

Complementary Foods : A Review on Types, Techniques and Nutritional Content

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ABSTRACT

During infancy, adequate nutrition is essential for healthy growth and development of infants. Breastfeeding provides the ideal food during the first 6 months of life. Complementary feeding starts when breast milk is no longer sufficient by itself, where the target age is for 6–23 months. The gap between nutritional requirement and amount obtained from breast milk increases with age. Nutritional deficits during this critical period increase the risk of illness and long-term developmental impairment. Complementary foods therefore must provide relatively large proportions of micronutrients such as iron, zinc, phosphorus, magnesium, calcium, and vitamin B6. In several parts of the developing world, complementary feeding continues as a challenge to good nutrition in children. The gaps are mostly attributed to either poor dietary quality or poor feeding practices, if not both. Commercial fortified foods are often beyond the reach of the poor. Thus, homemade complementary foods remain commonly used. Even when based on an improved recipe, however, unfortified plant-based complementary foods provide insufficient key micronutrients (especially, iron, zinc, and calcium) during the age of 6–23 months. This review aims to provide an overview on the available research on CFs and its health outcomes. Studies on the fortified cereals reported improvement of iron status and possibly growth. Further large scale, multicenter trials are needed to support the current findings and to investigate the long-term benefits of these recommended CFs.

INTRODUCTION

Complementary food plays a very important role in the total growth and development of children. Along with mother's milk, infants require nutritionally balanced and calorie-dense supplementary foods to meet the increasing nutritional demands of the growing body (Yaseen et al., 2014) [51]. The World Health Organization (WHO) issued a global recommendation from the previous recommendation of breastfeeding of four to six months of age to a full six months to extend the period of exclusive breastfeeding as breast milk has got all the nutrients that babies need to stay healthy and grow. But after six months of age, it may become insufficient to support the nutritional demands of the growing infants and hence, there is the need to complement breast milk with other foodstuffs which can help to improve any deficiency that can result

from such inadequacy (Ikujenlola and Adurotoye, 2014) [22] . Complementary feeding is the process by which infant progresses from a diet composed of only breast milk or infant formula milk to a family diet consisting of wide varieties of food which is necessary to ensure that nutrient intakes continue to be adequate for healthy growth and development throughout childhood (WHO, 2003) [50] . Processed-cereal based complementary food, commonly called as weaning food or supplementary food means foods based on cereals and/or legumes, nuts and edible oilseeds, processed to low moisture content. It shall contain milled cereal and legumes combined not less than 75 per cent and the product is intended to be mixed with milk or water before consumption. All ingredients, including optional ingredients, shall be clean, safe, suitable and of good quality. The material shall be manufactured and packed under hygienic conditions. The flavour and odour of the processed-cereal based weaning food in the powder form or when reconstituted with water/milk shall be fresh and sweet (BIS, 2006) [11] . The product shall be packed in containers which will safeguard the hygienic and other qualities of the food and the containers, including packaging materials, shall be made only of substances which are safe and suitable for their intended uses (CODEX, 1991).

METHODOLOGY

A systematic review of literature was performed as previously reported, to identify published studies, which investigated all about complementary foods, the association between the timing of the introduction of complementary feeding and the risk of childhood malnutrition, a computerized search of the online databases was carried out using the terms 'weaning', 'complementary food' and 'infant feeding'. The specific objectives of this systematic review are to collect relevant information on the roles of complementary feeding and develop an analytical summary of current evidence of intervention impact and draft recommendations. Results Complementary foods Complementary foods in liquid, semi-solid and solid form are developed for infant to provide required nutrients adequately. Complementary feeding is the process that starts when breast milk is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods are needed in addition to breast milk. The term 'weaning foods' are nowa-days no longer recommended to use as a synonym for 'complementary food' because the term 'weaning' means total cessation of breastfeeding. In order to have optimal growth, development and health, infants should be breastfed for the first six months of life. Thereafter, transition from only breast-milk to other solid and semisolid foods, along with breast-feeding is referred as complementary feeding which covers 6- 24 months of age (WHO, 2000; WHO, 2003; Sajilata et al., 2002; Alexander, 1983; Lutter and Rivera, 2003; Prentice and Moore, 2005) [49, 50, 7, 27, 42, 39] . Processed-cereal based complementary food should contain milled cereal and legumes combined not less than 75 per cent and the product is intended to be mixed with water or milk before consumption. All ingredients, including optional ingredients, shall be clean, safe, suitable and of good quality. It may also contain following ingredients - protein concentrates, essential amino acids, iodized salt; milk and milk products; eggs; edible vegetable oils

and fats, fruits and vegetables; various carbohydrates such as sucrose, dextrose, dextrin, maltose dextrin, lactose and carbohydrate rich foods like honey, corn-syrup, malt and potatoes. The material shall be manufactured and packed under hygienic conditions (BIS, 2006) [11]

Processing techniques used in complementary foods Obizoba (1990) [34] in a study of nutritional evaluation of blends of corn with germinated cowpea, pigeon pea, and bambara-groundnut, concluded that germinated corn with germinated legumes showed nutritional superiority to ungerminated blends. However, recently there has been growing interest in the application of malting to improve the acceptability and nutritional value of locally based weaning foods in many developing countries (Kulkarni, et al., 1991) [24] . Plahar et al. (2003) standardized an extrusion cooking process for production of high protein weaning food based on peanuts, maize and soybeans. Sadana and Chabra (2004) [41] developed low cost weaning foods namely panjiri, kheer, halwa and dalia using germination, malting, roasting and pressure cooking processes. The experimental formulations were based on germinated wheat, pulses (Bengal gram, green gram and lentil) and roasted groundnut in the ratio of 75:25:25. The grains were allowed to germinate at room temperature in wet muslin cloth for 24- 48 hours. Germinated grains were dried at 60°C for 7-8 hours. Germinated and un-germinated dried grains were milled into flour and dalia. The germinated grain flours were used to develop experimental formulations while ungerminated wheat formulations were treated as control. Fagbemi et al. (2005) [14] reported that processing significantly reduced antinutritional factors of fluted pumpkin seed. Total phenols of curcas seeds significantly reduced

CONCLUSION

A review of existing material has highlighted the fact that breastfeeding and complementary feeding are two distinct issues. The WHO recommends six months of exclusive breastfeeding and thereafter gradual introduction of semi solid complementary foods. When compared to breastfeeding, complementary feeding has comparatively attracted less attention. The focus of most studies has been on the foods given, devices used and the timing rather than on the process of feeding, the choices and options available to the mother and how the infant gets initiated into the process. Those that have linked feeding practices and growth are even fewer. Finally, the reasons for the early introduction of complementary feeding should be more closely examined and used to help promote comprehensive and consistent guidelines that promote a healthy, balanced diet throughout infancy and childhood. Moreover, due to unaffordability of high priced commercial infant foods, more attention should be given to homemade nutritious complementary feeding techniques, using household and traditional processing methods that increase the nutritional content of the prepared foods.

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