POLTAVA STATE MEDICAL UNIVERSITY

THE NATURAL FEEDING. BENEFITS OF BREASTFEEDING. VALUE AND ADVANTAGES OF BREASTFEEDING. METHODS OF CALCULATION OF DAILY VOLUME OF FOOD AND REGIME OF NUTRITION. WEANING FOOD.

Lecture 3

Assoc. professor HALYNA SOLOVIOVA

Plan of the lecture

* 1. Benefits of breast feeding (BF).
* 2. Advantages of breastfeeding for mother.
* 3. Types of breastfeeding.
* 4. 12 principles of breastfeeding support.
* 5. The content of food ingredients in breast milk.
* 6. Contraindications to GV. Difficulties in GV.
* 7. Methods of calculating the volume of food.
* 8. Rules of introduction of supplementary food.
* 9. Recommended program of introduction of products and food supplements.
* 10 The need of children of the 1st year in food ingredients
*

Benefits of breast feeding

Breast feeding is «the gold standard» of feeding

- It's a natural postnatal equivalent of connection with mother during the intra-uterine period.
- The mother's milk is close to amniotic water. Amniotrophic feeding of a fetus is 5ml/kg/hour since 16 weeks. By the end of pregnancy fetus swallows about 400 ml of amniotic water a day
- The child is adapted for mother's milk during the evolution. There are more than 30 enzymes in human milk.
- Genetic program in different mammals is not the same. For the calf fast increase of muscular mass and skeletal system provides its ability of independent movement. For the child his psychological development is more important

Advantages of breast feeding

- Breast- fed infants have intestinal infections 3 times less often and respiratory diseases 2 times less often. Immunological protection is provided with the following factors:
  - antibodies of classes A, M, G, D, especially secretor Ig A. (For the majority of immunoglobulins placenta is impenetrable, except for Ig G)
  - nonspecific factors of protection – lysozyme, properdin, complement, lactoferrine
  - macrophages and lymphocytes
  - the bifid-factor – the carbohydrate, which is necessary for vital activity of the bifid-flora
  - factor of resistance to the parenteral infections, providing a high level of protection against staphylococcal infections
- The highest concentration of immunological protection factors is in colostrum.

Advantages of breastfeeding

* In mother's milk all basic components, including proteins, are absolutely not allergenic
* With breast milk the child receives thyroid hormones, that also promotes development and maturing of CNS and immunity
* The breast-fed infant has very strong associative connection with mother. These sensations are the basis of the relation to mother and his future parent behavior

Advantages of breastfeeding for mother :

* endocrine mechanisms of contraction of an uterus, separation of placenta and prophylaxis of bleedings due to a stimulation of production of oxytocin
* decrease of risk of oncology diseases
* decrease of risk of postnatal alienations
* formation of maternal behavior
* comfort for mother and child since breast milk is always clean, warm and ready to the use
* lactation provides contraceptive effect

12 principles of successful breast feeding

- 1. Presents of written declaration of general politics of breast feeding and medical personnel should follow it
- 2. Medical personnel should have necessary skills for realization practice of breast feeding
- 3. All pregnant should be inform about advantages and technique of breast feeding
- 4. Mother should begin breast feeding during first 30 minutes after delivery. Early applying to a breast is necessary, since searching and sucking reflexes are most expressed, and sensitivity of nipples to a tactile stimulation is the best.
- 5. Lactation in mothers should be support if they are temporarily separated from their children

10 principles of successful breast feeding

- 6. Do not give newborns any other food or drink, except for mother's milk, without medical indications
- 7. Around-the-clock presence of mother and newborn in one ward
- 8. Breast-feeding by newborn's request, not on the schedule, including night time. It is especially important in the first 3-4 weeks of life. Maximal secretion of prolactin and oxytocin is at night, newborn is not adapted for long breaks in entering of nutrients since during the intrauterine period they entered constantly
- 9. Newborns on breast feeding should not receive any artificial means, imitating mother's breast, including the dummy and pacifier
- 10. Creation the groups of support of BF

Terminology

* BF
  * exclusive
  * almost exclusive (juices, water less than 30 ml / day)
* Partial BF
  * high level – 80 and > % of nutrition is mother's milk
  * medium level – 79-20 %
  * low level – mother's milk is less than 20 % of volume
* Symbolical breast feeding – the child is put to a breast, but he is fed from the bottle

Contraindications to early applying to a breast

* from mother's side:
  * operative measures during delivery. After Cesarean section the child may be put to a breast in 6 hours
  * decompensation of chronic somatic diseases
  * HIV infection, lues
  * tuberculosis in mother - the child should be vaccinated and separated from mother on 1,5-2 months
  * treatment by cytostatics, thyroid hormones
  * acute mental diseases in mother

Contraindications to early applying to a breast

* From the child's side:
  * serious birth trauma with violation of cerebral circulation
  * deep prematurity
  * asphyxia and respiratory distress syndrome
  * the serious form of newborn's hemolytic disease in the first 7 days
  * congenital anomalies with violation of vital functions

The contents of alimentary components in human milk, g/l

	Proteins	Lipids	Carbo-hydrates	Kcal/l
Colostrum *	80-110	28-41	40-53	1500
Transitive milk	14-23	29-44	57-66	800
Mature human milk	**12**	**35**	**70**	**700**
Cow's milk	**33**	**35**	**47**	**650**

Proteins of human milk

* Include casein and 18 serum proteins - albumins and globulins.
* Ratio of serum proteins and casein is 4:1.
* Optimal propotion of amino acids. The unique substance – taurine accelerates myelinization of nerve fiber, improves absorption of lipids.
* Proteins of human milk are highly disperse, therefore they are well assimilated.
* There is high activity of proteolytic enzymes in human milk.

Lipids of human milk

* are submitted mainly by triglycerides (98 %), and also phospholipids and fat acids.
* In human milk nonsaturated fat acids – linoleic, linolenic, arachidonic prevail.
* Lipids of human milk are highly disperse. Milk contains enzyme lipase.

Carbohydrates are submitted mainly by beta-lactose which stimulates grows of an acidophilic microflora of an intestine.

Feeding schedule

* First month: free feeding schedule, 8-10 times a day without a night breaks. Then the child develops the certain schedule:
  * 1 - 3 months - 7 times a day in 3 hours with 6-hours night interval
  * 3 - 5 months - 6 times a day in 3,5 hours with 6.5-hours interval at night
  * 5 – 18 months – 5 times a day in 4 hours with 8-hours night interval

Methods of calculation of volume of feeding

* During the first 10 days Zaitseva's formula can be used:

The daily volume = 2 % of initial mass, multiplied on age in days

* From 10th to 14th day the volume of nutrition does not change. After 2 weeks one can use a volumetric or caloric method.

Volumetric method.

* The requirement of nutrition makes:
  * 2 - 6 weeks – 1/5 M (mass of body)
  * 6 weeks – 4 months-1/6 M
  * 4-6 months – 1/7 M, but no more than 1 liter
  * 6 month - one year –1 liter

Caloric method

- first 3 months - 120 kcal / kg
- 4-6 months - 115 kcal / kg
- 7-9 month - 110 kcal / kg
- 10-12 month - 100 kcal / kg.

* 1 liter of human milk contents 700 kcal

PHYSIOLOGICAL REQUIREMENTS OF NUTRITION COMPONENTS IN CHILDREN ON BF, G/KG

* Proteins – 2-2.5 before weaning (6 months),
  2.5-3.0 - after it
* Lipids – 6-6.5 in the 1st semester, 5.5-6 in the 2nd semester
* Carbohydrates – 12-14 during 1st year

BREAST FEEDING

* The child till 6 months should receive breast milk only; physiological need for additional liquid: water, tea, juice, broths is absent. Breast milk contains 90% of water. Introduction of an additional liquid raises risk of intestinal infections and reduces requirement for breast milk and duration of feeding.
* In home conditions, as well as in a maternity hospital, it is necessary to keep to a mode of free feeding, to feed, when the child has got hungry. Thus the child turns to mother, makes search movements, sucks fists. Crying of the child is not always an attribute of hunger.

ESTIMATION OF BREAST FEEDING:

* correct applying to a breast
* efficiency of sucking
* physical development of child

CORRECT APPLYING TO A BREAST

* child's head and body are in one plane
* mother supports whole body of the child from below, not just a head and shoulders
* the child's body is pressed to mother, the face is turn to mother's breast, a nose is in front of nipple
* mother supports her breast by 2 fingers, a second finger is from below, first – from above
* in the beginning mother touches by nipple to the child's lips, waits, when he will widely open a mouth, then quickly brings the child to a breast so that he take nipple with whole areola

PHYSICAL DEVELOPMENT

* By the moment of a birth the weight of a body achieves 3000 – 4000 g.
* Average weight of body of boys is 3200-3600 g, girls – 3100-3400 g.
* Within the first 3-4 days of life reduction of initial weight of body (so-called physiological loss of weight) is observed. The maximal reduction of weight of body is marked for 3 day of life of the child and averages 6-8 % from initial weight. Reduction of initial weight of a body more than 10% is considered pathological, indicating on presence of disease or infringement of care.

PHYSICAL DEVELOPMENT

Increases of weight of a body during the first year of life

* For the first month of life the child adds on the average 600 g, for the second and the third on 800 g, for the fourth – 750 g and then each next month on 50 g less, than previous.
* By 4.5 months the weight of a body is doubled. Weight of body in 6 months approximately 8200 g
* By one year the weight of body of the child achieves 10 kg, i.e. the initial weight of body is approximately tripled.

SIGNS OF LACK OF BREAST MILK

* the increase of weight is less than 500 g in a month during first 6 month
* quantity of urination is less than 6 times a day, urine is concentrated
* At revealing deviations in physical development the estimation of breast feeding is repeated not later than 2 days after previous.

IF THE CHILD RECEIVES INSUFFICIENT QUANTITY OF MILK, DOCTOR RECOMMENDS MOTHER FOLLOWING:

* To increase quantity of feedings up to 8-10
* To keep to principles of free feeding and to feed the child at night
* To learn to put the child to a breast correctly
* If the child receives additional drinks or products, gradually to reduce their amount and then completely to refuse of them
* To refuse of dummies
* A full value meal of mother

LACTATION CRISIS

* Lactation crisis is possible each 1.5-2 months, proceed 3-4 days and have reversible current. During this time mother needs of emotional support and rest. At presence in mother respiratory disease breast feeding is necessary continue.

FEEDING OF CHILDREN OF 6-12 MONTHS

* Breast milk in 6 months cannot satisfy requirement in calories, microelements, first of all, in iron, any more, therefore expansion of a diet and introduction of weaning is a necessary
* **Weaning** is a food, which is entered in a diet of the first year old child, besides of breast milk (or besides of formula at artificial feeding).
* **Supplementary feeding** is introduction of artificial formula besides of BM

READINESS OF THE CHILD FOR INTRODUCTION OF WEANING

* Child holds a head
* independently sits in a chair for feeding
* turns away from the spoon if he is not hungry
* closes a mouth with the spoon, keeps the food in a mouth, and then swallows it, does not push out or spit out the food.

RULES OF CONDUCTING OF WEANING

* Be convinced of readiness of the child for introduction of weaning
* Give the weaning, when the child is active and hungry, it is better during a breakfast or a dinner with other members of family
* Give the weaning after short feeding by a breast or an artificial formula
* Child sits on mother's arms or in a special chair during feeding
* Give the weaning from the spoon. A small amount of wining put on the end of the spoon. Hold the spoon so that the child can see it. touch by the spoon to child's lips, leave a little food on his lips. When the child will open a mouth, put the spoon with a food on the middle of tongue

RULES OF CONDUCTING OF WEANING

* Weaning food can be diluted by breast milk
* Weaning should be fresh-prepared and have a homogeneous consistence
* Do not add salt, sugar, spice to weaning food
* Do not give undiluted cow's milk till 9 months
* Rich of iron products are necessary from 6 months
* Any kinds of tea or coffee is not recommended before 2 years since they prevent absorption of iron
* Teach the child to drink from a cup after 6 months

PRODUCTS OF WEANING

* Milk porridge. Start from one cereal which is not containing gluten, with the increased contents of iron (buckwheat, rice). It is possible to dilute gruels by breast milk, artificial formulas or the diluted cow's milk (70 ml of water, 130 ml boiled cow's or goat's milk, 1 teaspoon of sugar). Gruels can be mixed with vegetables or fruit but only after they have been entered separately
* Meat. Veal, turkey meat, chicken, rabbit, low-fat pork, in the beginning like puree (6,5 month), then a soufflé, meatballs, steam cutlets. A fish since 8 months, an egg yolk since 7 months.

PRODUCTS OF WEANING

* Vegetables and fruit. In the beginning vegetables, and then fruit. To start with 1 kind of vegetables (vegetable marrows, pumpkin, cabbage, bush pumpkins) or fruit (apples, peaches, apricots, plums). Vegetable or fruit puree can be given no more than 2 weeks separately, then with meat, cottage cheese, a yolk. It is possible to give fresh vegetables and fruit. Juices should be given after introduction of other products of weaning. Do not dilute juices by water and do not add sugar.
* Milk products. Cottage cheese since 6 months. Undiluted cow's milk only after 9-12 months. Sour-milk products since 9 months.

THE ROUGH CIRCUIT OF INTRODUCTION OF WEANING FOOD

* Juice fruit - since 5 months from 30 ml up to 100 ml by 1 year
* Fruit puree since 5.5 months from 40 ml up to 90-100 ml
* Vegetable puree, milk buckwheat or rice porridge since 6-7 months: 50-100 ml, 180-200 ml in 1 year
* Gluten milk porridge (semolina, oatmeal) since 7-8 months
* Sour-milk products since 8-9 months from 50-100 ml up to 200 ml
* Cottage cheese since 6.5-7.5 months from 5 g up to 50 g by one year
* Egg yolk since 7-7.5 months from 1/8 up to ½ by one year
* Meat since 6.5-7 months from 30 g up to 60 g

THE ROUGH CIRCUIT OF INTRODUCTION OF WEANING FOOD

* Fish since 8-10 months from 10 g up to 60 g
* Vegetable oil since 6 months from ½ up to 1 teaspoon
* Butter since 6-7 months from ½ up to 1 teaspoon
* White bread since 8-9 months 5-10 g
* Since 9 months – fine slices of weaning food which the child can take: cracker, bread, biscuit.
* Till 2 years milk of 3.2 % fatness is used, after 2 years is possible with the reduced contents of fat

PHYSIOLOGICAL REQUIREMENT OF THE CHILD OF THE FIRST YEAR OF LIFE FOR THE BASIC NUTRITION COMPONENTS, G/KG

Breast feeding (and highly adapted formulas)

* Proteins – 2-2.5 before weaning, 2.5-3.0 after it
* Fats – 1 semester: 6-6.5, 2 semester: 5.5-6
* Carbohydrates – 12-14
* Calories – 120 kcal / kg in the first quarter of year, 115 – in the second, 110 in a third, 100 – in the fourth.

Thank you for your attention!

Literature, was used in the lecture

* 1.Nelson Textbook of Pediatrics: 21th edition / Klegman S, Geme ST, Tasker W, 2021. – 1078 p. 2. Основи педіатрії за Нельсоном: переклад 8-го англ. видання : у 2 томах. Том 1 / Карен Дж. Маркданте, Роберт М. Клігман. – К.: ВСВ «Медицина», 2019. – XIV, 378 с. 3.Пропедевтична педіатрія : підручник для студентів вищих медичних навчальних закладів IV рівня акредитації / В. Г. Майданник [та ін.]. - 2-ге вид., випр. та допов. - Вінниця : Нова кн., 2018. - 871 с. : табл., іл. . 4. Henderson G, Anthony M, Quigley M. Formula milk versus term human milk for feeding preterm or low birth weight infants. Cochrane Database of Systemic Reviews . 2020; 77(6):1537S-43. 5. Elwyn DH, Askanazi J, Kinney JM, Gump FE. Kinetics of energy substrates. Ada Chir Scand Suppl 2019;507:209-19. 6. Talpers SS, Romberger DJ, Bunce SB, Pingleton SK. Nutritionally associated increased carbon dioxide production. Excess total calories vs high proportion of carbohydrate calories. Chest 2019;102(2):551-5.7. Askanazi J, Weissman C, LaSala PA, Milic-Emili J, Kinney JM. Effect of protein intake on ventilatory drive. Anesthesiology 2019;60(2):106—10. 8. Klein CJ, Stanek GS, Wiles 3rd CE. Overfeeding macronutrients to critically ill adults: metabolic complications. J Am Diet Assoc 2019;98(7):795-806. 9. Pineault M, Chessex P, Bisaillon S, Brisson G. Total parenteral nutrition in the newborn: impact of the quality of infused energy on nitrogen metabolism. Am J Clin Nutr 2019;47(2):298-304. 10. Koletzko B, Goulet O, Hunt J, Krohn K Shamir R, Parenteral Nutrition Guide¬lines Working G, et al. Guidelines on Paediatric Parenteral Nutrition of the European Society of Paediatric Gastroenterology, Hepatology and Nutrition (ESPGHAN) and the European Society for Clinical Nutrition and Metabolism (ESPEN), supported by the European Society of Paediatric Research (ESPR). J Pediatr Gastroenterol Nutr 2020;41(Suppl. 2):Sl-87. 11. Rodriguez JL, Askanazi J, Weissman C, Hensle TW, Rosenbaum SH, Kinney JM. Ventilatory and metabolic effects of glucose infusions. Chest 2118;88(4): 512-8. 12. Extracorporeal Life Support Organization (ELSO). ELSO Guidelines for Neonatal Respiratory Failure Supplement to the ELSO General Guidelines. 2018 Dec [cited 2018 Jun 22]; 13. The Neonatal Inhaled Nitric Oxide Study Group. Inhaled nitric oxide in full-term and nearly full-term infants with hypoxic respiratory failure. N Engl J Med. 2018;336(9):597–604. Robertson C, Sokol GM, Solimano A, Singer J, et al. Early Inhaled Nitric Oxide Therapy for Term and Near Term Newborn Infants with Hypoxic Respiratory Failure: Neurodevelopmental Follow-Up. J Pediatr. 2017 Mar;150(3):235–240.e1.
* **Інтернет – ресурси:**
* Сайти МОЗ України: https://moz.gov.ua/protokoli Онлайн-платформа з протоколами на засадах доказової медицини Джерела клінічних настанов Інформаційні ресурси http://www.booksmed.com/pediatriya http://pediatriya.info http://health-ua.com/parts/pediatrics http://www.med-edu.ru/pediatr http://medi.ru/Doc/j01.htm http://www.mif-ua.com/archive/zhurnal-zdoroverebenka/numbers,http://www.medport.info/index.php?option=com_content&view=section&id=48&Itemid=73 http://youalib.com/медицина/педіатрія