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The Importance of Vitamin D in the Metabolism of Children

Jalilova Dildora Murodovna, Shukurova Dilorom Bakhodirovna
Samarkand State Medical University, Samarkand, Uzbekistan

Abstract: Vitamin D is important for the health of bones and muscles of a young growing organism. Vitamin D helps the body absorb calcium and phosphates from food, which are important for bones. Only some foods (some types of fish) naturally contain vitamin D, and it is difficult to get enough vitamin D from food alone. Some types of baby cereals and additional dairy products, milk powder, contain vitamin D, but most of them receive only a quarter (or even less) of the vitamin D requirement in children with food. Most of the vitamin D is produced in the skin under the influence of the sun. Children's health vitamin D knowledge grows over the years. The normal course of metabolic processes in children is inextricably linked with vitamin D.

Key words: metabolism, cholecalciferol, ergocalciferol, parathyroid hormone, calcitonin, immunity.

Energy costs in the body consist of three unequal parts: basic metabolism, energy supply of functional activity and growth, energy costs for the processes of development and adaptation of the body. The share of these costs is determined by the stage of individual development and specific living conditions. As children grow, energy costs decrease mainly for the basic metabolism, as well as for growth and development, while functional costs increase (for example, the expenditure of muscle energy due to physical exertion during puberty can sometimes be greater than that of a child), but in any case they are the reason for significant qualitative changes. Vitamin D of group B (UVB), important for various biological processes, is synthesized in the skin in the form of cholecalciferol (vitamin D3) due to ultraviolet radiation and turns into the active form of calcitriol in the liver and kidneys. Often, insufficient synthesis with sunlight or food can lead to skeletal problems and general metabolic disorders associated with deficiency caused by kidney or liver problems. New research shows the effect of vitamin D on metabolic processes, showing a link between obesity-related conditions and vitamin D deficiency. Vitamin D affects glucose metabolism, increased insulin resistance, the absorption of iodine ion, biosynthesis of prostate paratharmone and inflammation, and shows interaction with hormones such as leptin and adiponectin.1 The role of vitamin D in health is growing as it affects the innate immune system to prevent infections and the adaptive immune system to modulate autoimmunity.the immunomodulator normalizes the Th1/Th2 ratio. High levels of IgE are also associated with vitamin D deficiency in the blood.2 the practice of using vitamin D in atopic conditions in children.3 Other studies have begun to identify the neurohormonal effects of vitamin D on brain development and behaviors associated with mental health disorders. Many of these effects begin long before the baby is born, so it is important to screen every pregnant woman for vitamin D deficiency and take supplements to achieve the best results for the baby's health. It is recommended that the level of 25(OH)D for each person is 40-70 ng/ml, which provides optimal health benefits and reduces healthcare costs. The current recommended doses of vitamin D supplementation are less than the amount needed to achieve an ideal serum level. The vitamin D supplementation program for disease prevention, like the current vaccination program, can have serious consequences for overall health worldwide. In addition to bone and muscle problems, there is evidence that low vitamin D levels are associated with other health problems:delayed maturation of the lymphoepithelial tissue of the pharyngeal system in the normal process of immunofunctional formation of the tonsils, an

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increased tendency to rapid diseases of the upper respiratory tract, and children aged 1-5 years often have diseases of the upper respiratory tract., strokes, etc. (rheumatism), problems with immunity (how the body fights infections)) and autoimmune diseases (including diabetes). Vitamin D, caused by irregular intake of dvuvitamin, increases the amount of calcium in the blood, causing the formation of stones from calcium salts in the kidneys.Since vitamin D provides calcium absorption, exerting an active activating effect during the absorption of vitamin D, in some young children, due to a lack of vitamin D and insufficient intake of calcium into the body, an increased content of urate salts leads to urinary tract urolithiasis.4 Vitamin D can be produced very effectively by humans, when ultraviolet B (UVB) radiation from sunlight or artificial sources reaches skin cells. Daily exposure to ultraviolet radiation on the entire body for 15-20 minutes is capable of producing up to 250 micrograms of vitamin D (10,000 IU). Once in the bloodstream, vitamin D is converted into 25-hydroxyvitamin D (25(OH)D) liver hydroxylase. The circulating 25 (oh) D level is an indicator of vitamin D status. This level reflects both exposure to ultraviolet light and the absorption of vitamin D from food. If necessary, 25 (OH) D is converted in the kidneys into the active hormonal form 1,25-dihydroxyvitamin D3 (calcitrol) participates in a process that is usually strictly controlled by parathyroid hormone. However, insufficient intake of vitamin D reduces the level of this important hormone circulating in the blood. Circulating calcitrol is also negatively affected by a decrease in vital nephrons, a high concentration of fibroblast growth factor in blood serum and a high level of inflammatory cytokines. 3. Therefore, low vitamin D levels can contribute to the development of cardiovascular diseases by affecting adipokine levels. About a century ago, ultraviolet radiation from the Sun helped cholesterol convert into vitamin D, thereby preventing rickets. Vitamin D is a prohormone that plays a crucial role in regulating calcium and phosphorus metabolism and is an important factor determining bone health in childhood and adolescence. In recent years, new evidence has emerged that vitamin D also affects extracellular tissues, since many cells in the body have vitamin D receptors in existing tissues, including the brain, heart, pancreas, stomach, gonads, prostate, lymph nodes and skin, vitamin D plays an important role in improving immune function and reducing inflammation. Vitamin D levels in childhood are being actively studied all over the world, especially in the USA and Europe. Available data on children and adolescents show that hypovitaminosis D is a widespread and emerging global public health problem. Vitamin D is unique among vitamins in that, provided sufficient exposure to ultraviolet radiation of group b (290-315 Nm), a person can independently produce it on their own skin. Vitamin D is found in small amounts in milk and eggs and relatively large amounts in oily fish such as herring and mackerel. However, vitamin D synthesis in the skin usually provides 80 to 90 percent of vitamin D reserves in people who lead a healthy lifestyle. This estimate is based on the fact that circulating concentrations of 25(oh) D are usually in the range of 30-80 nmol/L in healthy young people, while dietary intake of vitamin D is usually less than 5 mcg per day, and 1 mcg of vitamin D increases the concentration of circulating 25(oh)D by about 1-3 nmol/l. The exact amount of vitamin D produced by human skin depends on geographic latitude, season, time of day, as well as weather conditions (cloud cover), and air pollution levels. In addition, vitamin D synthesis is strongly influenced by clothing habits, lifestyle and public places (for example, indoors or outdoors), the use of sunscreen and the practice of sunscreen. It is also important to note that a person's skin type determines the effectiveness of vitamin D production.

The darker the pigmentation of the skin, the more ultraviolet radiation is absorbed by melanin and the less vitamin D is produced. Migrants and their children often have a skin type incompatible with the surrounding ultraviolet environment. To achieve a similar effect on fair skin in the production of vitamin D, a black person living in Europe or North America needs six times more time to be exposed to ultraviolet light. If vitamin D production or intake is low, the result is a deficiency or even deficiency of vitamin D. The level of parathyroid hormone begins to rise at a threshold level of 25 (oh) D 75 nmol/l or lower. This affects the water salt metabolism. The action of vitamin D on cells is carried out through membrane-bound and cytosolic vitamin D receptors (VDR). VDR is expressed almost everywhere, and almost all cells respond to the action of vitamin D; about 3% of the human

genome is directly or indirectly regulated by the endocrine system containing vitamin D. Calcitriol is also produced by native 1A-hydroxylases derived from its precursor 25(OH)D in various extracellular cells, including vascular smooth muscle cells, colonocytes and monocytes, dendritic cells (DC) and immune cells such as b lymphocytes. Calcitriol plays an important paracrine and autocrine role here. Vitamin D deficiency is known to cause rickets in children and osteomalacia in adults. After the discovery of vitamin D and the introduction of vitamin D supplements in food, alimentary rickets practically disappeared in developed countries. However, over the past two decades, many factors have led to the recurrence of this disease, especially among children of Caucasian origin. Current challenges in this area include establishing generally accepted "normal" vitamin D levels and the need to improve screening, prevention and treatment strategies for hypovitaminosis D.

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