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Review on aspects of infant food

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Abstract
The 6–23-month-old age range of children is one with a high prevalence of malnutrition. It is crucial to have food mixes or a variety of foods that satisfy the infant's needs for both macro and micronutrients in order to provide complementary diets that are nutritionally appropriate and balanced. Infant formula is manufactured foods that mimic human milk, are intended to feed babies up to 1 year of age, and can safely be used to partially or completely replace breastfeeding. The aim of this review was to study about Infant Food Premix and its nutritional requirements and also study about the previous work done on Infant Food Premix.

Keywords: Infant food premix, nutritional, human milk

Introduction
The best and most acceptable meal for infants is mother's milk. Although the majority of infants in India are breastfed for the first six to eight months of their lives, not all of them are fortunate enough to have a healthy mother who could offer enough nutrition, which also drives up need for weaning meals (Mishra *et al* 2014) [17]. The introduction of supplemental foods for weaning that are high in protein created from readily available and inexpensive ingredients, with great digestibility and energy density. It is crucial to understand raw materials. These weaning foods might be utilized to satisfy reduce levels of to meet the needs of the developing youngsters and as a result malnutrition in underdeveloped nations (Raza *et al* 2009; Satter *et al* 2013) [23, 7].

Infant's development of their eating habits changes when complementary food (CF) is introduced. In order to ensure for an infant's health, the World Health Organization (WHO) advises that they be nursed exclusively for the first six months before beginning to get CFs. essential nutrients for their development, such as iron and zinc. Lacking in nutrition infant could experience a nutritional shortage without a well-balanced diet. In order to help infants, learn to accept a range of meals, it is generally recommended to introduce CFs to them in a variety of flavors and textures. In addition, limiting infants' sugar and salt intake will help them form healthy eating habits and prevent chronic diseases in adulthood.

History of Infant Foods
The historical evolution of feeding practices for a full-term infant immediately after birth includes wet nursing, the feeding bottle, and formula use. Before the invention of the feeding bottle and formula, it was normal practice to use a "wet nurse," or "a woman who breastfeeds another child."

As early as 2000 BC, infants were being fed with cow milk. Since then, synthetic formulas have become part of alternate milk sources. Breastmilk is still regarded as the finest source of baby nourishment, despite the fact that feeding infants artificial foods or formula is currently considerably safer than it has been in previous decades (Leung & Sauve, 2005) [13]. Animal milk was the most often used type of fake food source up until the 19th century. As was previously noted, pap and panada were only used as additions to animal milk when the infant did not thrive. The kind of animal available goats, sheep, donkeys, camels, pigs, or horses determined the type of milk that was used. But cow's milk was by far the most popular and widely utilized milk for artificial feeding. The first chemical examinations of both human and animal milk started to appear in the 18th century. Des-Essartz defended human milk as the finest source of baby nutrition based on its chemical properties. Many scientists attempted to create nonhuman milk that resembled human milk using mother's milk as the benchmark.

A baby meal was created, patented, and sold in 1865 by chemist Justus von Liebig. It was first sold in liquid form, then later in powder form for improved storage. The ideal baby diet was thought to be Liebig's formula, which contained cow's milk, wheat and malt flour, and potassium bicarbonate. Gale Borden, a Texan, added sugar to the evaporated milk in 1853, canned it, and sold it as Eagle Brand Condensed Milk, which quickly gained popularity as a baby food. John B. Myerling created an unsweetened condensed milk in 1885 and called it "evaporated milk." From the 1930s to the 1940s, paediatricians highly promoted Myerling's product as a choice for new born feeding (Radbill, 1981) [14]. Following the marketing of Liebig's infant food and the creation of evaporated milk, a large number of new commercial products and formulas were swiftly produced (Radbill, 1981) [14]. There were 27 infant food brands with patents by 1883 (Fomon, 2001) [11]. These commercial items, which came in powder form, contained dextrin, sugars, and other carbohydrates that were meant to be mixed with milk. "Nestle's Food," "Horlick's Malted Milk," "Hill's Malted Biscuit Powder," "Mellon's Food," "Eskay's Food," "Imperial Granum," and "Robinson's Patent Barley" were some of the well-known names for the items (Radbill, 1981, p. 619) [14]. The fattening foods were deficient in important elements like protein, vitamins, and minerals. The nutrients were gradually added one by one (Radbill, 1981) [14]. Due to the deterioration of milk left in bottles, the use of artificial formula was linked to a number of new born deaths during the summer (Weinberg, 1993) [15]. However, this association was not recognized until the general public embraced the germ idea. For infants allergic to cow's milk, scientists started creating non-milk-based formulas in the 1920s. In 1929, a non-milk formula based on soy flour was made accessible to the general public. Soy formula lacked essential minerals, especially vitamins, just like the earliest formulae made available in the late 19th century. Eventually, vitamin fortification solved the issue (Fomon, 2001) [11]. Manufacturers started targeting doctors directly with advertisements as formulae developed and research proved their effectiveness. Many baby food producers were compelled to apply for AMA approval or the group's "Seal of Acceptance" when the American Medical Association (AMA) established the Committee on Foods in 1929 to certify the safety and quality of formula composition (Emily E. Stevens, 2009) [16].

Infant's foods should have fulfilled the following requirements:

- The food should be low in indigestible fibre and high in calories, protein, vitamins, and minerals.
- It should not be contaminated by antinutritional elements.
- To make swallowing easier, the food should produce a semisolid mass with a soft consistency when combined with water or milk.
- The food should be processed in such a way that it needs minimum preparation before feeding and is easily digested by the child.
- It is not advisable to add artificial colours or flavours to infant foods.
- The Infant food's composition must adhere to the guidelines suggested by reputable organisations.

Sajilata *et al*. (2002) [9]

Infant foods should made from a variety of cereals, legumes, vegetable oils and proteins, milk solids, and various carbs like maltose, lactose, sucrose, dextrose, and dextrins, according to PFA (2004), Prevention of Food Adulteration Act (India). Along with vitamins, it must also contain calcium and iron salts, phosphates, citrates, and other nutrients-important minerals. It must be in flakes or powder form with a homogeneous look. Preservatives and other food additives, such as colours, flavours, and antioxidants, should not be present in the product. It should also be devoid of dirt, pollutants, and any other substance that is damaging to human health. Milk solids must make up at least 20% of the product, and milk fat must make up at least 5% of the total product. It should be protected from deterioration by being placed in hermetically sealed, sanitary, and secure containers or packaging made of board paper, polyethylene, polyester, metallized film, or aluminium foil.

Infant food is eaten for

- Babies go through a period of rapid growth in the first year of life, so nutrition is crucial at this time.
- In actuality, good nutrition in the early years of life is the key factor in determining healthy development throughout childhood and adult health.
- The infant is virtually exclusively breastfed during the first six months of life. Usually demonstrates satisfactory development and growth.
- Because new-borns at this period of development require more calories and protein to meet their rising metabolic needs, child malnutrition is a widespread problem in underdeveloped nations.

During their formative years, kids need to ingest 14.5 gm of protein, 30 to 40 gm of fat, 250 gm of carbohydrates, 25 gm of fibre, 5.0 mg of iron, 400 mg of calcium, 800 mg of potassium, and 485 KJ/Kg of calories.

Nutritional status in developing countries

In the developing world, millions of people experience food insecurity, chronic hunger, starvation, and malnutrition, which increases illness and death. The risk of underweight, stunted growth, and death in babies and young children between the ages of 6 and 24 months is increased by the high prevalence of undernutrition and micronutrient deficiencies in poor nations.

According to the National Family Health Survey of India, malnutrition affects 48% of children in the country, with the percentage rising to 55% of children in rural areas and 45% of children in urban areas. States like Bihar, Uttar Pradesh, Madhya Pradesh, and Rajasthan experience a worsening of the situation. Mishra *et al*., (2014) [17].

Diets that are nutritionally deficient and improper feeding techniques are two main causes of the rise in malnutrition rates. Government agencies and international organizations have made numerous attempts to create and commercialize a formula that offers a well-balanced weaning diet. However, these formulas were too costly for low-income communities to use. Thathola and Srivastava (2002) [18].

Malnutrition is made worse in Kenya by a number of reasons, including repeated drought, flooding, and political unrest. In these unfavorable circumstances, high fertility rates and insufficient household food production both contribute significantly to malnutrition while also raising poverty levels. Insufficient consumption of a range of grains, legumes, and vegetables as well as ignorance of the fundamentals of healthy nutrition also contribute to low diet quality. Kunyanga *et al*., (2012) [19].

The world's highest rates of malnutrition were found in Bangladesh. Children in Bangladesh suffer from malnutrition as a result of low food quality, inadequate dietary intake, and

severe and recurrent infectious infections. 50 percent of children under the age of five in Bangladesh are underweight, and 42 percent are stunted, according to the Institute of Public Health and Nutrition (IPHN). The IPHN also stated that about 30% of children aged 6 to 9 months do not consume any solid or semi-solid foods, with 42% of infants under six months old receiving just breast milk. Satter *et al*., (2013) [7].

Children in these nations typically experience malnutrition throughout the weaning process, because safe and nourishing infant meals are not consumed enough or improperly. Furthermore, mother's milk could not sufficient to meet the nutritional needs after the first three months of life. According to a WHO survey, the number of breastfeeding mothers is steadily declining. Has been noticed during the past 25 to 30 years, and the bottle size has increased significantly. Around the world, feeding and early weaning were also observed. Ali *et al*., (2016) [20].

Infant Foods Traditionally Available in India

Lack of knowledge of basic processing to make nutritious food has also been noted as another issue contributing to the poor nutrient density in local supplemental foods. To enhance the nutritional value of the cereal, simple, conventional household technologies have been applied in the processing process. They include roasting, germination or sprouting, fermentation, boiling, and soaking, all of which have a significant impact on the nutrients they contain. Cooking and germination play a significant part in these processes because they affect the bioavailability and use of nutrients and also increase palatability, which can improve digestibility and nutritional value.

Traditional infant diets from plant-based staples frequently fall short of infant's dietary requirements as a result of their rigid consistency and high volume to provide a cheap, satiating meal that frequently lacks sufficient nutrition hence, familiar to poorly promote development and growth. Ineffective blending and formulation have contributed to the traditional supplemental food's low performance. Numerous studies have demonstrated that a combination of cereals and legumes or tubers with fruits, vegetables, and food obtained from animals can sustain growth better than a single diet as well as growth. It has been demonstrated that plant-based foods adversely affect the bioavailability of nutrients. The most well-known is oxalic acid, which produces oxalate precipitates. Phytic acid creates insoluble phytates with dietary calcium, Fe, Zn, and perhaps other elements. The relatively low availability of the relatively high Fe content of, for example is mostly because cereals have proportionally high phytic acid levels.

Development of Infant foods

Singh *et al* (2021) [21] Aim of this study was to create nutrient-rich infant food premix using locally available resources and household food processing techniques and to do its sensory and nutritional analysis to enhance the nutritional status of the malnourished infants. They formulated Infant Food Premix by blending of pearl millet/wheat, pumpkin/carrot, finger millet, roasted Bengal gram, milk powder and Niger seeds and analyses them for sensory attributes. It was concluded from the study that organoleptically accepted infant food premix had the high nutrient content which indicated that it has the potential to improve the nutritional status of infants.

Paul *et al* (2008) [3] studied the soy rice based processed complementary food and compared the acceptability of an infant soy-rice infant food premix without milk powder and with milk powder. In the sensory evaluation they found that there was not so difference in acceptability of both the products even though mothers were more interested in feed the product with milk powder.

Moy (2000) [4] studied all about the Iron in Infant food, its fortification and the need for Fe fortification of infant formula at various ages, its limits and whether there is any adverse effect on health. Also studied the Iron absorption from mother milk and infant food formula and then done the Iron fortification in infant formula and by clinical research its confirm that Iron level in infants got increased.

Cizkova (2009) [22] the aim of this work to compare declared and real (measured) values of selected nutritive parameters to asses potential adulteration and differences between brands. They had used fruit purees, sugar, water, rice flour and some more additives to formulate the baby food. The analyses were focused on the determination of authentic fruit content, identification of sugar and other additives addition, evaluation of the processing on the main quality indices, namely, contents of antioxidants and time-temperature effort indicators. The study indicates that there are big differences in composition and quality of commercial fruit baby food, whereas some samples contain fruits only, other products are diluted with significant amount of sugar, water and starchy fillers.

Nutritional Requirements of Infant food

According to food adulteration act (India) following are the nutritional requirements for the Infant food which should be fulfilled.

Table 1: Prevention of Food Adulteration Act (India) Infant food standards

Sr. No.	Parameters	Requirements
1	Moisture, (not more than)	5%
2	Total protein, (not less than)	12%
3	Fat, (not less than)	7.5%
4	Total Carbohydrates, (not less than)	55%
5	Total ash, (not more than)	5%
6	Crude fibre (on dry basis), (not more than)	0.1%
7	Vitamin A (as retinol), (not less than)	350 µg/ 100 g.
8	Vitamin C, (not less than)	25 mg/ 100 g.
9	Added Vitamin D, (expresses as cholecalciferol)	5 µg/ 100 g.
10	Thiamine (as hydrochloride), (not less than)	0.5 mg/ 100 g.
11	Riboflavin, (not less than)	0.3 mg/ 100 g
12	Nicotinic acid, (not less than)	3.0 mg/ 100 g.
13	Iron, (not less than)	5 mg/ 100 g
14	Bacterial count (not more than)	40,000 cfu/g
15	Coliform, Salmonella, Shigella, *E. coli*, *Vibrio cholera* and *V. parahaemolyticus*, *Faecal streptococci*, *Staphylococcus aureus*, Yeast and mould count.	Should be absent in 0.1 g

Conclusion

In recent year's Infant food premix powder were developed using various raw materials for targeted populations. The quality of the food product should be maintained as per the requirements. The formulations of the product can be done by using another raw material and the study can be included as per the FSSAI regulations. The infant food premix can be developed by fortifying the minerals and vitamins to recover the infant's health. As well as to control the anaemia in infants the infant food can be fortify with iron and for avoiding other deficiencies in the children it can be fortify by various vitamins and minerals as per requirements.

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