lives are being lost and many more millions of children are not growing and developing to their full potential.

Nutrition is a core pillar of human development and concrete large-scale programming not only can reduce the burden of under-nutrition and deprivation in countries but also can advance the progress of nations (Dubey et al 2018). The burden of wasting is highest in India, which has more than 25 million (20%) wasted children. This exceeds the combined burden of the next nine high-burden countries (Gautam et al 2018).

Malnutrition is a major cause of child mortality and widely recognized as a public health problem in developing countries including India. India has a very high burden of childhood stunting as 61 million (37%) of the 165 million stunted children aged under five years globally are Indian children (de Onis 2012).

Under-nutrition jeopardizes children's survival, health, growth and development; it slows national progress towards development goals. Under-nutrition is often an invisible problem (Ankita 2018).

There is a critical window of opportunity to prevent under-nutrition by taking care of the nutrition of children in the first two years of life, girls during adolescence and mothers during pregnancy and lactation – when proven nutrition interventions offer children the best chance to survive and reach optimal growth and development.

According to WHO and UNICEF, optimal infant and young child feeding entails the initiation of breastfeeding within one hour of birth; exclusive breastfeeding for the first six months of the child's life and continued breastfeeding for two years or more, together with safe, age-appropriate and hygienically prepared complementary foods starting at 6 months of age (<https://www.who.int/news-room/fact-sheets/detail/infant-and-young-child-feeding>).

There is growing evidence of the benefits to mother and child of early initiation of breastfeeding, preferably within the first hour after birth. Early initiation of breastfeeding contributes to reducing neonatal mortality. It ensures early skin-to-skin contact, which is important in preventing hypothermia and establishing the bond between the mother and her child. Early initiation of breastfeeding also reduces a mother's risk of post-partum haemorrhage, one of the leading causes of maternal mortality (Anon 2012).

While breastfeeding provides optimal nutrition to the child and prevents infections, the timely initiation and age-appropriate complementary feeding can substantially reduce stunting and related burden of disease (Anon 2013).

A comprehensive programme approach to improving complementary feeding practices includes timely introduction of age-appropriate and hygienically

prepared complementary foods, counselling for caregivers on feeding and care practices and on the optimal use of locally available foods, improving access to quality foods for poor families through social protection schemes and safety nets and the provision of fortified foods and micronutrient supplements when needed.

During supplementation, gradually introducing foods, other than breast milk in the child's feeding schedule, breast milk is continued till child demands. The introduction of supplementary foods not only ensures the fulfilment of nutritional requirement but also introduces the child gradually to the normal family eating pattern. By the time the child is one year old, child should get used to eating the normal family diet. The supplementary feeding practices vary among families in different communities.

Due to dearth of knowledge regarding particular feeding practices of Jain community as feeding practices and to standardize nutritious and low-cost supplementary food preparations, the present study was carried out which would be helpful to policy makers to adopt and recommend supplementary food preparations for intervention programmes.

METHODOLOGY

The information was collected regarding supplementary feeding practices of 0-3 years children of Jain community and development and standardization of instant supplementary food preparations for household use and interventions. Study was conducted in Udaipur city district headquarters of Rajasthan. Locality was selected randomly. Fifty Jain families were randomly selected to gather the related information by interview schedule method. A pre-tested interview schedule was developed, standardized and tested to collect the information. Information was collected on economic condition, education status and family size. Type of supplementary food, time of introduction of supplementary food and its frequency were inquired.

Supplementary foods were developed and standardized. Products were analysed for their acceptability and nutritional quality parameters. Standard methods were adopted for sensory evaluation and proximate composition (Raghuramulu et al 2003). Data were collected, coded, tabulated and analysed

statistically to fulfil the objectives of the study. Percentages were calculated to draw the findings.

RESULTS and DISCUSSION

The general information about the families revealed that majority of the families were joint type. They contained more than four members in the family. The educational status was found poor. Most of the members were educated up to tenth standard only.

The supplementary foods were introduced at the age of 4 months. Jaggery water (50%), honey (33%) and Janamghuti (17%) were introduced at the pre-lacteal stage. Khichadi, soft chapati with milk and soups (vegetable), mashed banana, Jhahharia (tender corn cobs-based milk reconstituted preparation) and Churma (churned wheat chapati with ghee and sugar) were given as supplementary foods.

Among liquid foods, maximum mothers fed Dal soup (84%) to their children followed by fruit juice and vegetable soup (60% each). Among solid foods, maximum mothers fed Khichadi and Dalia (84% each) followed by soft chapati and fruits and vegetables (60% each) (Table 1). Served supplementary foods were not only the good source of protein and energy but also had vitamins and minerals.

Among processed foods, biscuits were fed by maximum number of mothers (84%) followed by bread (50%). On the other hand, among commercialized products, various products such as Farex, Cerelac, Lactodex, Bony Mix and many others were available in market (Table 2), but mothers (34%) were using Cerelac for their children.

Khanna et al (2014) reported similar findings. Weaning was reported at 4-6 months of age. Fruit juices, cooked cereals, boiled eggs, cooked vegetables and pulse preparations were the common weaning and supplementary foods up to the age group of 10-12 months. Abdalla et al (2009), while studying the food supplementation regime of the infants, reported that the highest number of infants were provided supplementary foods gradually (56%), while the rest were given suddenly (23.3%) or were still sucking (20.7%). Moreover, it was also reported that there was a remarkable variation regarding the age of introduction of supplementary foods to the infants. Most of the

Table 1. Distribution of respondents as per consumed solid and liquid supplementary foods

Type of food item	Respondents (%)
Liquid (n = 50)	
Fruit juice	60
Vegetable soup	60
Dal soup	84
Non-vegetarian soup	-
Any other	-
Solid (n = 50)	
Rice	34
Khichadi	84
Dalia	84
Soft chapati	60
Halwa	20
Fruits and vegetables	60
Eggs	34
Multiple responses	

Table 2. Distribution of respondents as per processed and commercialized supplementary foods

Type of food item	Respondents (%)
Processed (n = 50)	
Bread	50
Biscuit	84
Maggi	34
Corn flakes	18
Any other	-
Commercialized products (n = 50)	
Farex	-
Cerelac	34
Lactodex	-
Bony Mix	-
Any other	-
Multiple responses	

infants were given supplementary foods between 19-24 months (60.7%), 0.7 per cent at the age of 6 months or less, 3.3 per cent at 7-12 months and 8 per cent at more than 24 months. Such habits had traditional origin and would have a negative impact on the infants' health. During the period of breastfeeding, 97.3 per cent of the children were found to take complementary food. The main items of the food consumed by infants were a mixture of Kisra (made from fermented sorghum) and water, Aceda (porridge cooked from sorghum), Weika (dried okra) and Ro (sour milk). Moreover, complementary foods provided to children were often cereal-based; there was no more consumption of fruits.

From nutritional point of view, such food types could be considered as energy and protein sources for the growing children, however, these did not supplement them with the full nutritional ingredients and remained insufficient as a balanced diet.

In a study, Singh et al (1997) reported that 81 per cent of mothers were illiterate and 65 per cent were engaged in agriculture or livestock. Only 23 per cent of the mothers initiated breastfeeding within 24 hours of delivery and 77 per cent discarded colostrum, depriving their infant of important nutrients. More common was the withholding of breast milk for the first 2-3 days of life; 65.2 per cent of the mothers gave jaggery water as a pre-lacteal feed; another 33.2 per cent offered tablets containing jaggery, ghee and Ajwain; 9.1 per cent of the mothers introduced supplementary foods before 3 months of age; 15.6 per cent introduced these foods at 3-6 months of age; 36.0 per cent began supplementation at 6-12 months and 24.1 per cent waited until after 12 months of age. The mean age at food supplementation initiation was 8.7 months, far beyond the recommended time of 4-6 months. The most common supplementary foods were milk, Rabadi (bajra- and curd-based preparation), rice and Roti. Most mothers breastfed the child for at least 2 years (mean age at weaning, 27 months), in part because of poverty and in part due to inadequate knowledge of child nutritional needs. During prolonged breastfeeding, mothers did not increase their own caloric intake. The feeding practices identified in this study were presumed responsible for the high rates of malnutrition among infants and pre-school children in the area.

Xalxo and Badaik (2012) suggested that time of introduction of supplementary food and the selection of type of supplementary food was dependent on education of parents, socio-economic

status of the family and food habits of the family members.

Development and standardization of supplementary foods

Instant vegetable gruel mix, instant semolina mix, instant cereal mix, instant corn mix and instant Boor mix were developed and standardized using indigenous foods. Products were acceptable on nine-point hedonic scale.

Vegetable gruel mix, instant semolina mix, instant cereal mix, instant corn mix and instant Boor mix contained 13.7, 9.2, 9.7, 5.4 and 2.0 g protein; 4.2, 8.4, 9.9, 28.6 and 6.5 g fat; 251.0, 572.0, 517.0, 473.0 and 190.5 Kcal energy; 39.8, 115.0, 99.0, 18.2 and 31.0 g carbohydrate and 2.5, 1.0, 1.7, 1.0 and 0.1 mg of iron content per kg respectively (Table 3). Instant corn mix has highest fat content due to addition of fat and while roasting contributes to its increased energy level. Products were protein- and energy-dense so these were sufficient enough for appropriate supplementation.

CONCLUSION

From the present study, it can be concluded that in the Jain community of Udaipur city of Rajasthan, supplementary feeding was started at the age of 4 months and food preparations such as Jhajharia, Khichadi, Halwa, Churma, soaked Roti, seasonal fruits and vegetables, Dalia and rice were introduced as supplementary foods. Supplementary foods were prepared as per food habits and availability of the food sources of the community. Products were protein- and energy-dense, hence, these were sufficient enough for appropriate supplementation. These supplementary foods can be used at household level and introduced in feeding programmes to combat nutritional deficiency diseases.

Table 3. Nutrient composition of supplementary food preparations (per kg)

Supplementary food preparation	Carbohydrates (g)	Fat (g)	Protein (g)	Energy (Kcal)	Iron (mg)
Vegetable gruel mix	39.8	4.2	13.7	251.0	2.5
Instant semolina mix	115.0	8.4	9.2	572.0	1.0
Instant cereal mix	99.0	9.9	9.7	517.0	1.7
Instant corn mix	18.2	28.6	5.4	473.0	1.0
Instant Boor mix	31.0	6.5	2.0	190.5	0.1

Source: Longvah et al (2017), Sharma (2000)

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