

Results with Complementary Food Using Local Food Ingredients

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Up to 6 months, an infant should be fed only mother's breast milk. After 6 months, breast milk alone is not enough, and complementary food should be given in addition to breast milk up to at least 2 years. When the child is 6 months old, the supply of energy and iron, among other nutrients, can be limited in breast milk, which can supply only 60–70 and 6–7% of the required intake of energy and iron, respectively [1]. Existing infant and young child feeding (IYCF) guidelines provide a robust guidance on complementary feeding of infants and young children. IYCF guidelines categorize food for children into seven groups which include: grains, roots, tubers; legumes and nuts; milk, yogurt, and cheese; meat and fish; eggs; vitamin A-rich fruits and vegetables, and other fruits and vegetables. Children after 6 months of age daily require food from at least four food groups in order not to become nutrient deficient (minimum dietary diversity). The minimally accepted diet is an important metric for assessing dietary intake of children. It is a composite of taking food from at least four food groups including milk and a daily feeding frequency of 2–4 times depending on age. In Bangladesh, only 23% of children under 2 years receive the minimally accepted diet. These figures are 26.5 and 11% for Nepal and Uganda, respectively.

Children receive inappropriate complementary diet for various reasons. Principal reasons include poverty, food insecurity and lack of awareness regarding appropriate child feeding practice. Globally, 21% of the population lived in poverty on less than USD 1.25 per day in 2010, while 15% are food insecure. In Bangladesh, 29% of the population lives below the poverty line. Food insecurity, assessed on the basis of consumption of less than 1,805 kcal per capita per day, affects 16% of the Bangladeshi population. In a study done in rural Bangladesh, we found that the prevalence of adequate intakes ranged from a mean of 0 for calcium to 95% for vitamin B₆ and was <50% for iron, calcium, riboflavin, folate and vitamin B₁₂ [2]. This level of inadequacy of micronutrient status

among children in Bangladesh was explained by diets low in energy and little diversity in foods. In the same study, we observed that almost all women consumed less than the recommended intake levels for total fat, total polyunsaturated fatty acids, α -linolenic acid and docosahexaenoic acid. Median breast milk linoleic acid (8.5% weight) and α -linolenic acid (0.2%) concentrations were among the lowest reported in the literature [3]. More than 95% of the children had fat intakes <30% of total energy. An estimated 80% of all of the children consumed <4% of total energy as linoleic acid, and 99% consumed <1% of energy as α -linolenic acid, implying an acute lack of essential fatty acids in the diet. These factors are important for the huge burden of childhood malnutrition in Bangladesh – 36% of children under 5 years of age suffer from linear growth retardation or stunting, 14% suffer from acute malnutrition while 33% are underweight.

Since inadequate energy and micronutrient intake during childhood is a major public health problem in developing countries which are plagued with food insecurity, we developed ready-to-use complementary food (RUCF) made of locally available food ingredients [4]. One was based on rice-lentil and the other on chickpea. Linear programming was used to determine possible combinations of ingredients and micronutrient premixes. The total energy contents obtained from 50 g of rice-lentil-/chickpea-based RUCFs were 264 and 267 kcal, respectively, which also supplied ~70% of the micronutrient needs of a child. The RUCFs were found to be well accepted by children and their mothers through an acceptability trial done in the community where the primary outcome variable was to see the acceptability of RUCFs versus another local food (Pushti packet) by measuring the amount of food consumed by children. The secondary outcome variable was to measure children's mothers' opinion on the food color, flavor, mouth feel and overall acceptability by using a seven-point hedonic scale.

We tested the efficacy of the local RUCFs by a cluster-randomized controlled trial in rural Bangladesh where the effect of the two RUCFs and a fortified blended food (wheat-soy blend++, WSB++) was compared with a commercial lipid-based nutritional supplement called Plumpy'doz, all with nutrition counselling versus nutrition counselling alone (control) on outcomes of linear growth (length and length-for-age z-score, LAZ), stunting (LAZ ≤ 2), weight-for-length z-score (WLZ) and wasting (WLZ ≤ 2) in children 6–18 months of age [5]. Children (n = 5,536) were enrolled at 6 months of age and provided with one of the allocated supplements daily for 1 year. Deceleration in LAZ was significantly lower (by 0.02–0.04/month) in the rice-lentil, Plumpy'doz and chickpea groups compared to control at 18 months of age. WLZ decline was lower only in Plumpy'doz and chickpea groups. WSB++ was not different from the

control. In children who received chickpea RUCF or Plumpy'doz, the prevalence of stunting was lower by 5–6% at 18 months.

Poor-quality complementary food is a risk factor for growth retardation. UCFs made of locally available food ingredients and conforming to standard specifications can be used to improve child growth particularly among those living in conditions of food insecurity and under social safety net mechanisms.

References

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