International Journal of Home Science 2020; 6(1): 90-96

International Journal of Home Science

ISSN: 2395-7476
IJHS 2020; 6(1): 90-96

www.homesciencejournal.com
Received: 13-11-2019
Accepted: 15-12-2019

Manisha Dutta
Department of Food Science and Nutrition, Assam Agricultural University, Jorhat, Assam, India

Manisha Sharma
Avinashilingam University, Tamil Nadu, India

Corresponding Author:
Manisha Dutta
Department of Food Science and Nutrition, Assam Agricultural University, Jorhat, Assam, India

Complementary foods: A review on types, techniques and nutritional content

Manisha Dutta and Manisha Sharma

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.

Keywords: Complementary foods, infant, nutrients, development, growth, breastfeeding

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) [12].

Appropriate complementary feeding practises involves a combination of techniques while maintaining the breast milk intake of the child and, simultaneously, improve the quantity and quality of other solid or semi-solid foods suitable for children. Good complementary foods should be high in energy content and also other necessary nutrients to ensure adequate growth and development of children. Complementary foods should be soft, thin in consistency and easily digestible and should not contain any hard pieces which may cause choking during swallowing. Foods should be given frequently since infants have small stomachs and cannot eat much at one time. Complementary foods should neither have strong flavour and odour nor it should be spicy and salty foods (USAID, 2011) [47].

Nutrient fortified cereals are the first complementary foods introduced to the infant, followed by fruits and vegetables in most developed societies. A number of convenient fortified proprietary formulas are available in developing countries but they are often too expensive and out of the reach of lower income families. The use of home based complementary food that can be easily prepared, available and affordable, is one feeding alternative that has been recommended to remove the effect of malnutrition on infant and young children (Akinola *et al*., 2014) [6]. To prepare complementary foods for infants and children the use of high nutrient dense food stuffs like cereal, legumes, fruits, vegetables and animal food products has been suggested by a number of researchers (Akinola *et al*., 2014; Bala *et al*., 2014) [6, 8]. To improve the nutritional status of children, different forms of economical and protein–rich plant mixtures are used. The traditional weaning foods are based on local staples usually cereals such as rice, wheat, barley, maize, etc. These serve as major sources of both calories and proteins in areas where consumption of cereals is primary and their quality of protein is generally low. The amino acid profiles of cereals show that they are generally lacking in lysine and tryptophan but have sufficient amount of sulphur-containing amino acids, methionine and cysteine. The protein of leguminous seeds is considered to be a rich source of lysine and its major deficiency lies in the sulphur amino acids methionine and cysteine. The chemical and nutritive characteristics of legume foods placed them as natural complements to cereal based diets (Ikujenlola and Fashakin, 2005) [21]. Complementary foods that are produced only from cereals are deficient in certain essential amino acids (lysine and tryptophan) which are essential for the adequate growth of infant. The essential amino acids are present in reasonable quantities in legumes (Abiose *et al.*, 2015) [1]. Therefore, when legumes are blended with cereals in the right proportions, a mutual complementation of amino acids and consequent improvement in protein quality is achieved (Ghasemzadeh and Ghavidel 2011) [16].

To increase the functionality and nutritional worth, cereals, millets and legumes are usually pre-processed by milling, fermentation, germination, cooking etc. It has been found that germination or sprouting is a simple technique which increases and enhances the nutritive value of cereals and legumes. Several studies have reported that germination can increase the protein content in addition to dietary fibre, increases mineral bioavailability of trace elements like calcium, copper, manganese and zinc, increases the vitamin concentration of riboflavin, niacin and ascorbic acid content and also decreases the content of phytic acid and tannin. In cereals, processing increases the oligosaccharides and amino acids absorption as observed in rice, wheat and barley. Malting is useful in preparation of low bulk weaning foods as malting activates the enzyme amylase and dextrinifies starch (Ikujenlola, 2008) [20]. Since germination is affordable and more effective, it was incorporated in mixes to contribute to the improvement of nutrition value of complementary food mixes (Murugkar *et al.*, 2013) [31]. Thus, this review study aims to provide an overview on the available research on all the aspects of complementary feeding and its health outcomes. Studies on different types of cereals or pulse based complementary foods 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 foods.

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 computerised 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 now-a-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].

The ideal time to introduce complementary foods in the diets of infants is difficult to pinpoint. Complementary foods introduced too early are of little benefit to the infant and may even be harmful due to the possibility of choking, developing food allergies, or causing an infant to consume less than the appropriate amount of breast milk or infant formula. Introducing complementary foods too late may cause an infant to develop nutritional deficiencies and/or miss that

period of developmental readiness. Consequently, the infant may have difficulties learning to eat complementary foods when they are introduced later. When complementary foods are introduced appropriate to the developmental stage of the infant, nutritional requirements can be met and eating and self-feeding skills can develop properly. Paediatric nutrition authorities agree that complementary foods should not be introduced to infants before they are developmentally ready for them; this readiness occurs in most infants between 4 and 6 months of age (USDA, 2009) [48].

Protein energy malnutrition is an important nutritional deficiency condition that often occurs during the critical transitional phase of weaning infants, crippling their physical and mental growth. This could be due to progressive decline in the incidence of breast feeding observed during the last 25-30 years (Acharya and Shah, 1998) [2]. This condition can be prevented to a large extent by introducing weaning foods of good quality and quantity at right proportion and at right stage (Pawar and Dhanvijay, 2007) [36].

Malnutrition is one of the major causes of morbidity and mortality among young children in most of the developing countries. To minimize this, low cost infant complementary foods have been developed and are being supplied to the needy through state-sponsored nutrition intervention programmes (Milan *et al*., 2007) [29]. Desikachar (1992) [13] stated that the complementary food mix should be nutritionally well-balanced in proteins, fat, carbohydrate, essential vitamins and minerals. It should be precooked, if possible, so that it can be fed to babies as a soft product by simply stirring in hot or warm water. Many commercial weaning mixes being marketed in India are at high cost; therefore it seems necessary to formulate low cost and nutritious complementary foods from available ingredients that can easily be prepared at home.

The prominent brands of weaning foods available in the market are cerelac, nestum and farex etc offering excellent nutrition for babies but are expensive which cannot cater to the needs of babies belonging to the low socio-economic strata. The formulation and development of nutritional weaning foods from locally and readily available raw materials has received a lot of attention in many developing countries (Ijarotimi and Aroge, 2005) [19].

Ingredients used in complementary foods

Kshirsagar *et al.* (1994) [25] used locally available ragi, green gram, groundnut and skim milk powder to formulate a weaning food containing not less than 20 per cent protein. Ragi, green gram, defatted groundnut and skim milk powder were blended in the proportion of 35:35:10:20. Protein qualities of weaning food combinations based on locally available cereals and pulses in India have been examined by Gahlawat and Sehgal (1994) [15]. Locally available foods such as sorghum, rice, green gram and jaggery were used in the formulation. They stated that their formulations had the potential of being produced locally, adaptable for household consumption and could be a good substitute for commercial formulas.

Prakash and Ramanatham (1995) [38] developed high protein weaning blends from rice bran protein concentrate and rice, with or without green gram. Weaning mix 1 consisted of rice bran protein concentrate (25%) and rice flour (75%). Weaning mix 2 consisted of rice bran concentrate (20%), rice flour (60%) and whole green gram flour (20%). Rice flour and/or green gram flour was added to wet protein concentrate and mixed with water. Nti and Plahar (1995) studied the effects of cowpea and amino acid supplementation on the protein quality and chemical characteristics of a maize-based West African traditional weaning food. They found that supplementation of the traditional weaning food with cowpea increased lysine, tryptophan and threonine content while the sulphur-amino acids decreased with increasing levels of cowpea. A 30% supplementation of the maize-based weaning food with cowpea, therefore, greatly enhanced the nutritive value especially when the cowpea was pre-cooked.

Griffith *et al.* (1998) [17] formulated weaning blends, in 60 per cent cereal to 40 per cent legume combination using teff, pearl millet, cowpea and peanut. The blends were formulated in proportions as: PMP (60% pearl millet+ 40% peanut), PMC (60% pearl millet+ 40% cowpea), TPMC (20% teff+40% pearl millet+ 40% cowpea) and TPMP (20% teff +40% pearl millet+40% peanut). Six types of millet-based Tempe were developed by Mugula and Lyimo (1999) [30]. Their formulation incorporated common beans, groundnuts, cowpeas, mungbeans, chickpeas, sesame and/or their mixtures. They concluded that the developed tempe had protein quality and energy content recommended for weaning food.

Nwanekezi and Okorie (2002) [33] formulated three infant weaning foods using different processing methods from complementary mixtures of maize and groundnut (unprocessed maize and roasted groundnut; fermented maize and fermented groundnut and malted maize & malted groundnut). Equal weights of skim milk were added to all three samples to improve their protein qualities. Thathola and Srivastava (2002) [46] formulated millet based complementary food using malted flours of foxtail millet (30%), barnyard millet (30%), roasted soy flour (25%) and skim milk powder (15%). Osundahunsi and Aworth (2002) [35] developed complementary foods using whole maize meal or dehydrated fermented maize ogi flour fortified with either cowpea or soybean in which the nutrient content of all the developed products was found to be within the range prescribed by the FAO/WHO pattern for processed weaning foods.

Mensa *et al*., (2003) [28] formulated weaning food using maize, cowpeas, peanuts, soybeans and soybean oil. Afoakwa *et al*. (2004) [3] prepared the traditional weaning foods by steeping maize in water for 24 hours, mixed with cowpea and co-milled into a meal. A 50 per cent moisture dough was made with the addition of water and fermented for 24 hours. The product was dried using solar drier (40-60°C for 72 hours) and oven dried (60°C for 8 hours), and packaged in polypropylene bags. Banakar (2005) [10] developed complementary mix with multivitamin – mineral mixture using roasted and malted sorghum, finger millet, green gram and roasted rice, soybean and peanuts. Lalude and Fashakin (2006) [26] conducted a study on the use of flours of germinated sorghum, sesame seed, groundnut and soybeans which were combined in the ratio of 3 ½:1:1:1 (w/w), to produce weaning diet rich in energy and protein. The experimental diet showed higher values in terms of protein content, minerals and energy content when compared with the commercial diet.

Imtiaz *et al.* (2011) [23] developed five weaning food formulations (F1 to F5) by using locally available resources. The formulations were based on germinated wheat and mung bean, sugar and skim milk powder. The compositions of formulations are: MF (Mungbean flour): WF (wheat flour): MP (full fat milk powder): S (Sucrose) =F1 is mixed as 1.2:6.8:1:1; F2 is mixed as 2.4:5.6:1:1; F3 is mixed as 3.6: 4.4: 1:1; F4 as 4.8:3.2:1:1 and F5 is mixed as 6:2:1:1.

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 (p<0.05) due to roasting at 160ºC for 30 minutes. Suitable and effective processing of the complementary foods and weaning foods is an important step to not only to improve nutritional and functional properties of the developed food but also to improve the shelf life (Ikujenlola and Fashakin, 2005) [21].

Roasting is one of the processing steps to improve the flavour of grains. Roasting reduces the moisture content of most grain and improves the colour, flavour and aroma. Roasting and grinding renders the grain digestible, without the loss of nutritious components. Roasting of cereals, pulses and oilseeds is a simple and common household and village level technology which is reported to remove most anti-nutritional factors such as trypsin inhibitor, hemagglutinin, gioterogenic agents, cyanogenic glycosides, alkaloids and saponins and increases storage life (Thapaliyal and Singh, 2015) [45].

Sensory evaluation of complementary foods

Six mixes were formulated using pre-gelatinised maize, sweet potato, soybean and peanuts (Idowu *et al*., 1993) [18]. Soybean and defatted peanut flours were used at 25 and 5 per cent respectively and evaluated for sensory quality in the form of porridge. The blend of 20:50 of maize and sweet potato was most acceptable, among all the mixes. Flour blends of rice and green gram were prepared at the ratio of 100:0, 80:20, 60:40, 50:50, 40:6, 20:80 and 0:100. To each of the blend sesame and carrot flours of 5g each were added. The blends were subjected to sensory evaluation in the form of gruels and results revealed that among the blends 50:50 was most acceptable with the overall acceptability scores of 6.8 (Naikare and Mabesa, 1993).

Plahar *et al.* (2003) standardised extrusion cooking process for production of a high protein weaning food based on peanuts, maize and soybean. Pair wise comparison of the sensory attributes of porridges prepared from milled samples of the weaning foods showed significant differences between extruded products, especially extruded raw (non-roasted) blend samples. At least 92% of respondents in two out of three major ecological zones of Ghana placed overall sensory and functional characteristics of extruded raw blend samples as 'highly acceptable'. About 7% of respondents scored sensory and functional quality attributes as 'acceptable'.

Sadana and Chabra (2004) [41] formulated low cost weaning foods from germinated and ungerminated grains of wheat, Bengal gram, green gram and lentil. All the formulations were evaluated for their acceptability by a panel of 12 judges using a Hedonic scale. All the formulations were found to be organoleptically acceptable obtaining moderately to extremely good scores ranging from 7.23 to 7.93. Germinated and supplemented grain flour weaning food formulations were more acceptable as compared to control products made from ungerminated grain flour.

Banakar (2005) [10] formulated malted and roasted supplementary foods using sorghum, finger millet, rice, soya bean, green gram, groundnut and amaranth leaves at specific proportion. Both roasted and malted supplementary foods scored between liked very much to liked moderately. Malted food in the form of porridge received higher scores for consistency (8.13), taste (8.05), aroma (7.72) and overall acceptability (7.99) compared to roasted (7.25, 7.57, 7.16 and 7.37 respectively) by panel of judges, though both the mixes were acceptable.

Ahmed *et al.* (2008) [5] developed weaning food based on overnight soaked and heat treated soy flour (0, 5 or 10%), wheat flour (100, 95 or 90%), whole milk powder (3%) and sugar (5%). The mixes were subjected to sensory evaluation in the form of porridge. Results indicated that, 5% soy flour incorporated mixes scored better (7.5-7.7) in overall acceptability. With an increase in heat treatment there was a decrease in sensory attributes like colour (7.6-5.1), flavour (8.0-5.5) and texture (7.7 – 7.6).

Imtiaz *et al.* (2011) [23] prepared formulations from germinated mungbean and germinated wheat. The overall acceptability score was highest (7.45) in F3 (36% germinated mungbean flour+ 44% germinated wheat flour+ 10% full fat milk powder+ 10% sucrose) weaning food followed by F4 (48% germinated mungbean flour+32% germinated wheat flour+ 10% full fat milk powder+ 10% sucrose) (7.20) ranging from 'like slightly' to 'like moderately'. The F3 weaning food was satisfactorily acceptable.

Ahmad *et al*. (2013) [4] prepared three weaning food samples using different combination of rice flour, gram flour and papaya powder along with equal quantity of milk powder. The result of sensory evaluation revealed that the sensory attributes like colour, aroma, taste and overall acceptability of all the three samples were in the range of 6-7.

Balasubramanian *et al.* (2014) [9] developed a weaning food using variations in the levels of malted pearl millet and barley. A 9 point hedonic scale was used to check the overall acceptability of the product. Acceptability ranged from like moderately to like very much for those formulas using higher concentration of malted millet flour.

Complementary food porridge samples were prepared by Zema *et al.* (2015) [52] from composite flours of germinated maize, pumpkin pulp and its seed (80%: 10%: 10%, 60%: 20%: 20% and 40%: 30%: 30%). Results of sensory analysis indicated that all the sensory attributes were liked very much by the sensory panel members. However, blends that contained increased amount of pumpkin pulp and its seeds scored more in appearance.

Nutritional content of complementary foods

Nnam (2000) [32] formulated eight multi-mixes using maize, sorghum, cowpea, soybean, yam, coco yam, plantain and

sweet potato at the ratio of 65:30:05 (cereal: legume: starchy staple). Results of nutrient analysis revealed that, soybean in combination with sorghum or maize contained higher amounts of protein (20.03 to 23.0%), fat (7.67-7.74%), crude fibre (2.46-3.71%) and calcium (70.06-81.69mg). Maize in combination with soybean plus plantain and sorghum with cowpea plus plantain contained higher amount of iron (3.66mg/100g).

Srivastava *et al*. (2001) [44] developed proso millet based malted and popped convenience mixes along with soybean and peanut flours, in the ratio of 70:15:15. Popped mix contained significantly higher amounts of fat (5.43g/100g), protein (15.98g/100g) and energy (336Kcal/100g) compared to malted mix (5.0g, 14.35g, and 328 Kcal/100g respectively). Composite mixes were formulated using popped cereals (40% wheat, finger millet, pearl millet or sorghum), legumes (20 or 10% defatted soy flour or 10% Bengal gram dhal), jaggery (30%) and vegetable fat (5%), fortified with vitamins and minerals contained 10.4 to 12.5g protein, 4.2 to 5.9g fat, 10.0 to 13.0g dietary fibre, 1.8 to 3.6g ash, 64 to 67g carbohydrates and 340 to 398 Kcal of energy (Baskaran *et al*., 2001).

Banakar (2005) [10] developed supplementary foods using roasted or malted sorghum, finger millet, green gram and roasted rice, soybean and peanuts. To enhance the micro nutrients powdered amaranth leaves were added. When analysed for nutritional quality, roasted food contained significantly higher amount of protein (16.88%), fat (4.27%) and ash (2.97%) compared to malted (15.96, 3.89 and 2.86% respectively) while, malted food contained significantly higher amounts of moisture (5.93%), crude fibre (2.52%) and total carbohydrates (68.84%) compared to that of roasted (5.89, 2.43 and 67.56% respectively). The energy value of roasted and malted foods was 376 and 374 Kcal respectively. Every 100 gram of malted mix had comparatively higher amounts of calcium (430.50 mg), iron (11.18mg), zinc (4.5mg) and copper (3.48mg) than roasted (4.27, 10.97, 4.28 and 3.39mg respectively).

Ahmed *et al*. (2008) [5] formulated six mixes using flours of wheat and soybean at different proportions. Soybean was heat treated for 5, 10 and 15 min, before powdering and mixed with wheat flour at the ratio of 95:5 or 90:10. Further 3g of milk powder and 5g sugar were blended to all the mixes and analysed for proximates. Mixes contained 12.52 to 13.63g protein, 4.58 to 4.88g fat, 1.47 to 1.57g ash and 72.69 to 73.72g carbohydrates.

Imtiaz *et al.* (2011) [23] prepared formulations from germinated mungbean and germinated wheat. The proximate composition results indicated that the moisture content was (5.26 to 5.12), protein (28.627 to 17.325), ash (3.144 to 2.609), crude fibre (1.865 to 1.321) and carbohydrates (69.561 to 60.2456) were significantly different (p>0.05) but were within the range of the standard specifications for weaning foods. Fat content (1.336 to 1.234), however, was low when compared to the standard specifications even though values were significantly different (p>0.05) when compared with the formulations. Calculated values for total energy provided by the blends ranged from 377.825 to 376.000 kcal/100g dry matter which was significantly different (p>0.05).

Ahmad *et al*. (2013) [4] prepared three weaning food samples using different combination of rice flour, gram flour and papaya powder along with equal quantity of milk powder had protein content varying between 18.42-19.02, fat content 1.5-1.7, carbohydrate 17.24-17.58 per cent and ash content 3.5-3.8 per cent respectively. Moisture content of weaning food was found in the range of 0.341-0.423 (OD), vitamin C in the range of 17.02-40.06 mg/100g.

In a study by Satter *et al*. (2013) [43] there was an attempt to develop nutritionally enriched instant weaning food and evaluate its safety aspects. The developed instant weaning food contained the major nutrients like moisture, ash, fat, protein, fibre, carbohydrate and energy 2.43 per cent, 2.26 per cent, 11.32 per cent, 15.98 per cent, 1.06 per cent, 75.35 per cent and 456.6 kcal/ 100 g, respectively and was comparable to three good quality imported commercial weaning foods.

Conclusions

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 increases the nutritional content of the prepared foods.

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