INTERNATIONAL JOURNAL OF
INTEGRATIVE AND
MODERN MEDICINE

Modern Aspects of Nutritional Etiology of Vitamin Deficiency in Children of Primary School Age

Duschanova Rakhatzhan Yuldashovna
Urgench branch of the Tashkent Medical Academy, Urgench, Uzbekistan

Annotation: The article provides a brief overview of materials reflecting the biological role of vitamins for the development of children and their health. The main types and causes of vitamin deficiency in children, disorders of assimilation and metabolism of vitamins, and increased need for vitamins are identified. Food products, which are the main sources of vitamins, are not always able to provide the growing children's body with the necessary amounts of vitamins.

Keywords: vitamin, children, deficiency, food.

Relevance. Due to the fact that our children of primary school age, as we would ideally like, are not so happy to consume what we are used to calling balanced in all the ingredients it contains (proteins, fats, carbohydrates, vitamins, minerals, etc.) food. More often they give preference to foods containing more carbohydrates and fats, sweets, yoghurts, carbonated drinks containing in most cases artificial carbohydrates, preservatives, and sometimes GMO products that are undesirable for children [8, 11].

It is known that mammals, including humans, give birth to immature offspring [6, 15-24], that is, the final development and formation of many body systems occurs after birth, during the period of early postnatal ontogenesis [25-40]. Naturally, the normal development of a child depends on the condition of the mother during pregnancy and postpartum lactation, where the main role is played by the maternal placenta and mammary gland [29-31]. Vitamins contribute to normal cell growth and development of the entire body. Vitamins play an important role in maintaining the body's immune responses, ensuring its resistance to adverse environmental factors. Maintaining the body's immune responses is essential in the prevention of infectious diseases. Vitamins mitigate or eliminate the adverse effects of many medications on the human body.

Proper nutrition in childhood and adolescence contributes to the prevention of diseases, increased efficiency and academic performance, physical and mental development, creates conditions for adaptation of the younger generation to the environment and has a significant impact on the formation and state of human health throughout his subsequent life [41, 42].

Special requirements are imposed on the provision of nutrients to school-age children. A number of anatomical and physiological characteristics of school-age children can be identified, which determine the increased needs of children of this age group for vitamins and minerals [8, 11, 12]:

- continued growth and increase in body weight with a sharp acceleration of growth during puberty (absolute increase in height is 20% of the height of an adult, the increase in body weight is about 50% of the body weight of an adult);
- increase in muscle mass, increase in bone density (accumulation of 80–90% of genetically determined bone mass, responsible for skeletal strength, occurs in childhood, affecting the time of appearance of signs of osteoporosis in older age);
- processes of differentiation of organs and tissues continue; in the pubertal period, intensive functional restructuring of the body occurs, which is based on a sharp change in the functioning of the endocrine system associated with puberty;
- there is an improvement in functional relationships and processes of regulation of the activity of organs and systems with maximum tension in the body's regulatory systems in adolescence;

- the formation of higher brain functions that determine the ability to learn is observed; the psychological sphere of adolescents changes in the form of imbalance, increased emotional excitability, cognitive functions improve (abstract thinking, self-control, criticism), emotional and psychological aspects of interpersonal interactions are formed;
- detoxifying systems of the body mature;
- food preferences and eating habits are consolidated.

Vitamins are low-molecular organic compounds with high biological activity that are necessary for normal life. Vitamins are among the essential nutritional factors, since they are not synthesized (or synthesized in insufficient quantities) in the body [4, 10].

Vitamins are divided into two large groups: water-soluble (vitamin C - ascorbic acid, vitamin B1 - thiamine, vitamin B2 - riboflavin, vitamin B6 - pyridoxine, vitamin PP - niacin, vitamin B12 - cyanocobalamin, vitamin Bc - folic acid, pantothenic acid, vitamin H - biotin) and fat-soluble (vitamin A - retinol, vitamin D - calciferol, vitamin E - tocopherol, vitamin K). There is also a group of vitamin-like compounds (choline, myoinositol, vitamin U, lipoic acid, orotic acid, pangamic acid, vitamin B15, vitamin P - bioflavonoids, carnitine).

Unlike proteins, fats, and carbohydrates, vitamins are not a source of energy or plastic material used for the formation or renewal of organs and tissues. Their role is to provide the body with a set of specific regulators of physiological and metabolic processes that underlie the implementation of most vital functions of the body and the functioning of its organs and systems. Vitamins are necessary for growth processes, maintaining normal hematopoiesis and sexual function, normal functioning of the nervous, cardiovascular and digestive systems, endocrine glands, maintaining vision and normal skin properties. They play an extremely important role in ensuring an adequate immune response, the functioning of the xenobiotic metabolic system, the formation of the body's antioxidant potential, maintaining human resistance to various infections, the effects of radioactive radiation and other unfavorable external factors [7, 24].

The basis for the high biological activity of vitamins is their participation in the construction of enzyme systems as coenzymes. Coenzymes are low molecular weight non-protein substances that form a complex with the protein part of enzymes and directly carry out chemical reactions catalyzed by this enzyme, while the protein component of enzymes is responsible for the high specificity of their action. This function is inherent in almost all water-soluble vitamins and fat-soluble vitamin K. Another key function of vitamins is their participation in the construction and functioning of cell membranes and cellular organelles (fat-soluble vitamins) [3].

Vitamin deficiency is a pathological condition caused by a reduced supply of a particular vitamin to the body of children or a violation of its functioning in the body. Depending on the depth and severity of vitamin deficiency, the following forms are distinguished: vitamin deficiency, hypovitaminosis, subnormal vitamin supply [2]. Vitamin deficiency is a state of almost complete depletion of the body's vitamin resources, accompanied by the appearance of a symptom complex characteristic and specific to a deficiency of a particular vitamin. Classical vitamin deficiencies are now extremely rare [1]. They can lead to profound disturbances in the absorption of nutrients due to malabsorption syndrome, damage to the hepatobiliary system and various hereditary anomalies (vitamin D-resistant rickets, vitamin E deficiency with abetalipoproteinemia, folate-dependent megaloblastic anemia) [9, 13].

Hypovitaminosis is a condition of a sharp decrease in vitamin reserves in the body, causing the appearance of a number of low-specific and mildly expressed clinical symptoms, often common to various types of hypovitaminosis, as well as some more specific microsymptoms. Subnormal vitamin supply is a preclinical stage of vitamin deficiency, manifested mainly by disturbances in metabolic and physiological reactions in which this vitamin is involved, as well as individual clinical microsymptoms. Subnormal vitamin supply is the most common vitamin deficiency [44].

Although a subnormal supply of vitamins is not accompanied by pronounced clinical disorders, it significantly reduces children's resistance to infectious and toxic factors, physical and mental performance, slows down the recovery time of patients, exacerbation of chronic diseases, and can serve as one of the risk factors for the occurrence of malignant neoplasms [24].

The most frequently recorded symptoms of polyhypovitaminosis are:

- general weakness, increased fatigue, muscle weakness, increased irritability, lethargy, absent-mindedness, forgetfulness, insomnia or drowsiness, chilliness, hypothermia;
- weakness and heaviness in the legs, pain in the legs and soles, paresthesia, hyperesthesia of the legs and feet, pain in the calf muscles on palpation;
- burning and tingling of the tongue, angular stomatitis, dry mouth, pharynx, dry cough, looseness, cyanosis, bleeding gums, changes in the tongue in the form of dryness, hyperemia, pain, swelling, lining, cracks;
- photophobia, lacrimation, blepharitis, conjunctivitis, dryness and clouding of the sclera, rapid visual fatigue;
- peeling in the area of the nasolabial triangle, folliculitis, pallor, dryness and flaking of the skin, hyperkeratosis, goose bumps, skin pigmentation in natural folds, around the navel, on the hands and neck, isolated petechiae, tendency to hemorrhage, positive pinch test, dryness, fragility and dullness of hair, transverse and longitudinal striations of nails, dryness and cracks in the skin in the area of the soles;
- loss of appetite and symptoms of dyspepsia, burning and heaviness in the epigastric region, short-term abdominal pain, constipation and diarrhea without mucus and blood, palpitations, a feeling of interruptions in the heart, shortness of breath during exercise, swelling of the feet and legs, reduction in the thickness of subcutaneous fat layer, weight loss;
- hypochromic, microcytic anemia, the development of hyperchromic anemia is possible.

Thus, insufficient consumption of micronutrients is a massive and permanent factor that has a negative impact on the health, growth and physical development of children and adolescents. It is obvious that the problem of providing school-age children with vitamins exists; therefore, it is necessary to improve preventive approaches to eliminate the deficiency of essential micronutrients.

Thus, the current situation of providing schoolchildren with essential substances dictates the need for an integrated approach to solving this issue. Optimizing the diet of students must necessarily be supplemented by children taking a daily vitamin-mineral complex or fortified drinks, enriching dishes with a multivitamin premix, or including industrially produced foods enriched with vitamins and microelements in the diet of schoolchildren.

List of used literature

1. Витамины и минералы в современной клинической медицине. Возможности лечебных и профилактических технологий / Под ред. Громовой О.А., Намазовой Л.С. — М., 2003. — С. 56.
2. Витамины и минералы для здоровья детей: Учебное пособие. СПРОФ «Здоровый ребенок». НЦЗД РАМН. — М., 2003. — С. 28.
3. Громова О.А. Школа по витаминам и микроэлементам. Практика педиатра. — М., 2004. — С. 3–5.
4. Гурова М.М. Современные подходы к питанию детей. — М.: МедЭкспертПресс, 2007. — С. 147.
5. Гурова М.М. Современные подходы к питанию детей. — М.: МедЭкспертПресс, 2007. — С. 147.

6. Зуфаров, К. А., Тухтаев, К. Р., & Хасанов, Б. Б. (2003). Количественные и ультраструктурные характеристики иммунокомпетентных клеток молочной железы в динамике беременности и лактации. Морфология, 124(4), 74-79.
7. Ключников С.О., Болдырев В.Б., Демин В.Ф. Проблемы и перспективы применения биологически активных добавок в педиатрии // Вопросы детской диетологии. — 2004. — № 3. — С. 40–44.
8. Конь И.Я. Рациональное питание в сохранении здоровья детей. В кн.: Физиология роста и развития детей и подростков / Под ред. А.А. Баранова, Л.А. Щеплягиной. — М., 2000. — С. 515–545.
9. Перевощикова Н.К., Басманова Е.Д. Эффективность коррекции дефицита витаминов у детей школьного возраста // Российский педиатрический журнал. — 2006. — № 1. — С. 29–32.
10. Ребров В.Г., Громова О.А. Витамины и микроэлементы. — М., 2003. — С. 9–19.
11. Руководство по детскому питанию / Под ред. В.А. Тутельяна, И.Я. Коня. — М.: Медицинское информационное агентство, 2004. — 662 с.
12. Руководство по детскому питанию / Под ред. В.А. Тутельяна, И.Я. Коня. — М.: Медицинское информационное агентство, 2004. — 662 с.
13. Студеникин В.М. Гиповитаминозы и поливитамины // Вопросы современной педиатрии. — 2002. — Т. 1, № 1. — С. 48–51.
14. Хасанов, Б. Б. (2004). Влияние токсического гепатита и сальмонеллезной инфекции на гематологические показатели матери в динамике лактации. Инфекция, иммунитет и фармакология, 1, 139-140.
15. Хасанов, Б. Б. (2018). Особенности развития иммунной системы тонкой кишки в динамике раннего постнатального онтогенеза при антигенном и токсическом воздействиях. Журнал теоретической и клинической медицины, 4, 152-153.
16. Хасанов, Б. Б. (2019). Endocrine regulation of mammogenesis. Новый день в медицине, (4), 92-99.
17. Хасанов, Б. Б. (2020). Ультраструктурные аспекты иммуногенной функции молочной железы. In Университетская наука: взгляд в будущее (pp. 659-661).
18. Хасанов, Б. Б. (2022). Иммуногенные свойства молочной железы и материнского молока. Re-health journal, (3), 15.
19. Хасанов, Б. Б. (2022). Морфология молочной железы при беременности и лактации. Бухара. Типография" Sadriddin Salim Buxoriy" при Бухарском государственном университете, 120.
20. Хасанов, Б. Б. (2024). Она сути цитокин ва гормонларининг (пролактин) янги туғилган чақалоқнинг иммун ҳужайралари функцияларига таъсири. Пробл. биол. и медиц, 2(152), 364-370
21. Хасанов, Б. Б., & Тухтаев, К. Р. (2001). Морфометрическая характеристика иммунокомпетентных клеток молочной железы при беременности и лактации. Проблемы биологии и медицины.
22. Хасанов, Б. Б., 0& Азизова, А. Х. (2022). Toxic Hepatitis of the Female and the Structural and Functional Formation of the Lean Intestine of the Offspring in the Period Breastfeeding.
23. Хасанов, Б. Б., Зокирова, Н. Б., & Тухтаев, К. Р. (2021). Влияние токсического гепатита матери на структурно-функциональные взаимоотношения иммунокомпетентных клеток молочной железы лактирующих крыс и тонкой кишки крысят в период молочного вскармливания. Педиатрия, 4, 225-229.

24. Шевченко И.Ю. Формирование нарушений здоровья подростков под влиянием факторов питания // Российский педиатрический журнал. — 2008. — № 1. — С. 20–25.

25. Burtkhanovich, K. B. (2022). Extragenital Pathology and Immunocompetent Cells Relations of Lactating Breast Gland and Offspring Jejunum. American Journal of Internal Medicine, 10(2), 28-33.

26. Burtkhanovich, K. B. (2023). Features of the Functional Development of the Gastrointestinal Tract. American Journal of Pediatric Medicine and Health Sciences, 1(4), 60-68.

27. Burtkhanovich, K. B. (2023). Hystogenesis of lymph nodes of some representatives mammals. American Journal of Pediatric Medicine and Health Sciences, 1(4), 189-196.

28. Burtkhanovich, K. B. (2023). Structural and Functional Features of the Thymus Under Some Impacts. American Journal of Pediatric Medicine and Health Sciences, 1(4), 81-87.

29. Burtkhanovich, K. B. (2024). Modern Ideas of Morphogenesis and Mammary Glands Function in Pregnancy and Lactation Dynamics. American Journal of Pediatric Medicine and Health Sciences, 2(6), 102-107.

30. Burtkhanovich, K. B. (2024). The Role of the Mammary Gland in Ensuring Immune Homeostasis of the Fetus and Newborn. American Journal of Pediatric Medicine and Health Sciences, 2(6), 108-116.

31. Burtkhanovich, K. B. (2024). Modern Views about Structural and Functional Features Spleen. American Journal of Pediatric Medicine and Health Sciences, 2(6), 117-123.

32. Burtkhanovich, K. B. Artificial feeding, posterity development features and adrenal gland formation in early postnatal ontogenesis. Problems of biology and medicine, 119, 160-164.

33. Khasanov, B. B. (2019). Endocrine regulation of mammogenesis. New day of medicine, (4), 92-99.

34. Khasanov, B. B. (2020). Experimental chronic toxic hepatitis and hematological features in the dynamics of mother's and the offspring lactation. European Journal of Molecular & Clinical Medicine, 7(09), 1367-1373.

35. Khasanov, B. B. (2021). Offspring jejunum structural and functional development during breastfeeding against the background of mother’s chronic toxic hepatitis. Europe's Journal of Psychology, 17(3), 330-335.

36. Khasanov, B. B. (2021). Structural and functional features of immunocompetent breast cells glands during pregnancy and lactation in chronic hepatitis. Psychology and Education, 58(2), 8038-8045.

37. Khasanov, B. B. Morphology of the mammary gland during pregnancy and lactation. Bukhara. Printing house “Sadriddin Salim Buxoriy” at the Bukhara State University-2022.

38. Khasanov, B. B., & Azimova, S. B. (2023). Extragenital pathology of the mother and morphological features of the development of the thymus in the period of early postnatal ontogenesis. European Chemical Bulletin, 12(8), 8322-8331.

39. Khasanov, B. B., Azizova, F. K., Sobirova, D. R., Otajonova, A. N., & Azizova, P. K. (2022). Toxic hepatitis of the female and the structural and functional formation of the lean intestine of of the offspring in the period breastfeeding.

40. Khasanov, B. B., Ilyasov, A. S., & Sultanova, D. B. (2023). Extragenital pathology of the mother and morphological features of the development of the spleen in the period of early postnatal ontogenesis. European Chemical Bulletin, 12(8), 8332-8341.

41. Nutrition in Pediatrics, B.C. Decker Inc. Publisher. — 1997. — 800 p.

42. Nutrition of normal infants, ed. by Fomon S., Mosby. — 1993. — 420 p.

43. Tukhtaev, K. R., Khasanov, B. B., & FKh, A. (2003). Structural and functional interrelations of immunocompetent cells in the mammary gland of lactating rats and in the small intestine of newborn rats during suckling period. Morfologiia (Saint Petersburg, Russia), 124(6), 70-72.

44. Yapi H.F., Ahiboh H., Ago K. et al. Protein profile and vitamin A in children of school age in Ivory Coast // Ann. Biol. Clin. — 2005. — V. 63, № 3. — P. 291–295. Jason J., Archibald L.K., Nwanyanwu O.C. et al. Vitamin A levels and immunity in humans // Clin. Diagn. Lab. Immunol. — 2002. — V. 9, № 3. — P. 616–621.