Course – B.A. Home Science
Paper Code – HSC CC409
Paper Name – Nutrition: A Life Cycle Approach
Semester – IV
Topic – Nutrition During Infancy
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# NUTRITION DURING INFANCY

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# INTRODUCTION

- Nutrition during infancy lays the foundation for health. This period, which spans from birth to one year of life, is a rapid growth period.
- Chemical maturation of the body is accomplished and internal activities occur at a high speed. Basal metabolic rate is also high.
- By the end of the first six months after birth a healthy child nearly doubles his birth-weight and by one year he triples it.
- According to WHO, the average weight of most healthy new born babies is around 3.2 kg. So, he will be about 6.4 kg at six months and 9.6 kg by one year.
- The normal birth length of 50 to 55cm increases by another 23 to 25 cm during the first year. With increase in length the body proportions also change.
- During this period, the child begins to crawl, babble, sit and some may even walk.

# NUTRITIONAL REQUIREMENTS

- During early infancy, much of the nutrient requirements are met by breast feeding and the RDA of an infant is depend on composition of milk.
- **Energy:-** Infants require 92kcal/kg body weight. For 1 month old infant, 50 per cent energy intake is used for basal energy, 25 per cent for activity and 25 per cent for growth. 70 per cent of calories can be met by milk alone and rest of the calories have to be supplied by supplementary foods after 6 months.
- **Protein:-** Protein intake of healthy infants is about 1.16 g/kg body weight. Human milk provides all the amino acids more than the required amount needed for proper growth.
- **Fat and Essential Fatty Acids:-** Fat intake should be 35% E depending on the physical activity of the child from age 6 months to 2 years. Linoleic acid is the most important essential fatty acid for an infant.

## ICMR Recommended Dietary Allowances for Infants - 2010

| Nutrient | Months | |
|---|---|---|
| | 0 - 6 | 6 - 12 |
| Energy kcal/kg | 92 | 80 |
| Protein g/kg | 1.16 | 1.69 |
| Visible fat g | - | 19 |
| Calcium mg | 500 | 500 |
| Iron mg | 46 µg/kg | 05 |
| Vitamin A<br>Retinol µg<br>β-carotene µg | <br>350<br>2800 | <br>350<br>2800 |
| Thiamine mg | 0.2 | 0.3 |
| Riboflavin mg | 0.3 | 0.4 |
| Niacin equivalent µg/kg | 710 | 650 |
| Pyridoxine mg | 0.1 | 0.4 |
| Ascorbic acid mg | 25 | 25 |
| Dietary folate µg | 25 | 25 |
| Vitamin B12 µg | 0.2 | 0.2 |
| Magnesium mg | 30 | 45 |
| Zinc mg | - | - |

Average body weight of 0-6 months child – 5.4kg; 6-12 months child – 8.4kg

# *Contd…*

- **Calcium and Phosphorus:-** Rapid growth requires 500 mg of calcium and 750 mg of phosphorus with a ratio 1:1.5. Large percentage of calcium from breast milk is retained by the infant.
- **Iron:-** RDA of iron for an infant is 46μg/kg body weight starting from three months. At birth body contains 80mg/kg. There is no reserve store of iron between the age of 6 months and 2 years.
- **Zinc:-** High levels is present in colostrums and it promotes normal growth. Zinc is necessary for normal brain development.
- **Vitamin A:-** The RDA for retinol is 350μg. The amount of vitamin A content of breast milk is sufficient, provided mothers' diet is rich in vitamin A. After 6 months egg yolk is supplemented in the infants' diet.
- **Vitamin D:-** It is essential for utilization and retention of calcium and phosphorus. The vitamin D requirement of child is 400IU if there is minimal exposure to sunlight.

# HUMAN MILK COMPOSITION

| Nutrient | Human milk |
|---|---|
| Water g | 88 |
| Energy kcal | 65 |
| Protein g | 1.1 |
| Carbohydrate g | 7.4 |
| Fat g | 3.4 |
| Calcium mg | 28 |
| Phosphorus mg | 11 |
| Iron mg | --- |
| β-carotene µg | 1120 |
| Thiamine mg | 0.02 |
| Riboflavin mg | 0.02 |
| Vitamin C mg | 3 |
| Caseinogen and Lactalbumin ratio | 1:2 |

Values per 100gm

# BREAST FEEDING

- Breast milk is the natural food for the infant. It is ideally suited for the physiological, nutritional and psychological needs of all infants.
- The infant should be put to breast within half an hour after normal delivery and within 4 hours after caesarean sections. Prelacteal foods like honey, distilled water or glucose should not be given.
- **Colostrum:-** During the first two or three days after delivery, thick and yellowish fluid is secreted from the mammary gland. This differs from the regular milk and is called colostrum.
  - ✓ It is secreted in small quantity of about 10-40ml.
  - ✓ It is rich in protein.
  - ✓ It is the first immunisation to the infant.
  - ✓ It contains interferon like substance which possesses strong antiviral activity.
  - ✓ It contains antibodies against viral diseases such as small pox, polio, measles and influenza.

# *Contd…*

- **Transition milk:-** During the next 2 weeks, the milk increases in quantity and changes in appearance and composition. This is called transition milk.
  - The composition of milk changes even during the length of a single feed to exactly suit the need of a particular baby.
- **Foremilk:-** The milk that comes at the start of the feed is called foremilk. It is watery and has a low level of fat and is high in lactose sugar, protein, vitamins, minerals and water. It satisfies the baby's thirst.
- **Hindmilk:-** It comes later in a feed and is richer in fat. It satisfies the baby's hunger and supplies more energy than foremilk.

# IMPORTANCE OF BREAST FEEDING (FOR INFANTS)

- Breast feeding is not only beneficial to the infant but also to the mother. The advantages of breast feeding can be considered under nutritional, immunological, psychological, economical and physiological and other factors.
- **Nutritional benefits:-** The composition of human milk is best suited to the infants and provides nutrients in easily digestible and bioavailable forms.
  - ✓ It is the sweetest milk due to the high amount of lactose. Lactose facilitates the absorption of magnesium and calcium and favours amino acid absorption.
  - ✓ Protein level of human milk result in soft curd and easily digestible.
  - ✓ Fat in human milk comprises PUFA especially linoleic acid and alpha linoleic acid.
  - ✓ The fat soluble and water soluble vitamins are in good amounts but their concentration depends largely on the mother’s diet.
  - ✓ Among minerals, the sodium content is low, as kidneys have difficulty in handling excess sodium.
  - ✓ Iron content though low in breast milk, is well absorbed.

# *Contd…*

- **Immunological benefits:-** These factors are present in colostrum as well as in matured milk. Human milk contains IgA antibodies which counter act against several antigens from microorganisms usually found in gut. Other non-specific anti-infective factors are phagocytes, lactoferrin, lysozyme, lactoperoxidase and the bifidus factors.
- **Psychological benefits:-** During breast feeding the child is very close to the mother and this feeling of security and warmth forms a very strong, emotional bond between the mother and the child, which is not formed in any type of feeding.
- **Economic benefits:-** It is economical to breast-feed an infant. There is no wastage in human milk. Commercial preparations are expensive.
- **Physiological factors:-** Infants fed human milk substitutes have 5 fold more gastrointestinal illnesses, 3 fold more respiratory illnesses and double the episodes of otitis media – inflammation of the middle ear cavity.

# *Contd…*

- **Other benefits:-**
  - ✓It is sterile and less danger of contamination.
  - ✓Low danger of incorrect formula and overfeeding.
  - ✓Reduced chances of allergic reactions.
  - ✓Less renal solute load.
  - ✓It can be continued during illness of the infant.
  - ✓It is always fresh and at the right temperature.
  - ✓Mortality rate of children is low.
  - ✓Reduced risk of otitis, severe low respiratory tract infections and asthma.

# IMPORTANCE OF BREAST FEEDING (FOR MOTHERS)

- It creates strong bonding with infant.
- It is an important birth control method.
- It reduces postpartum bleeding and delays the menstrual cycle.
- Uterus comes back to normal size.
- It helps mother to shed extra weight accumulated during pregnancy.
- It is convenient to administer for the mother at any place and time.
- It decreases the risk of postpartum depression.
- It reduces the incidence of premenstrual breast cancer, ovarian cancer and type 2 diabetes.

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