



Review Article

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REVIEW ON COMPLEMENTARY FEEDS: A STEP TOWARDS INFANT NUTRITION

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ABSTRACT

Pediatrics is concerned with the health of infants, children and youth, their growth and development and opportunities to achieve full potential as adults. The dramatic growth of infants during the first year of the life imposes unique nutritional needs. The rapid rates of growth are accompanied by marked developmental changes in organ function and composition. Failure to provide adequate nutrients during this time is likely to have adverse effect on growth as well as development. Ayurveda gives due importance on good nutrition at every stage of life, in order to preserve health of individuals. Initially babies are nourished with exclusive breast feeding but after certain age, only breast milk is not sufficient to provide the nutritional needs of growing baby therefore infants are to be supplemented with additional nutritious feeds called as complementary feeds to prevent growth faltering. This article highlights on Ayurvedic as well as modern concept of complementary feeding practices in infants.

Keywords: Nutrition, Infancy, Weaning, Complementary feeds, Phalaprashana, Annaprashana.

INTRODUCTION

Main aim of Ayurveda is promotion and prevention of health. Ayurveda gives lot of importance on good nutrition at every stage of child life, in order to preserve their health. The human body grows by food. As rightly said that there is no medicine like food and food alone can make people healthy.¹ That is why food is considered as mahabhaishajya.² The dramatic growth of infants during the first year of the life (threefold increase in weight and two fold increase in length) impose unique nutritional needs during this period. The rapid rates of growth are accompanied by marked developmental changes in organ function and composition, failure to provide adequate nutrients during this time is likely to have adverse effect on growth as well as development. Compared to adults their energy requirement is much high especially during infancy.³ It is mentioned that a child should never be kept hungry.⁴ Unfortunately, provision of special nutrient needs, during early life is complicated by the young infants' lack of teeth and immature digestive and metabolic processes. As long as the baby remains in the mother's womb the placenta takes care of the fetal nutrition. The nutritional status of child depends upon the nutritional status of mother during antenatal period. Whatever the food a pregnant lady consumes is divided into 3 parts, one part nourishes the mothers own nutritional needs, the second part supply the nutrition for breast milk secretion and the third part nourishes the fetus growing inside the womb.⁵ After birth, even the age classification (Vayovibhajana) in children is mainly done on the bases of food they consume as^{6,7}

- Ksheerapa – the children up to one year of age and main diet is milk,
- Ksheerannada – the children up to 2 years of age and on both milk and semisolid food
- Annada – the children who takes solid food as main food.

For a newborn, mother's milk is ideal⁸. Exclusive breast milk (only breast milk to the baby is indicated till 6 months of age) is indicated. In absence of breast milk baby can be fed with animal milk – goat or cow's milk. This animal milk should be processed with some drug and sugar, so that the animal milk becomes light and easy for digestion.⁹ Or else in case of absence of breast milk, a wet nurse (Dhatri) can be appointed who feed her breast milk to the baby¹⁰. Even though babies may thrive on breast milk alone during the first 6 months of life, six months onwards there is a gap between total energy needs and energy provided by breast milk. This gap increases as the child gets older. At this age they need to be supplemented with some extra nutrition. Weaning/ complementary feeding gives the child other nutritious foods in addition to breast milk. Concentrated energy dense complementary foods are essential in order to maintain an adequate velocity of growth in infants. These should complement rather replace breast milk. Weaning is essential to prevent the growth faltering.¹¹ Weaning is defined as 'the systematic process of introduction of suitable food at the right time in addition to mothers milk in order to provide needed nutrients to the baby'(UNICEF 1984). The term complementary feeding is now preferred because weaning implies abrupt stoppage of breast feeding.¹² Weaning is a difficult period in infant's life because;

- If the food supplement is not adequate in quantity and quality leads to malnutrition at an early age itself.
- Infants are learning to eat first time, so it is very important to be patient and gentle with child.
- Unhygienic feeding practices may result in entrance of infections and diarrhea which again a cause for malnutrition in children.
- Infants are having weak digestive power so suitable feeds need to be selected

Time of weaning or complementary feeding

For the first 6 months of age baby should be fed with breast milk only (exclusive breast milk). Weaning is to be started gradually at the age of 6 months because

- Birth weight doubles by 5 months of age. The nutrition demands in infants gradually increases and the calcium and iron stores get depleted.
- Breast milk supply increases till 6 months and then it plateaus off. By five months of age, the weight of the baby doubles and becomes around 6 kg and the baby needs 600-700 cal/day and around 600 ml of breast milk can supply only 400 kcal.
- By four months of age the baby achieves head control and develops hand mouth coordination and starts enjoying mouthing.
- Intestinal amylase mature and the gut become ready to accept cereals and pulses (legumes).
- Gum hardens prior to tooth eruption and the baby enjoys gumming semisolids. Biting movement begins and tendency to push the solids out of mouth reduces.

Thus the baby is biologically fit to accept semisolids by 4 – 6 months of age. Early weaning is often due to ignorance and leads to contamination and infection due to the unhygienic preparation. Dilute weaning foods also lead to malnutrition. Late weaning leads to growth faltering and malnutrition. After 6 months of age, gradually introduce semisolid food to the baby. Introducing fruit juices is recommended when the child is about 6 months age called as phalaprashana samskara,¹³ Human milk is deficient in vitamin C, D and iron, and these are to be substituted to the infants.¹⁴ Fruit juices are rich sources of these nutrients. Fruits generally relieve constipation and are agnideepaka (increases the digestive capacity) also. Thus introduction of fruit and fruit juices help in supplementing the extra nutrition to the baby at an early age itself. When the baby is around 10 months of age, and has tooth eruption, start with semisolid mashed foods. This introduction of solid food is called as Anna Prashanasamskara and is performed religiously.¹⁵⁻¹⁶ During this samskara mashed food is fed to the child 3 to 5 times in little quantity. Wholesome dietetics is followed as per guidelines on Aharavidhi (guidelines on food and eating), Matrashiteeya (eating in adequate quantity as per need) and along with avoidance of junk and unwholesome food-Virudhahara.¹⁷ The child who does not get other nutritious food and continued to be fed on milk alone for long time is likely to become ill with different nutritional disorders.¹⁸ During ksheerannadakala (1 to 3 years) as the baby is taking both ksheera (milk) and anna (solid food), the agni (digestive power) of the child is not optimum, so

consider the agni (digestive capacity) before giving food to the child. The diet given to the child should be satmya (congenial), laghu (light) and hitakara (good to the body) to the child.¹⁹ If weaning is not done in proper way and time, child will suffer from many nutritional disorders like parigarbhika,²⁰ phakka,²¹ balashosha (nutritional disorders during childhood)²² etc. So to prevent nutritional disorders the weaning or complementary feeding should be started at proper time and proper way.

Continuation of breast feeding

Breast milk should continue to be the main food of the baby even when weaning is started. To minimize interference with normal breast feeding, weaning foods should be given between the breast feeds. Breast feeding should be continuing for as long as feasible, preferably till two years of age. This is important as the first two years is a period of rapid brain growth and breast milk contains factors essential for brain growth and development.²³

Complementary foods

All foods provide some energy but the taste, consistency, texture of food is important on successful complementary feeding. Stomach of young children is small, thin foods and liquids fill it quickly, so consistency or thickness of the food makes a big difference to how well that food meets the young child's energy needs. A food of thick consistency helps to fill the energy gap. A food that easily stays on spoon is right consistency. First food should be soft, homogenous, smashed, strained and bland in taste. When infants accept soft food then different taste, consistency, thickness and varying texture can be tried. Mono-cereal is preferred initially followed by multi-cereals and cereal pulses combinations. They should be locally available, cheap, acceptable and adequate to provide all nutrients. Cereals like ragi, rice, wheat etc are good weaning foods. Cereal pulse combination is better, due to fortification of amino acids, as cereals generally lack lysine and pulses lack methionine. Tubers, fruits, biscuits and banana powders are also popular weaning foods. Addition of jaggery will increase calories and minerals. Addition of milk will increase protein and oil will increase calorie intake. Coconut milk can be added instead of cow's milk it is rich in lauric acid, which promotes brain growth.

Family pot feeding

It is essential to switch over to the usual family food. By one year of age, the baby should be taking everything cooked at home. This is called 'family pot feeding'. It can be given in a thickened and mashed form, from the family pot without adding hot spices. Provide little extra oil or ghee, green leafy vegetables and seasonal fruits to the baby. A new food should be introduced in the morning session and only one item should be introduced at a time. Soaking and malting of grains will increase digestibility and vitamin content. Sprouting and germination will enhance vitamin content and make it amylase rich food and will decrease the bulk on cooking. Fermentation enhances vitamin C and digestibility; e.g. curds / yogurt.

Preparation and storage of weaning foods

Careful hygienic preparation and storage of weaning food is important. The food stuffs should be freshly prepared. Precooked ready to mix cereal pulse combinations can be prepared and stored in airtight containers.

Weaning / complementary feeding – A safety net to prevent protein energy malnutrition (PEM)

Most of the children fall into the pit of malnutrition during the weaning and post weaning phase. Malnutrition in infants and young children typically develops during the period between the first 6 and 18 months of age, and is often associated with intake of low nutrient and energy dense diet. Linear growth and brain development are especially rapid during the first 2 years of life and young children are particularly susceptible to growth failure and developmental delays if they are not breastfed and are fed complementary foods with low nutrient and energy density and poor bioavailability of vitamins and minerals. Furthermore, preparation of complementary foods in conditions of poor hygiene and sanitation can lead to dietary contamination and frequent infections, which further impairs child's nutritional status.²⁴

Some special complementary food preparation ShashtikaShalyadi Yoga

Semisolid foods prepared out of old and fried shali (rice), or shashtikadhanya (specific variety of rice) are considered as good weaning food. Instead of these, powders of Yava (barley) and Godhuma (wheat) can also be used. These grains are to be soaked in water over night; husk is removed, then sundry, roast and make powder. This powder is being cooked with milk, ghee and jaggery and used for nursing the child. Warm semisolid foods treated with vidanga²⁵, ghrita (ghee) and salt suits well for infants. If the child suffers from repeated attacks of indigestion and loose motion, to the complementary food add kodrava. For children with vata constitution the gruel should be cooked with matulunga rasa (juice of *Citrus medica* L.) and salt. Dried grapes, honey and ghee are to be added to the children of paittika constitution. Complementary feeding should be always gradual. Feeds can be given once or twice considering the desha²⁶ (Place of living), agni (digestive power), bala (strength of the child) and kala (season and time). Whenever the child is hungry, it can be given taking into consideration about child's appetite.²⁷

Preenanamodaka (Priyalu Majjadi Modaka)

Use of specific type of weaning food preparation called modaka, which is a sweet ball, prepared by using powders of priyalamajja (*Buchanania lanzan* spreng.), yasthimadhu²⁸⁻²⁹ (*Glycyrrhiza glabra* L.), laja (rice pops), sitopala (sugar candy) and madhu³⁰ (honey). This food preparation is a sweet bolus which will ease the palatability because generally kids like madhura rasa (sweet taste). It is a combination of protein, carbohydrates and having high caloric value as this food preparation contains honey and sugar candy. Thus Preenana Modaka is mentioned in general for improving the infant's nutritional status.²¹

Dhatkyadimodaka

A complementary food prepared with Dhataki pushpa (*Woodfordia fruticosa* L. Kurz.), Madhuka (*Glycyrrhiza glabra* L.), Sharkara (sugar candy) and Laja (rice pop) is good in children with indigestion and who suffers from repeated attacks of gastroenteritis.²¹

Bala Bilvadi Avaleha

Bilwa (Unripe fruit of *Aegle marmelos* L. Corrêla)³¹ (cardamom), sharkara (sugar candy), lajasaktu (rice pops). This food preparation is indicated in infants with weak digestive capacity.³²

In all these preparations main ingredients are combination of pulses, grains and sugar, all the ingredients are rich source of protein, carbohydrate, and energy. To these preparations adding ghrita (Ghee)³³⁻³⁴ and jaggery will again increase the caloric value making them energy dense food. Adding of some drugs like vidanga which is having krimihara (anthelmintic) effect, helps in deworming. Madhuka, dhataki will increase the digestive capacity of the infant.

Selection of complementary foods according to age Around 6 months of age

Cereal based porridge (ragi, rice, suji etc.) enriched with jaggery / sugar, oil/ ghee and animal milk can be started. Start with 1-2 spoonfuls and gradually increase to ½ to 1 cup per day in 1 – 2 servings in addition to breast feeding. Fruit juices can also be started.

6- 9 months of age

Introduce mashed items from the family pot enriched with jaggery / sugar, oil/ ghee. Mashed rice with pulses, mashed tubers and vegetables, soups, mashed fruits; egg yolk followed by white etc can be given.

9- 12 months of age

Introduce soft food that can be chewed avoiding hot spices. Chapatti and other hard items can be made soft by adding little milk. By one year of age, the baby should be taking everything cooked at home. This is called 'family pot feeding'. A one year old child should eat half of what the mother eats.

CONCLUSION

Complementary feeding is the second step in child nutrition. Along with the other semisolid foods breast feeding should be continued till 1 ½ to 2 years of age. Most of the children fall into the pit of malnutrition during the weaning and post weaning phase. Malnutrition in infants and young children typically develops during the period between the first 6 and 18 months of age, and is often associated with intake of low nutrient and energy dense diet. Early weaning and delayed weaning both are not recommended because both may land up in malnutrition. So proper time, proper food preparation and proper way of introduction plays very important role in successful weaning and preventing the malnutrition in children.

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