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Research Paper

Complementary Feeding –A Review

Medical Science

KEYWORDS :

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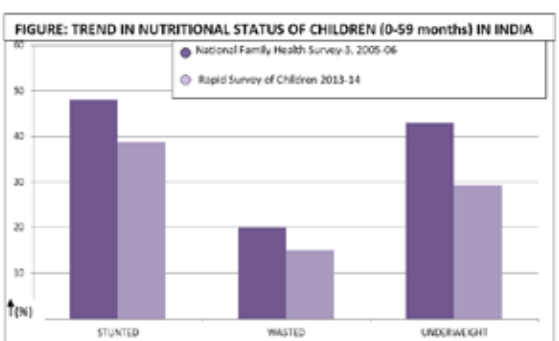
Undernutrition is unacceptably high among Indian children. About a third of children under 5 years of age are underweight and a slightly more are stunted as well. Growth faltering or stunting may begin in utero and continue for at least the first 2 yrs of post natal life. Furthermore, it is difficult to reverse stunting, especially after about 2 yrs of age. so, the first 1000 days, the period from conception to a child's second birth day offer a critical window of opportunity for appropriate nutritional intervention to improve child's health. The complementary feeding period covers at least half the duration of the 1000 days critical window. Hence, the quality of complementary feeding has a substantial effect on the growth and development of the infant.

FIGURE: TREND IN NUTRITIONAL STATUS OF CHILDREN (0-59 months) IN INDIA



Chronic micronutrient deficiencies, collectively called hidden hunger, are not obvious in those affected by them. However, the negative and lifelong consequences of hidden hunger on health, productivity and mental development can be devastating.

In India, 7 of every 10 young children aged between 6 months to 59 months are anemic. It has been found that iron deficient status in otherwise healthy infant can lead to about 6-17 point lower scores on mental development and motor development tests, compared with normal iron level infants. One third to more than half of preschool children are victim of subclinical vitamin A & Zinc deficiency. Deficiency of Vitamin A & zinc are may leads to for recurrent GIT and Respiratory tract infection.

Delayed introduction & inadequacy of Complimentary feeding can contribute to under nutrition. Thus appropriate feeding practices are critical for children below 2 years of age to ensure survival, healthy growth, intellectual & physical development. Complementary feeding is not only the foundation of good health, but also an important phase to established future healthy eating habits.

WHEN TO START?

IAP recommends complementary foods should be introduced at 6 months of age whilst continuing of breastfeeding. ESPGHAN committee on nutrition considers that the introduction of complementary food should not occur before 17 weeks (~ 4 months) & not be delayed beyond 26 weeks (~ 6 m) Neonates are capable of only sucking and swallowing liquids. As infants mature, feeding skills develops further and set the stage for introduction of complementary food.

TABLE: Infant development and feeding skills

	Mouth pattern	Hand , body and feeding skill
Birth – 5 M	Suck, swallow, tongue thrust, rooting, gag reflex present.	Brings hand to mouth Poor head, neck and trunk control Swallows liquids Pushes most solids from mouth
4M – 6 M	Transfers food from front to back of tongue Diminishing gag reflex Tongue thrust, rooting reflex begin to disappear	Grasps objects using whole hand Good head control Drinks small amounts from cup when fed Swallow pureed and strained food without choking
5M - 9M	Controls position of food in the mouth Positions food between jaw for chewing	Begin to sit alone unsupported Use motor skill to pick up objects Eat mashed food and self feed with hands Drinks from a cup with some spilling Can eat from a spoon easily
8 M – 11M	Moves food from side to side in mouth Begins to chew in rotatory pattern	Sits alone easily Begins to eat ground and finely chopped food Drinks from a cup with less spilling
10M – 12M	Rotatory chewing	Begins to hold cup Self spoon feed with help Good eye –hand-mouth coordination Eats chopped food and small pieces of cooked food.

Taste development: Flavour exposure during fetal life, breast feeding & Complementary feeding phases sets the stage to future food preference.The inhalation and swallowing of amniotic fluid at 6 months of gestation mark the beginning of flavour learning. Furthermore, amniotic fluid contains an array of nutrients having distinct tastes as well as flavour of foods consumed by the mother. Flavour learning continues during lactation when infants can detect the flavours of maternal diet transmitted by breast milk. This contributes to a preferential acceptance of foods with similar flavours when complementary feeding is initiated. During complementary feeding phase, introducing a variety of foods and repeated exposure of the same to infants can increase acceptance of that food. It has been seen that infant and younger children except vegetables more readily than older children.

Introduction of appropriate texture is favourable for acceptance – children may be more accepting to foods that can be broken down and chewed easily. Exposure to different texture of food early in life may promote the acceptance of complex texture in the later life.

ENERGY & NUTRIENT DENSITY

Appropriately thick homogenous complementary food made

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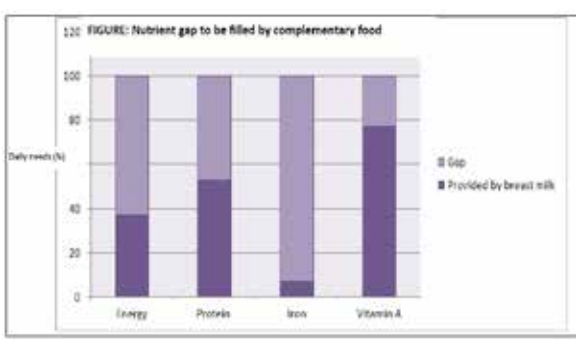
from locally available foods should be introduced at 06 months to all babies while continuing breast feeding. To address the issue of small stomach size which can accommodate limited quantity at a time, each meal must be energy dense. Macro nutrient such as carbohydrate, protein & fat provide energy for growth during childhood. It is important to provide energy dense foods to support growth during early years of life. Energy density of food determines the amount of food required to meet the nutrient demands of the infant. Ideally, Energy density of the feed should be more than that of breast milk (0.7kcal /ml). Watery diluted feeds generally have an energy density of 0.3kcal/ml & hence, they will not meet the total energy intake of the child. It may even be less than that was with exclusive breast feeding, leading to undernutrition.

TABLE: Energy density of feeds

TYPE OF FEED		ENERGY DENSITY
1.	Breast Milk	0.7 kcal/ml
2.	Complementary Feed	0.6 -1 kcal/g
3.	Watery Diluted Feed	0.3 kcal/g

To provide more energy from smaller volume, food must be thick in consistency – thick enough to stay on the spoon without running off, when the spoon is tilted.

In addition to energy, Complementary food should also provide sufficient protein and micronutrients to bridge the nutrient gap left to be fulfilled by breast milk.



Usually, the local staple available in the region forms the basic ingredient of complementary food. Staple mainly contribute to energy and some protein; hence, it becomes essential to add a variety of other foods to improve the nutrient density of the feed.

There are seven food group which can improve nutrient density of infant feed:

- Grains,roots and tubers
- Legumes and nuts
- Dairy products
- Flesh foods(Fish, Chicken)
- Eggs
- Vit. A rich fruits & vegetable
- Other fruits/ vegetable.

Fats and oil are valuable food components for infants as they improve the energy density and taste of food and aid in absorption of fat soluble vitamins.

To begin one can start with mashed ripe banana, mashed boiled potato, cooked pulse(dal). AAP recommends introduce single food at a time and do not introduce other new foods for 3-5 days to observe for tolerance. One to two spoons are enough to start with and the quantity and frequency should be increased gradually. Khichdi, dhalia, chappati softened in dal, dahi, cooked vegetables, fresh fruits introduce gradually. Egg, fish and chicken should be introduced later in view of allergy to animal protein. Every 1-2 week, a new food may be added till age of 1 year. After one year of age infant should be on food prepared for other family members.

Breast milk should continue to first 12 months, cow milk is then substituted. But cow milk intake should be limited upto 24 oz/day. Do not give fruit juice during first 6 month and limited amount (4-6 oz) of 100% juice thereafter.

Indicators of optimal complementary feeding : In 2008, the WHO updated indicators for assessing complementary feeding at the community level

- Minimum dietary diversity
- Minimum dietary frquency
- Minimum acceptable diet

Minimum dietary diversity – this indicator represents the proportion of children who receive food from 4 or more food groups. This may be linked to the high possibility of eating at least 1 food from animal source and 1 from fruits or vegetables.

Minimal dietary frequency – this indicator relects the proportion of breastfed and nonbreastfed children who receive solid, semisolid food ,the minimum number of times.

TABLE: Number of meals required when energy density of males is between 0.8 – 1 kcal/gm

Age (months)	Breastfeeding status	Recommended daily meal frequency
6-8	YES	2-3 Meals
9-23	YES	3-4 Meals 1-2 additional snacks
6-23	NO	1-2 Cups of milk 4-6 meals 1-2 additional snacks

Minimal acceptable diet – this indicator refers the proportion of children who receive a minimum acceptable diet , apart from breastmilk. This indicator is useful measure to track progress and simultaneously improve the quality and quantity dimension of the child's diet.

Practical feeding tips for children

- Systematically introduce new food
- Serve age appropriate foods
- Encourage self feeding
- Maintain a calm and pleasant attitude throughout meal
- Avoid distraction during meal time such as- TV, cellphone etc
- Make a family meal time a priorit
- Hand wash & maintanance of hyegine during feed preparation.

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