

## Lecture 7.....Formula Feeding

**Learning objectives:** : By the end of this lecture the students should know:

- Why some mothers used formula feeding?
- What are the Differences between breast and formula milk.?
- What are the Types of formula commonly used?
- How to prepare the formula?
- What are the common Problems may associated with feeding during first year of life?
- **Complementary feeding: Weaning , Why?!, Timing, Type of food.**

Despite efforts to promote exclusive breastfeeding through 6 months, less than 50% of women continue to breastfeed at 6 months. The causes include: -

- Parental preference.
- Medical problems of the infant (e.g. Inborn errors of metabolism).
- Maternal factors: Medical, social or psychological reasons or other health reasons may prevent a mother from breastfeeding
- As a supplement to support inadequate weight gain in breast fed infant.

### Comparison Of Human Milk, Cow's Milk and Infant Formula (Per 100 ml)

	Mature Breast Milk	Cow's Milk	Infant Formula (Modified cow's milk)
Energy (kcal)	62	67	60-65
Protein (g)	1.3	3.5	1.5-1.9
Carbohydrate (g)	6.7	4.9	7.0-8.6
Casein:whey	40:60	63:37	40:60 to 63:37
Fat (g)	3.0	3.6	2.6-3.8
Sodium (mmol)	0.65	2.3	0.65-1.1
Calcium (mmol)	0.88	3.0	0.88-2.1
Phosphorus (mmol)	0.46	3.2	0.9-1.8
Iron (µmol)	1.36	0.9	8-12.5

Infant formulas are available in

- Ready-to-feed,
  - Concentrated liquid
  - Powder forms.
- The caloric density of formulas is 20 kcal/30 ml (oz) , similar to that of human milk. Care must be taken in following the mixing instructions to avoid over- or under dilution, to use boiled or sterilized water, and to use the specific scoops provided by the manufacturer as scoop sizes vary. Water that has been boiled should be allowed to cool fully to prevent degradation of heat labile nutrients, specifically vitamin C. Parents should be instructed to use proper hand washing techniques when preparing formula and feedings for the infant.

### ➤ *Types of formula*

1. **Cow's-milk-based formula:** commonest formula available.
2. **Soy-based formula:** Indications for soy formula include galactosemia and hereditary lactase deficiency, because soy-based formulas are lactose-free; and situations in which a vegetarian diet is preferred.
3. **Hydrolyzed formula:** Protein hydrolysate formulas may be partially hydrolyzed, containing oligopeptides or extensively hydrolyzed.
4. Specialized infant formula
  - Formulas for (premature and low-birth-weight babies)
  - Lactose free formula.
  - Others.

### **Problems associated with formula feeding**

- Risk of cow's milk protein intolerance: Gastrointestinal bleeding, anemia, wheezing, eczema
- Infections:
- Obesity.

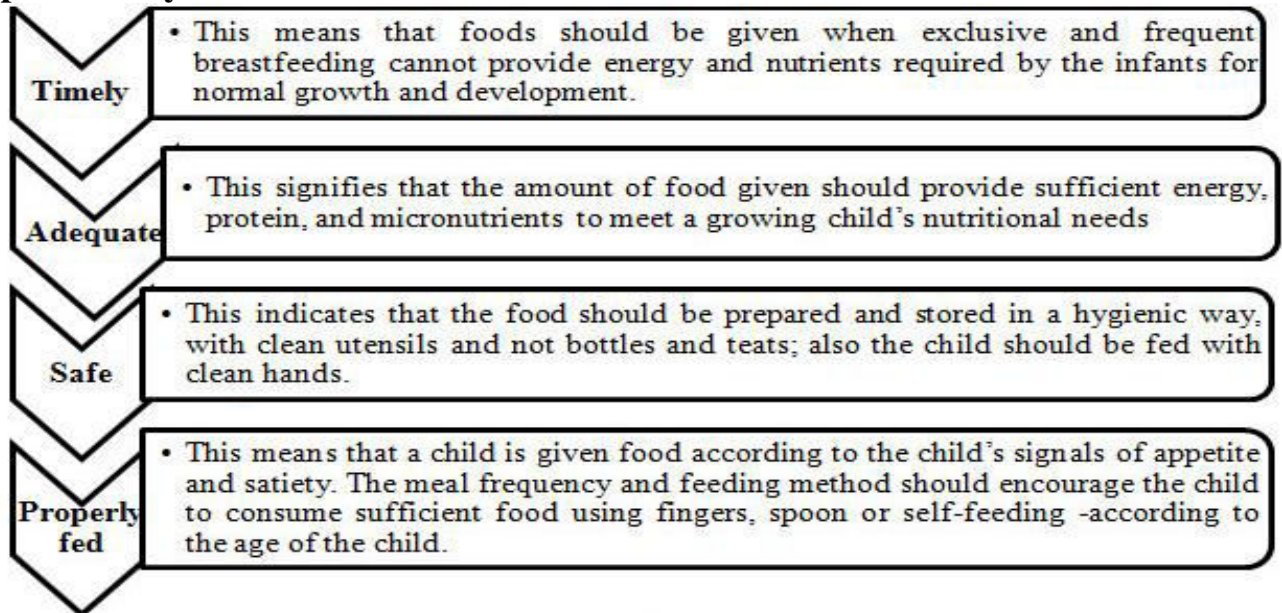
### **Complementary feeding:**

**Weaning** After 6 months of age, breast milk becomes increasingly nutritionally inadequate as a sole feed, as it does not provide sufficient energy, vitamins or iron. Solid foods are recommended to be introduced from around 6 months of age, not before 17 weeks and no later than 26 weeks. This is done gradually, initially with small quantities of pureed fruit, root vegetables or rice. Foods high in salt and sugar should be avoided. The timely introduction of complementary foods (solid and liquid foods other than breast milk or formula, also called weaning foods during infancy is necessary to enable transition from milk feedings to other table foods and is important for nutritional and developmental reasons . The most commonly fed complementary foods between 4 and 11 mo of age are infant cereals. The complementary foods should be varied to ensure adequate macro- and micronutrient intake. In addition to complementary foods introduced at 6 mo of age, continued breastfeeding or the use of infant formula for the entire 1st year of life should be encouraged.

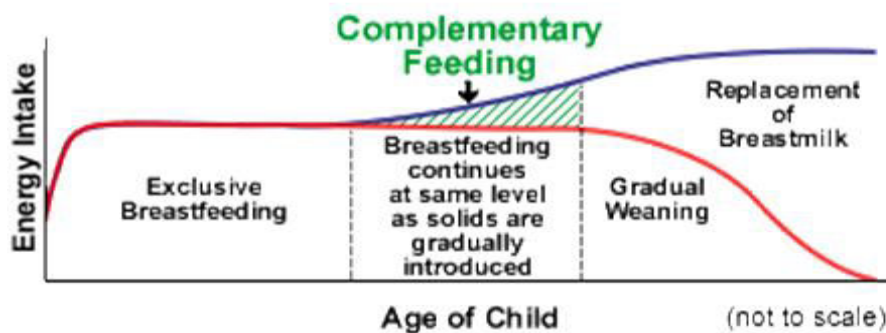
- Begin at 6 mo of age Breast milk should continue to 12 mo
- Introduce 1 food at a time.
- Whole cow milk should not be introduced until 12 mo of age.
- Iron-containing foods (meat, iron-supplemented cereals) are required
- Zinc intake should be encouraged with foods such as meat, dairy products, wheat, and rice
- Phytate intake should be avoided to enhance mineral absorption
- Give no more than 24 oz/day of cow milk.
- Fluids other than breast milk, formula, and water should be discouraged

Give no more than 4-6 oz/day of fruit juices; no sugar sweetened beverages.

**Complementary food should be:**



1<sup>st</sup> 6 months



- Right consistency
- Soft
- Easy to digest
- Inexpensive
- Locally available
- Culturally acceptable
- Easily prepared at home

Calories supplied by breastmilk — (red line)  
 Total calorie intake — (blue line)

## Feeding problems during the 1<sup>st</sup> year of life

- Underfeeding
- Overfeeding
- Regurgitation and vomiting
- Constipation
- Diarrhea stool
- Colic

**Adequate Milk Intake:** It is difficult to know if a baby is getting enough breast milk except by demonstrating normal weight gain through regular weight checks. Insufficient milk intake and dehydration in the infant can become evident within the first week of life. Inadequate milk intake may be caused by *insufficient milk production, failure of established breastfeeding, and health conditions in the infant that prevent proper breast stimulation*. Parents should be counseled that breastfed neonates feed 8-12 times a day with a minimum of 8 times per day.

Direct observation of breastfeeding can help identify the cause.

In formula fed infant the usual intake of formula feed baby is to allow a weight gain of 25-30 g/day will be 140-200 mL/kg/ day in the first 3 months of life. The rate of weight gain declines from 3-12 months of age.

**Adequacy of milk intake** can be assessed by voiding and stooling patterns of the infant. A well-hydrated infant voids six to eight times a day. Each voiding should soak, not merely moisten, a diaper, and urine should be colorless. By 5 to 7 days, loose yellow stools should be passed at least four times a day. Rate of weight gain provides the most objective indicator of adequate milk intake(25-30 g/day)

### Strategies for increasing energy intake

#### Dietary

- Three meals and two snacks each day
- Increase number and variety of foods offered
- Increase energy density of foods (e.g. add cheese, margarine, cream)
- Limit milk intake to 500 ml/day
- Avoid excessive intake of fruit juice and squash

#### Behavioral

- Offer meals at regular times with other family members
- Praise when food is eaten, ignore when not
- Limit mealtime to 30 minutes
- Eat at same time as child
- Avoid mealtime conflict and Never force feed

**Possetting and regurgitation** are terms used to describe the non-forceful return of milk, but differ in degree.

**Possetting** describes the small amounts of milk that often accompany the return of swallowed air (wind) whereas **Regurgitation** describes larger, more frequent

losses. Possetting occurs in nearly all babies from time to time, while regurgitation may indicate the presence of more significant gastroesophageal reflux.

**Vomiting** is the forceful ejection of gastric contents.

Vomiting in infants Common chronic cause is gastro-oesophageal reflux.

- Feed volumes should be calculated as overfeeding is common in bottle-fed infants.
- If transient, with other symptoms, e.g. fever, diarrhea or runny nose and cough, most likely to be gastroenteritis or respiratory tract infection, but consider urine infection, sepsis or meningitis.
- If projectile at 2–8 weeks of age, exclude pyloric stenosis.
- If bile stained, potential emergency – exclude intestinal obstruction, especially intussusception, malrotation and a strangulated inguinal hernia. Assess for dehydration and shock

### **Infant ‘colic’**

The term ‘colic’ is used to describe a common symptom complex that occurs during the first few months of life. Paroxysmal, inconsolable crying or screaming often accompanied by drawing up of the knees and passage of excessive flatus takes place several times a day. The condition occurs in up to 40% of babies. It typically occurs in the first few weeks of life and resolves gradually from 3–12 months of age. The condition is benign but it is very frustrating and worrying for parents. The Diagnosis: exclude any organic cause: cow’s milk protein allergy, gastroesophageal reflex, obstructed inguinal hernia, ...etc. **Fewer than 5% of infants evaluated for excessive crying have an organic etiology.**

**Treatments:** Techniques for calming infants include soothing vocalizations or singing, swaddling, slow rhythmic rocking, walking, white noise, and gentle vibration (e.g., a ride in a car).

**Medications**, including phenobarbital, diphenhydramine, simethicone, dicyclomine, and lactase, are of no benefit in reducing colic and should be avoided. In most circumstances **dietary changes** are not effective in reducing colic but should be considered in certain specific circumstances. There is rationale for change to a non-cow’s milk formula if the infant has signs of cow’s milk protein colitis. If the infant is breastfeeding, the mother can eliminate dairy products from her diet.

Infants who have been tightly swaddled for sleep and rest during the first weeks of life often calm to swaddling during a crying episode; this is not true for infants who have not experienced swaddling before a crying episode.

References:

- Nelson Textbook of Pediatrics , 20<sup>th</sup> edition .
- Nelson essentials Textbook of Pediatrics , 7<sup>th</sup> edition.
- Illustrated textbook of pediatrics.5<sup>th</sup> edition