

Nutrition of healthy infants

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Abstract

The daily energy requirement of infants depends on age, sex and body weight. Breastfeeding is the most appropriate way to feed babies in the first 6 months of their lives. According to WHO recommendations, one should aim for exclusive breast-feeding for the first 6 months of your child's life. After 6 months, the baby's diet should be extended, continuing breastfeeding. It is recommended to continue feeding with the mother's milk, according to the WHO, until the second year of life, and according to AAP up to 12 months, with the simultaneous introduction of supplementary foods. When, for various reasons, it is not possible to feed the infant with mother's milk, the products substituting for female milk are used. Infant formula is intended for children under 6 months of age and fully satisfies the nutritional needs of an infant. Complementary Feeding should be started between 17 and 26 weeks of age.

Key words: nutrition, breast-feeding, infant formula, complementary feeding

Nutrition needs

The daily energy requirement of infants depends on age, sex and body weight. For boys in 1 month of age is about 109, and girls about 103 kcal/kg body weight. Once with age, the caloric needs decrease and amount to 79 kcal/kg body weight for boys and 77 kcal/kg for girls in 11-12 months of life. The supply of protein in the first year of life should meet the needs calculated at 1.77 g/kg daily in 1-2 month of life and 1.14 g/kg body weight daily in 11-12 months of life. The energy from fat should account for 50-55% in the first half of the year and drop to 40% of energy in the second half of life. The supply of unsaturated fatty acids, which are precursors of long chain polyunsaturated fatty acids (LCPUFA), which are part of cell membranes, mainly nerve and retinal cells, is important. Carbohydrates should account for 40-45% of energy value in the first half-year and 50-55% in the second half-year of life. [1]

Breast-feeding

Breastfeeding is the most appropriate way to feed babies in the first 6 months of their lives. According to WHO recommendations, one should aim for exclusive breast-feeding for the first 6 months of your child's life. This means, that this is not recommended to give your child other drinks, water, juices, dairy mixtures, only drugs or vitamins if necessary. After 6 months, the baby's diet should be extended, continuing breastfeeding. It is recommended to continue feeding with the mother's milk, according to the WHO, until the second year of life, and according to AAP up to 12 months, with the simultaneous introduction of supplementary foods. There is no upper age limit for when breast-feeding should be ended. However, it should be remembered that long-term and late breastfeeding is a risk factor for early childhood caries - but infant formula (even without saccharose) is more cariogenic than breast milk. [1,2,3,12,13]

The mother's milk is rich in many valuable substances, including lactoferrin, oligosaccharides, IgA antibodies, enzymes, hormones and growth factors. Benefits for a child resulting from breastfeeding include, among others: a less frequent occurrence and a milder course of infectious diseases such as eg otitis media, respiratory tract, meningitis. A significant 50% reduction in the incidence of gastrointestinal infections has been proven and an 80-90% reduction in the risk of death for this reason. It probably also reduces the risk of SIDS and type 1 and type 2 diabetes, as well as lymphoma and leukemia and malocclusion. Breastfeeding also benefits the mother: it reduces the risk of breast cancer and ovarian cancer, reduces the risk of postpartum bleeding, accelerates the process of uterine involution, and helps return to pre-pregnancy weight. [1,2,3,9,10,11]

An absolute contraindication on the part of the child for breastfeeding are only classic galactosemia and inborn lactase deficiency. Other contraindications (cleft palate, severe condition of the child, etc.) are relative and often disappear, but it is recommended to administer withdrawn mother's milk in these situations. [2,3]

Contraindications from the mother are: HIV infection, HTLV-1 and HTLV-2 infection, active untreated tuberculosis, severe clinical condition of the mother, mother's treatment with some medicines, mental illness preventing feeding. It is worth noting that contraindications are not: infectious disease in the mother, hepatitis B and C in the mother, silicone breast implants, mastitis, herpes (if doesn't affect breast). [2,3,11]

For a child who is exclusively breastfed, supplementation should be supplemented with vitamin D at a dose of 400 IU/day in the first half-year of life, and 400-600 IU/day in the second half-year of life. In Poland, supplementation with vitamin K is not recommended (except for a single intramuscular dose given after delivery). There are also no recommendations to commonly supplement iron in healthy, time-born infants. [1,2,3]

Infant formula and follow on formula

When, for various reasons, it is not possible to feed the infant with mother's milk, the products substituting for female milk are used - infant formula and follow on formula. Infant formula is intended for children under 6 months of age and fully satisfies the nutritional needs of an infant, it can also be used in older infants. Follow on formula can be used from the age of 6 months and its composition is suitable for children who are also fed with other foods. [1,4]

Infant formula and follow on formula are produced (after being subjected to appropriate qualitative and quantitative modifications) most often from cow's milk, but you can also get products

from goat's milk and derived from soy protein. The composition and nutritional values of dairy products for infants in the European Union are legally regulated by the Commission Directive of 23 October 2006 on infant formulae and follow-on formulae. Manufacturers have the possibility to introduce minor modifications to the composition of dairy products provided that safety is proven by appropriate scientific research. [1,5]

When preparing an infant formula, follow the instructions of the manufacturer. However, the general rules apply:

- always prepare a portion immediately before feeding
- do not store leftovers of food after a meal and do not use it for the next feeding
- do not store water-diluted formulae in thermos and heaters
- infant formulae should be prepared on the basis of boiled and cooled water, it is allowed to use bottled water provided it is still water and comes from a factory closed bottle. [1, 12]

Complementary Feeding

The introduction of supplementary products according to ESPGHAN and EFSA should be started between 17 and 26 weeks of age. It was determined that this is the age at which both the gastrointestinal tract and the kidneys are sufficiently mature, to metabolize nutrient from complementary feeding, and motor skills are so developed that infant can safely handle solid food. In addition, between 4 and 6 months of life, there is so “a window of acceptance of new flavors”, i.e. there is a good chance that the taste first known in this period of life will be immediately accepted [1,6,10]

Complementary feeding is necessary because of the increased demand for protein, iron, zinc, vitamins, micronutrients and calories. It is necessary to gradually replace milk meals, so that at the end of the first year of life they constitute 2-3 meals a day. It is recommended to gradually introduce new foods and observe the child's reaction. You should not introduce several new products at the same time, especially at the beginning of the diet. [1,6,7]

According to the WHO, partially breastfed babies should receive 6-8 m 2-3 complementary meals, and in 9-24 m.ž. 3-4 complementary meals and 1-2 healthy snacks. Artificially fed infants should receive 4-5 meals and 1-2 healthy snacks throughout the day. As a snack, vegetables, fruit and bread are recommended. It is important for parents to be able to observe symptoms of hunger and fullness in children. A frequent mistake is overfeeding children, not responding to signs of satiety, which leads to disorders of self-regulation of hunger and satiety and, consequently, obesity. [7,8,10,13]

There is no imposed sequence of introducing new foods, but it should be remembered that the first two years of life are crucial in shaping dietary preferences. It is recommended to start expanding the diet from the introduction of vegetables, because they are difficult to accept by the babies, and only after about 2 weeks to introduce fruits into the diet. It should be remembered that the acceptance of a given food is affected by repeatability, so it is worth trying to give the product to the child several times before giving it up, because of the child's failure to accept it. According to ESPGHAN, gluten should be introduced into the child's diet between 4 and 7 months of age. Chicken egg is a source of fat, iron, B vitamins and should be introduced like other products, do not delay the introduction of the egg into the diet, but do not give the egg in raw form.

Also, meat, due to its high content of iron, zinc, protein and vitamins, should be early introduced in infant diet. Recommended meat for babies are poultry - turkey, duck, goose, and beef, lamb and rabbit. Cow's milk should not be the main drink until 12 months of age, and after 1 year of age, daily intake should not exceed 500 ml per day. Goat milk and sheep milk should not be given to infants due to the very high concentration of mineral salts and low content of vitamins. Do not use salt or sugar in the preparation of infant meals, avoid salty foods as well as foods sweetened with sugar or sugar-based syrups. It helps to shape correct dietary preferences, as well as reduces the risk of obesity, caries and hypertension in adulthood. Honey is another product not recommended for infants. It may contain the spores of *Clostridium botulinum* causing infant botulism. It is safe for older children. [1,4,6,10,13]

An important aspect is also the right selection of water for babies. Served water should be low-mineralized and low-sodium or spring water. Tap water can be given to infants under proper preparation, including: draining a stream of cold water for 2 minutes, collecting the right amount of water, boiling and leaving in the cooking phase for 1-2 minutes and cooling. It is not recommended to

give babies well water due to the risk of contamination, among others nitrates (V) and (III). It is inadvisable to give juices, sweet and fizzy drinks to the child, they bring with them not only additional unnecessary calories, but also contribute significantly to the development of caries. The amount of juice administered during the day should be limited and do not exceed 150 ml per day. Avoid juice administration during sleep and at night, and between meals, it is allowed to consume juices only during a meal. [12,13].

Conclusion

Adequate nutrition of infants is one of the factors affecting their proper development. With the advancement of science, there are new recommendations for the correct diet of infants. It is important for the young generation of parents to be up to date, what to give and what to avoid when feeding infants, and consciously decided on the child's diet.

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