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Prevailing supplementary and weaning practices in children

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Abstract
Weaning (i.e., introduction of complementary foods) is a transitional process between the consumption of a unique food, milk, and family foods. The World Health Organization recommends the practice of exclusive breastfeeding of infants for the first 6 months after birth. Breastfeeding, the simplest, healthiest and least expensive feeding method that fulfils the infant‟s needs for nutrition and growth and it also reduces child morbidity and mortality. Although breastfeeding is a common practice in India, several factors like some cultural beliefs and misconceptions etc. affect poor breast-feeding practices. Most of the people do not properly understand the importance of the knowledge about breastfeeding how it should be given, the timings, duration, correct techniques and appropriate time of weaning mother‟s milk. However, more attention should be paid to aspects such as the timing of the introduction of the first complementary food, the addition of salt and sugar to baby meals and the introduction of potentially allergic foods. Appropriate weaning practice is the process of introducing soft, semisolid, and solid foods by the age of 6 months with age optimal minimum dietary diversity, minimum meal frequency and continued breast milk feeding.

Keywords: Weaning practices, supplementary feeding, breast feeding, nutritional status

Introduction
The term „‟to wean‟‟‟ means „‟to accustom‟‟‟ and it describes the process by, which the baby is gradually introduced to foods other than milk and is recommended between the 4th-6th months of life. It is transitional to change from liquid to a solid diet, the feeding behaviour changes from sucking to chewing and biting and the obligatory introduction with the mother or other caretaker changes to independent feeding (Chaudhary R, and Humayun N, 2007). This is the time when growth faltering and nutritional quality of the transitional foods (WHO, 2006).
Adequate and balanced weaning food is perhaps one of the most important single and direct remedial measures to combat infant‟s malnutrition. Not only the appropriate timings, but appropriate quantity and quality in a hygienic environment, along with increased maternal interaction time also have a desired positive effect on the growth of young children (Liaqat P, and Rizvi MA, 2006) [15]. Guidelines for weaning foods suggest that weaning foods given should have characteristics according to nutritional needs, appropriate textures and viscosity and appropriate forms (liquid, semisolid, solid) to support mental and physical development (WHO, 2006). Weaning is the process of gradually introducing an infant to adult foods while gradually withdrawing breast milk. The child is not abruptly taken off breast milk, the process of weaning should be started after the age of 6 months and natural weaning happens as the infant start to accept increasing amounts and different variety of complementary feedings although still breastfeeding on request (Mohammed, 2014; and Ogunsuyi, 2016) [21, 9]. Weaning is traditionally described as withdrawal from breast feeding i.e. when breast feeding is gradually replaced by semisolid food. The shift from exclusive breastfeeding to family foods is referred to as complementary feeding is defined by World Health Organization (WHO) as the addition of energy as well as non-energy containing fluids, non-human milk and semisolids or solids to children‟s diet which covers the time from 6 months to 19-24 month of age (WHO, 2002; Chaudhary and Humayun, 2007) [19]. The weaning period, which usually corresponds with the eruption of the child‟s major dentition, implies that the child is ready to chew (Aliyu *et al.*, 2019) [1].

The weaning period is a very susceptible period, since it is the point in which malnutrition set offs in many infants. Infants are predisposed to malnutrition as a result of poor quality of weaning foods, improper feeding and weaning practices, which can also predispose the infants to growth retardation, infectious diseases and high mortality rate (Rahul *et al*., 2014). It is indicated that poor infant feeding and their consequences are one of the world‟s major problems and a serious obstacle to social and economic development. During the first two years of life, poor feeding practices and weaning practices have both instant and long-standing consequences. Inappropriate feeding of infants has long been observed in our society to be one of the global problems responsible for about one-third of the cases of malnutrition worldwide (Anoshirike *et al.,* 2014) [5].

Formulating Complementary/Supplementary Foods for Weaning Purposes

Complementary food and Supplementary food refers to the food that is used to complement breast milk or the food that complements or supplements other foods used during weaning period. However, weaning age which the child is actually weaned (or put off breast milk), varies from mother to mother and may be influenced by any or a combination of factors, such as: (1) Mother‟s physiologic state or willingness to breast feed, (2) Mother‟s exposure or level of awareness (i.e. modernization), (3) Mother‟s economic status (i.e. relative empowerment, poverty), (4) Socio-cultural influences, and (5) Child‟s willingness to give up breastfeeding. However, a study of the pattern of infant feeding in Nigeria showed that the age of introduction of foods other than breast milk depends on what was used in the preparation of the foods. Where cereal pap was used as complementary food, it might be given as from the first month of life. Whereas, the former did so from the first month of their babies‟ lives, the later introduced solid foods from 4-5 months only. World Health Organization (WHO) recommends early initiation of breastfeeding, followed by exclusive breastfeeding for the first 6 months and introducing complementary feeding timely and adequate in amount, frequency, consistency and variety to address the nutritional needs of the growing infant at 6 months of age with continuing breast feeding up to 2 years (The British Dietetic Association and WHO, 2013) [23]. This gradual replacement of milk with solid food as the main source of nutrition is known as weaning or complementary feeding (Canadian Paediatric Society, 2004) [4]. It is the provision of any nutrient containing foods or liquids other than breast milk (K.D. Foote and L.D. Marriott, 2013) [14]. Inappropriate complementary feeding remains among the contributing factors for the persistence of malnutrition in a widespread manner, only quarter of children aged 6-23 months meet the criteria of age appropriate dietary diversity and feeding frequency (S. Shamim *et al.,* 2016) [22]. World Health Organization (WHO) defines complementary feeding as „‟a process starting when breast milk alone is no longer sufficient to meet the nutritional requirements of infants, and therefore other foods and liquids are needed, along with breast milk (WHO, 2001) [29]. In order to provide infants with additional nutrients, complementary foods (foods other than breast milk or infant formula) should consequently be introduced to the infants (USDA, 2009) [25]. The target age range for complementary feeding is between the age of 6 and 23 months (with continued breastfeeding), where most infants reach a general and neurological stage of development (chewing, swallowing, digestion and excretion) that enables them to be fed other foods rather than breast milk (Monte CM, and Giugliani ER, 2004). Complementary foods could be especially designed transitional foods (to meet particular nutritional or physiological needs of infants) or general family foods, and are expected to address the gaps between the daily energy and nutrient requirement of infants and young children and the amount obtained from breastfeeding (WHO, 2009) [28]. In several parts of the developing world, complementary feeding continues as a challenge to good nutrition in children of 6-23 months. In India, for instance, 54.5 per cent of children between the ages of 6-8 months had received any complementary foods in the previous day, but only 7 per cent of breastfed children between the ages of 6-23 months met the minimum acceptable diet criteria. In Nigeria, only 21 per cent of breastfed children receive the minimum acceptable complementary feeding diet (UNICEF, 2011) [24]. The challenges during complementary feeding are context specific, but many are common across settings. They are often characterized by poor feeding practices and poor dietary quality of homemade complementary foods (Krebs NF *et al.,* 2011) [13].

Poor feeding practices are characterized by poor timing of complementary foods (too early or too late); infrequent feeding; and poor feeding methods, hygienic and child-care practices (WHO, 2001) [29]. Added to these is the poor dietary quality of the foods served, characterized as too little variety; inappropriate consistency (food is too thin or too thick); too few essential vitamins and minerals, especially vitamin A, iron, zinc and calcium; too few essential fatty acids; and too few calories among non-breasted fed infants (Alive and Thrive, 2015). The poor quality and lack of diversity in foods adversely affects the children‟s growth and nutritional status (Onyango AW *et al.,* 2014) [18]. During infancy and early childhood (birth to 2years), adequate amount of appropriate nutrition has paramount importance for full development of children‟s human potential. This period is also regarded as „‟critical window” for child‟s health, growth and development (WHO, 2003) [26]. It is also peak period for faltering in child‟s growth, micronutrient deficiencies and emergence of common childhood ailments as diarrhoea. Furthermore, reversing of stunting developed during this period is very difficult after the second year of the children (World Bank, 2005) [30]. Complementary feeding should be timely (start receiving from 6 months onward) and adequate (in amounts, frequency, consistency and using a variety of foods). During these formative years, poor nutrition has immediate consequences of increased morbidity and mortality and delayed development of the brain and other nervous systems (Westcott J. *et al.,* 2011) [13]. The latent impacts of deficits in nutrients in early ages include impaired cognitive performance and reproductive outcomes and reduced work capacity and health status during adolescence and adulthood. Furthermore, malnutrition cycle persists with intergeneration impacts. When malnourished girl child grows up, she faces greater odds of having malnourished, low birth weight infant (Muller O, *et al.,* 2005). Whereas, the failure to consume additional nutritious food in low resource settings has been identified as important risk factor resulting in excess disease and death of young children (Westcott J, *et al.,* 2011) [13].

Age of Introduction of Complementary Foods

According to paediatric nutrition authorities, developmental readiness in most infants and the ability to tolerate foods consumed would occur around 4-6 months of age (Issaka AI *et al*., 2015) [12]. During this period, the intestinal tract will

have well developed defense system that minimizes or averts risk of allergic reaction in infants following intake of foods containing foreign proteins, while its ability to utilize proteins, fats and carbohydrates improves. Similarly, the infant‟s kidney develops to a state where it can successfully eliminate waste products emanating from foods such as meat with characteristics high renal load. Furthermore, their neuromuscular system matures enough leading to development of abilities for recognizing food, accepting spoons, masticating and swallowing foods and distinguishing and appreciating varieties in food tastes and colours (Health Service Executive; 2008) [10].

Consistency of Complementary Foods

Starting at 6 months, infants can eat pureed, mashed and semi-solid foods prepared from infant cereal, vegetables, fruits, meat and other protein rich foods. By 8 months, most infants will become capable of eating „‟finger foods‟‟‟. In line with changing oral skills and emerging new abilities (such as munching, chewing etc.), the thickness and lumpiness of the foods can gradually change from pureed to ground, fork mashed and eventually diced foods (Health Service Executive; 2008) [10]. Evidence suggest that most infants are able to consume solid consistency „‟family foods‟‟‟ by 12 months, even if they frequently are still served semi-solid foods (European Food Safety Authority, 2009) [6]. The risk of chocking from ingesting certain food is often subject to its size (small, but hard pieces that may get into the airway and larger more difficult to chew pieces that may block airways), shape (sphere or cylinder shaped that may block airways), and consistency (firm, smooth or slick foods that may slip down the throat; dry or hard foods; sticky or tough foods that may not break apart easily and may be hard to remove from the airways) (WHO, 2009) [28].

Food Items Used to Prepare Complementary Foods

From the sixth month onward, complementary foods should be of variety and balanced mixtures of food items containing cereals, tubers, foods of animal and vegetable origin and fat should be offered. Only a varied diet guarantees the supply of micronutrients enhances good eating habits and prevents the development of anorexia caused by monotonous foods (FAO, 2011) [8]. Grain products (whole grains) can serve as sources for carbohydrates, fibres and micronutrients such as thiamine, niacin, riboflavin and iron. Protein rich foods such as meat, poultry, fish, egg yolks, cheese, yogurt, and legumes can be introduced over time can provide infants with carbohydrates, including fibre, vitamin A and C, and minerals (Northstone K, *et al.*, 2001). Commercially, complementary foods can be produced following simple technologies such as malting, popping, fermentation or using modern food processing tec hnologies such as roller drying and extrusion cooking. some of the commonly available commercially prepared infant foods include iron-fortified infant cereal made of food items, such as rice, oat and barley, wheat, mixed-grain infant cereals and infant cereals and fruit combinations; juices such as canned juices, vegetable or fruit infant foods and commercially prepared infant food meats (Dibley MJ, *et al.*, 2012) [17].

Homemade Complementary Foods

These are commonly described as homemade complementary foods. The recommendation for specific food type to prepare depends on their age appropriateness and development stage of infants and young children. for infants and young children of age 6-11 months, for instance, provision of thick porridge made of maize, millet; to which milk, soy, groundnuts or sugar is added; or mixtures of pureed foods made out of potatoes, rice and green vegetables added would allow consumption of nutritious foods. Addition of nutritious snacks such as egg, banana, bread, papaya, avocado, mango and puddings with milk would suffice their nutritional needs (Federal Ministry of Health, 2006) [7]. For children 12-23 month, provision of adequate servings of mixtures of mashed or finely cut family foods made out of potatoes, mix with fish or beans, add green vegetables or thick porridge made out of maize and millet would allow consumption of nutritious foods. Iron, zinc and calcium are limiting nutrients in unfortified plant-based complementary foods commonly used in developing countries (WHO, 2003) [26]. However, the nutrient density for iron meets the desired values even under the assumption of low availability, while zinc meets the nutrient density requirement when accounting for a moderate bioavailability. While the children consumed sufficient amount of protein and iron, they fell short of their calcium and zinc needs from complementary foods (Baye *et al.*, 2012) [3].

Conclusion

WHO recommends that infants start receiving complementary foods at 6 months of age in addition to breast milk? Initially, they should receive complementary foods 2-3 times a day between 6-8 months and increase to 3-4 times daily between 9-11 months and 12-24 months. Additional nutritious snacks should also be offered 1-2 times per day for ages 12-24 months; as desired. Gradually increase food consistency and variety as the infants gets older, adapting to the infant‟s requirements and abilities. Infants can eat pureed, mashed and semi-solid foods beginning at 6 months. By 8 months most infants can also eat „‟finger foods‟‟‟ (snacks that can be eaten by children alone). By 12 month, most children can eat the same types of foods as consumed by the rest of the family, while keeping in mind the need for nutrient-dense foods, including animal-sourced foods like meat, poultry, fish, eggs and dairy products.

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