

**MODERN PRINCIPLES OF INTRODUCING COMPLEMENTARY FOODS TO CHILDREN UNDER 1 YEAR OF AGE WITH NATURAL, ARTIFICIAL AND MIXED FEEDING**

**Alikulova Muxabbat Mannonovna**

Xudaykulov Shoxruxmirzo Otabekovich

Karshi State University

**Annotation:** According to the World Health Organization, complementary feeding is the feeding of liquids and foods to infants in addition to natural, artificial or mixed feeding. The purpose of expanding the children's diet is saturation the baby and creates conditions for his growth and full development. The article presents the principles and general rules for introducing the first complementary foods to a child, as well as the advantages and disadvantages of pediatric and pedagogical types of complementary foods. The author also highlighted the general rules for the introduction of complementary foods to children in the first year of life.

**Keywords:** First complementary food, breast milk, infant diet, natural feeding, artificial feeding, mixed feeding, pedagogical complementary food, pediatric complementary food, vegetable and fruit puree.

Modern principles of complementary foods for infants under 1 year of age are a unique combination of practical experience and the latest scientific developments. They are based on the recommendations of the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN), the American Academy of Pediatrics (AAP) and national recommendations from specialized ministries and associations [1].

Modern recommendations are based on the analysis of the results of many studies on the composition and timing of complementary foods for healthy full-term newborns, taking into account various aspects of complementary food introduction and its impact on physical and mental development indicators. [3]. Timely introduction of complementary foods contributes to the optimal development of all body systems and organs, physical parameters, psychomotor development, and nervous system activity. The period of introducing complementary foods is very important for the growth and development of the child, and it is also an outstanding stage in the transition from breastfeeding to feeding from the general table [4].

Developing separate recommendations for introducing complementary foods for breastfed and formula-fed infants is not advisable, as the approaches are the same in both cases. Mother's breast milk remains the "gold standard" of infant nutrition from birth, and continued breastfeeding is essential when introducing complementary foods, as this reduces the risk of gastrointestinal and respiratory infections, as well as hospitalization in infants.

Formula milk - breast milk substitutes are prescribed in the presence of contraindications to breastfeeding or insufficient milk from the mother, and when introducing complementary foods, it is necessary to continue artificial or mixed feeding.

Complementary foods should be introduced to the child no earlier than the end of the 4th month and no later than the 6th month.

The introduction of the first complementary food should be started when the child's weight has increased sufficiently, on average doubling the child's weight from birth. Complementary foods can be introduced to premature babies if the baby's weight has increased 2.5 times. It is important to continue breastfeeding alongside the introduction of complementary foods, as this reduces the risk of gastrointestinal and respiratory infections, as well as cases of hospitalization in the child. With age, when introducing complementary foods, it is necessary to offer the child food that is diverse in consistency, texture, taste, and smell. A mother who eats a healthy diet can provide all the nutrients, vitamins, and minerals her baby needs through exclusive breastfeeding for up to 6 months of age. Sugar or salt should not be added to complementary foods, and the child should avoid consuming sweetened drinks and juices. Sweet drinks are liked by children in the first few months, but if they are not given after 6 months, children no longer like them very much. Sugar affects future eating behavior. Whole cow's milk is not recommended for infants under 1 year of age. The consumption of cow's milk is associated with the intake of an increased amount of energy, protein, fats, and lower amounts of iron. Therefore, children who consumed large amounts of cow's milk in early life were at higher risk of developing iron deficiency anemia.

**General rules for introducing complementary foods to infants in the first year of life:**

- ✓ it is better to introduce the first complementary food during the morning feeding from 9 to 11 am to monitor the child's reaction to the new product;
- ✓ give the first complementary food to your baby when they are calm and not tired;
- ✓ complementary foods are given at the beginning of feeding, and then the baby is supplemented with milk nutrition;
- ✓ without adding sugar and salt;
- ✓ give the first complementary food to your baby when they are calm and not tired;
- ✓ start with 0.5-2 teaspoons, and if the baby refuses, do not insist, try to give it later or the next day;
- ✓ if the reaction is normal - no rash, skin changes, or stool changes, you should double the dose the next day. Gradually, you need to bring the baby's first feeding to the age norm of 80-200 g;
- ✓ if an allergic reaction or other intolerance reaction occurs, you should stop introducing this complementary food for three days. If there is an unwanted reaction again, do not give this product and consult a pediatrician;
- ✓ each subsequent new complementary food product should be single-component;
- ✓ a dish made from mixed products can be given when the child has already been introduced to all the products separately.
- ✓ do not introduce a new product into the diet 1 week before and 1 week after the next routine vaccination;
- ✓ the child should be healthy. Complementary foods should not be introduced during acute illnesses, during trips, relocations, on the eve of vaccination or immediately after it for 3-5 days;
- ✓ never introduce two products at once, as if the baby has an allergy, it will be impossible to determine what exactly it is;
- ✓ complementary foods should be given warm and from a spoon;
- ✓ introducing complementary foods to infants on formula feeding does not differ from introducing them to breastfed babies.

There are two main complementary feeding schemes: pediatric (classical or traditional) and pedagogical.

**Pediatric complementary feeding** - This is the gradual introduction of new food products to a child according to a specific scheme. Complementary feeding products should have a uniform consistency, not contain individual pieces of food, and have an adequate structure for consumption. They can be prepared independently or specialized industrial-grade children's products can be used (so-called jar food). After the child has been given complementary foods, it is recommended to breastfeed.

**Pedagogical complementary feeding** - This is the introduction of complementary foods when the child begins to show interest in the food that the parents eat.

The child is given the food they ask for, in microdoses, in pieces, not introduced according to a scheme, and not rubbed into puree. As a result, the child gradually tries all the products and begins to get used to the products that are eaten in the family. And then it is easy to switch to the common table.[5]. Breast milk remains the main food for the child. The goal of pedagogical complementary feeding is not to feed the child, but to introduce them to different foods.

In a study conducted by a family doctor, the advantages and disadvantages of both pediatric and pedagogical complementary feeding were studied. Under observation were 102 children under 1 year of age, 57 girls and 45 boys. All children received an Apgar score of 7-9 at birth and received vaccinations according to the calendar schedule. 28 children (15 boys and 13 girls) were breastfed, 33 children (14 boys and 19 girls) were bottle-fed, and 41 children (16 boys and 25 girls) were mixed-fed.

Mothers of children were provided with detailed information on the principles of introducing complementary foods, and they were also trained in the rules of introducing early complementary foods into the child's diet. During home visits, the doctor and the visiting nurse observed the children's physical and mental development, measured the anthropometric indicators of each child, and provided consultations to mothers on pediatric and pedagogical complementary feeding of children.

Based on the data obtained, we have identified the advantages and disadvantages of both pediatric and pedagogical complementary feeding.

Advantages	
Pediatric complementary feeding	Pedagogical complementary feeding
<ul style="list-style-type: none"> <li>✓ more clear and understandable guide, which reassures, if the mother is worried, whether she is doing everything right;</li> <li>✓ it is possible to gradually replace breastfeeding with complementary foods if the mother does not plan to breastfeed for an extended period;</li> <li>✓ reduced risk and earlier detection of allergic reactions, while the cause can be easily identified due to the introduction of homogeneous foods;</li> <li>✓ reduced risk of gastrointestinal (GI) disorders;</li> <li>✓ food is better adapted (purees, porridge, finely ground);</li> <li>✓ if the food is prepared by the mother, then it will certainly be fresh and natural;</li> <li>✓ if the food is canned, it saves time, all the preparation is just opening a can;</li> <li>✓ the child receives the exact amount of vitamins and nutrients, which reassures the mother.</li> </ul>	<ul style="list-style-type: none"> <li>✓ breastfeeding continues to play a significant role in the relationship between mother and child;</li> <li>✓ shapes proper eating habits;</li> <li>✓ there's no need to cook separately, the child eats what the mother eats;</li> <li>✓ the child gradually learns table manners and becomes familiar with family traditions;</li> <li>✓ the child learns to chew, and their digestive system gradually gets used to new foods;</li> <li>✓ the opportunity to try different foods in small amounts helps the baby get used to eating a variety of foods;</li> <li>✓ a food interest is established;</li> <li>✓ children almost never have problems with their appetite;</li> <li>✓ the child can grab a piece of food with their hand, developing their motor skills and a sense of self-confidence;</li> <li>✓ the child is preparing for kindergarten;</li> <li>✓ reduces financial expenses on the purchase of baby food.</li> </ul>



Disadvantages	
Pediatric complementary feeding	Pedagogical complementary feeding
<ul style="list-style-type: none"> <li>✓ feeding the child separately from other family members does not establish proper eating habits and table manners;</li> <li>✓ there are two options for feeding a child: preparing food separately, which requires additional dishes and time, or purchasing ready-made puree;</li> <li>✓ children often become accustomed to pureed food, making it more difficult for them to transition to the family table;</li> <li>✓ pureed food can lead to sluggishness of the digestive tract and the development of chronic diseases;</li> <li>✓ the child may prefer food over breast milk (relevant if the mother planned to breastfeed for a long time);</li> <li>✓ some children may refuse such food on their own, because they are much more interested in the contents of their parents' plates;</li> <li>✓ feeding a child against their will and at set times can lead to a loss of appetite;</li> <li>✓ a child may develop chewing and swallowing skills later than expected if they are primarily fed liquid puree;</li> <li>✓ a child experiences 'food violence' when they are forced to eat a certain amount of food at a certain time.</li> </ul>	<ul style="list-style-type: none"> <li>✓ breastfed babies are more suitable for the following compared to formula-fed babies;</li> <li>✓ the likelihood of developing allergies or intestinal reactions is more difficult to pinpoint in breastfed babies compared to formula-fed babies;</li> <li>✓ there is a risk that the baby will choke, so you need to watch them closely. Some babies choke for a long time before they learn to chew;</li> <li>✓ the family should follow healthy eating principles. Food should be free of spices, sugar, and salt, and safe for the child;</li> <li>✓ this complementary feeding approach is suitable for a family that practices a healthy diet and avoids harmful foods for children;</li> <li>✓ there are no set norms or deadlines for introducing solid foods;</li> <li>✓ children are allowed to behave at the table within the framework of age-appropriate behavior, which requires maintaining cleanliness;</li> </ul>

Signs of a baby's readiness for solid foods include: extinction of the tongue-thrust reflex with a well-coordinated swallowing reflex, readiness to chew, teething (either occurred or ongoing), ability to sit upright or with minimal support, ability to express emotions and gestures related to food, maturity of gastrointestinal tract functions.

Solid foods should be introduced towards the end of the fourth month of life. By four months of age, a baby's gastrointestinal tract becomes more mature: the increased permeability of the small intestinal mucosa decreases, a number of digestive enzymes mature, and a sufficient level of local immunity is formed [2].

The child acquires the ability to swallow semi-liquid and thicker food, associated with the extinction of the "tongue-pushing reflex." At the same time, it should be remembered that at 4 months of age, breast milk or formula is quite enough for a child's full development. It is important to continue breastfeeding, artificial or mixed feeding in parallel with the introduction of complementary foods. Complementary foods at 4 months of age are usually a single-component vegetable or fruit puree. If the child does not gain weight well enough, it can be gluten-free cereals: rice and buckwheat. It is better to start with vegetable puree. If a child tries a sweeter fruit puree, they may refuse vegetables for a long time, and the mother may have difficulties introducing this very useful dish.

Delay in introducing complementary foods after 6 months can lead to a deficiency of nutrients that are necessary for the full growth and development of the infant. According to some studies, children who were fed only breast milk for the first 6 months of life may already show signs of iron deficiency by 9 months. And also, untimely introduction of complementary foods leads to a slowdown in the maturation of the gastrointestinal tract. The later a baby is introduced to new food, the more difficult the adaptation may be, since the child's body will have less time to get used to new products. As a result, the load on the intestinal immune system will increase.

In addition, due to the untimely introduction of additional food, children often have problems with chewing or swallowing a thick food lump.

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