HME103-Principles of Nutrition

Nutrition by developmental stages (infant)

Lesson Code: HME103-Principles of Nutrition

Instructure: Assoc.Prof. Dr. Elif Feyza TOPDAŞ

atauni.edu.tr Atauni1957

Nutrition in Infants

Which age is considered a baby?

- ✓ The term infant generally refers to a baby from birth to about 1 year of age. The term "infant" may also be used during this period, or "newborn" for young babies up to about 3 months of age.

Nutrition in Infants

Health in infancy is an important indicator of health in later life, and human health is especially structured by ideal nutrition in infancy.

Breastfeeding is the heart of healthy baby nutrition.

Advantages of breast milk:

- ✓ It is suitable for the baby's growth rate in terms of composition and quality.
- ✓ It is easily digested and there is no loss in digestion.
- ✓ It is not allergic.
- ✓ It is economical.
- ✓ It is clean and microbe-free.
- ✓ It does not require any special preparation.
- ✓ It contains protective elements against microbes.
- ✓ Toxic elements that can harm the baby are found at the lowest level in breast milk.
- ✓ It ensures the establishment of a strong attachment between mother and child.
- ✓ It protects the mother's health. The incidence of breast cancer, ovarian cancer, osteoporosis and anemia is reduced in breastfeeding mothers. Breast milk helps the uterus return to its original shape and protects the mother from excessive blood loss.
- ✓ The risk of postpartum depression also decreases with breasfeeding.

Nutrition in Infants

The composition of breast milk is adjusted to meet the baby's needs.

In the first 3-4 days after birth, the amount of milk secreted is less, it is more viscous and its color is dark lemon yellow. This milk is called '**colostrum**'.

Colostrum is very rich in protein. A significant part of these proteins consists of immune cells and antibodies that protect the baby against germs.

Nutrition in Infants

In cases where breast milk is not sufficient or cannot be given, formula milk should be given instead of breast milk until the age of one.

Even though they are prepared by imitating breast milk content, formula milk does not have the chance to offer the advantages of breast milk.

However, when given alone, standard starter milk meets all the nutritional needs of a baby in his first six months.

Nutrition in Infants

- The selected formula milk must be appropriate for the baby's age (formula milk adapted to breast milk for the first 6 months)
- Formula milk used by a baby whose acceptance and growth is good should not be changed without reason.
- Formula milk should be carefully prepared and consumed immediately before feeding.
- Cow's milk-based formula milk, which is the animal milk closest to breast milk, should be preferred first, and special formula milk should not be preferred unless there is a special medical reason.

Formula milk types

- **Formula milk adapted to breast milk (starter milk):** These are formula milks that can be used from birth if breast milk is not available. The whey/casein ratio is 60/40 and the amount of protein is similar to breast milk. Their carbohydrate source is lactose and they do not contain starch.
- **Follow-on formula milk (follow-on milk):** These are milks used for babies aged 6-12 months, with higher protein, iron and mineral content than breast milk.
- **Partially hydrolyzed formula milks:** They are formulas whose proteins are partially broken down using enzymes. These formulas are used in babies at risk of allergies.

- **Soy-based formula milks:** Soy-based formulas are not recommended for healthy baby nutrition unless there is a medical reason. There is no soy-based formula milk in Turkey.
- **Special formula milks:** They are designed to meet the nutritional needs of babies with allergies, diarrhea, reflux, lactose intolerance, malabsorption, liver disease or metabolic disease.

Basic Differences Between Breast Milk, Formula Milk and Cow's Milk

- **Each species' own milk is ideal for its own baby.**

- Although its content is not comparable to breast milk, the ideal food for babies under six months of age whose breast milk is not sufficient (cannot provide appropriate growth for their age) is formula milk adapted to breast milk.

- Formula milk has positive properties that are incomparable to cow's milk in terms of content. Energy, fat, protein contents and osmolarities of formula milk have been tried to be kept as close to the values of breast milk. Similarly, it is supported with the vitamins and minerals that the baby needs.

- Since the whey/casein ratio in breast milk is 60/40, the same ratio was preferred in formula milk adapted to breast milk. Lactose, the main sugar in breast milk, is also present in similar amounts in formula milk.

Basic Differences Between Breast Milk, Formula Milk and Cow's Milk

- The amount of protein in cow's milk is much higher than breast milk and formula milk, and the amount of casein is dominant (whey/casein: 20/80).
- The high and diverse protein content of cow's milk causes it to be allergenic and predispose to autoimmune diseases.
- Casein is a protein that is more difficult to digest and has allergenic properties.
- There are also differences in the structure of casein found in breast milk and cow's milk. Alpha-lactalbumin, a whey-type protein, is twice as much in breast milk as in cow's milk, followed in quantity by iron-binding lactoferrin. Beta lactoglobulin is not found in breast milk, it is found in cow's milk and has high allergenic properties.

- The amount of iron is low in both breast milk and cow's milk, but the bioavailabilty rate is higher in breast milk.

Contents of breast milk and cow's milk (per 100 mL)

	Breast milk	Cow milk
Protein (g)	1.3	3.4
Casein: Whey	40:60	80:20
Whey proteins		
Alpha lactoalbumin	0.42	0.17
Lactoferrin	0.27	trace
Beta-lactoglobulin	-	0.57
Lisosim	0.08	trace
Imminoglobulin A	0.16	0.005
Imminoglobulin G	0.005	0.096
Imminoglobulin M	0.003	0.005

Contents of breast milk and cow's milk (per 100 mL)

	Breast milk	Cow milk
Calcium (mg)	32-36	124
Phosphorus (mg)	14-15	98
Calcium: phosphorus	2.3:1	1.3:1
Sodium (mg)	11-20	52
Potassium (mg)	57-62	15
chlorine	35-55	98
Iron (mcg)	62-93	50

Complementary Nutrition in Infancy

After the first six months, it is not possible for breast milk alone to meet the baby's nutritional needs.

In this period when breast milk alone is no longer sufficient, giving foods other than breast milk along with breast milk to meet nutritional needs is called complementary feeding.

In a healthy complementary feeding practice, five conditions must be met:

1.On time,
2. Good quality,
3. Adequate,
4. Safe,
5. Enjoyable eating

Daily Energy and Protein Requirements

Age	Energy (kcal/kg)	Protein (g/kg)
<3 months	120 (95-145)	2.40
3-6 months	115 (95-145)	1.85
6-9 months	110 (80-135)	1.65
9-12 months	105 (80-135)	1.45
1-2 years	100	1.25
Up to 2 years	100	1.20

Complementary Nutrition Starting Age

The appropriate time to start complementary foods should be around 6 months. Complementary foods should never be started before the 4th month, but should not be delayed until after 6.5 months.

The Concept of Quality Foods and Diversity That Can Be Used in Complementary Nutrition:

Stomach capacity in babies is approximately 30 ml (2 tablespoons) at birth, 180 ml (1 teacup) at 6 months, 240 ml (1 cup) at 1 year of age, and 960 ml (1 jug) in adults.

Generally, stomach volume is accepted as 30 ml/kg.

Compared to an adult, such a small capacity should be used very efficiently and foods with high energy and sufficient protein and micronutrient content should be given to the baby.
It is essential for a successful nutrition that these foods are familiar foods that can be easily accessed and prepared.

The Concept of Quality Foods and Diversity That Can Be Used in Complementary Nutrition:

- Variety is essential for a healthy complementary diet.
- Including animal foods, vegetables-fruits, legumes and grain groups, and dairy products in complementary nutrition in case breast milk decreases, provides diversity.
- Food and Agriculture Organization of the United Nations (FAO) recommends classifying foods into 9 groups;

These:

1-Cereals, roots and tubers
2-Fruits and vegetables rich in vitamin A
3-Other fruits
4-Other vegetables
5-Legumes and hazelnuts-peanuts
6-Meat, chicken and fish
7-Oils
8-Dairy products and
9-Egg.

Dietary diversity can be achieved by consuming foods from at least four of these groups; Consuming 6 or more groups means high diversity.

Foods that babies can take according to their months

periods	Foods
0-6 Months	Breast milk
4-6 Months (If breast milk is not enough)	Breast milk
	Formula milk
	Vegetable soup with grain and oil additives (unsalted)*
	Fruit puree*
6-8 Ay	Breast milk
	Dairy products if breast milk is not enough
	Formula milk, preferably enriched with iron
	Yogurt*
	Pudding prepared with milk, rice pudding*
	Vegetable soup (meat, chicken, cheese)*
	Lentil soup*
	Boiled egg yolk*
	White cheese*
8-12 Ay	In addition to those given in months 6-8
	Boiled whole egg
	legumes
	Crushed pasta, rice, bread
	Meat, chicken, fish, meatballs, vegetable dishes

*If formula milk is not available

Amount of Food to be Used in Complementary Nutrition

The average daily energy required from complementary feeding is 200 kcal in the 6th-8th months, 300 kcal in the 9th-11th months and 550 kcal in the 12th-23rd months.

It is recommended that one gram of complementary foods contain at least 0.8 kcal of energy, preferably 1-1.5 kcal.

For a 6-8 month-old baby who receives complementary food containing approximately 0.8 kcal/g of energy and breast milk, two meals are sufficient, and for a 9-11 month-old baby, three meals are adequate. For 12-24 month-old baby, 1-2 snacks can be added if necessary.

If the amount of breast milk is low, it is supplemented with follow-on milk, but if formula follow-on milk is not available, one more complementary meal can be given.

Since the stomach capacity is considered to be approximately 30 ml/kg, it is important not to exaggerate the amounts in the meal to prevent the development of food rejection and vomiting problems.

Safe Complementary Nutrition:

- Some foods are more allergenic than others, such as eggs, fish, nuts, peanuts and seafood.
- The data showing that not giving or delaying allergenic foods prevents allergy formation is not convincing. On the contrary, it has been shown that delaying these foods (starting after the age of 1) in babies at risk of egg or peanut allergy increases the risk. The most effective method of preventing allergies is exclusive breastfeeding for 4-6 months.
- Tea and herbal teas, sugary drinks, canned foods, ready-made soups, ready-made fruit juices, sugary yoghurts and cheeses, salty and peppery foods are not suitable foods for babies.
- Honey, which can cause infantile botulism, should not be given before the age of one year, and round and hard foods such as nuts, grapes, uncooked carrots, and candy, which can cause choking, should not be given during infancy.
- Salt and sugar should not be added to complementary foods. Sugar consumption (those added to foods and found in fruit juices) should be as little as possible. Beverages containing sugar should be avoided.
- **Foods such as sausages, salami and sucuk containing nitrites have no place in baby nutrition.**

HEALTH PROBLEMS THAT CAUSED BY NUTRITION

Malnutrition in Infancy

Although it is gradually decreasing, malnutrition is still an important problem in babies and children. Healthy nutrition for 0-2 year olds is important in preventing malnutrition.

- ✓ Malnutrition does not only develop due to low intake of macronutrients, micronutrient malnutrition can also be defined as hidden hunger. In our country, micronutrient deficiency is thought to be a more important problem than macronutrient deficiency.

- ❖ **The most common micronutrient deficiency in the world is iron deficiency a**nd for babies under the age of two in our country, this rate varies between 2-46%.
- ❖ Free iron support has been started nationally for all babies between the ages of 4-12 months.
- ❖ **Similarly, vitamin D deficiency was reduced** from 6% to 0.1% after the national vitamin D support program started in 2005.

HEALTH PROBLEMS THAT MAY BE CAUSED BY NUTRITION

Obesity in Infancy

Low birth weight, rapid weight gain in the first two years, and high protein intake are characteristics that increase the risk of obesity in later life.

The risk of obesity decreases inversely with the duration of breastfeeding.

In this context, the easiest preventive measure for obesity is exclusive breastfeeding for the first six months and giving breast milk for as long as possible.