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Research Article

THE MAIN PROPERTIES, DESCRIPTION AND BENEFITS OF VITAMIN D

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Tukhtayeva Mashkhura Mukhiddinovna
Assistant of the Department of Propaedeutics of Children's Diseases, Samarkand State Medical University, Uzbekistan

ABSTRACT

The article discusses the main properties of vitamin D and its effect on the human body. Modern specialized literature and relevant scientific information were systematically studied. The best natural sources of vitamin D are shown. The possible negative effects of vitamin D on the human body under certain medical conditions and diseases are analyzed separately.

KEYWORDS

Vitamin D, harm of vitamin D, beneficial properties, contraindications, sources.

INTRODUCTION

The problem of vitamin D deficiency is of particular importance today, because according to the data obtained in many studies, almost 1/2 of the world's population suffers from hypovitaminosis D. Epidemiological data on provision of cholecalciferol to children of different ages are presented. This article also identifies various modern approaches to the estimation of vitamin D concentration in the body [1,4,6,11]. Particular attention is paid to the understanding of the metabolism and biological functions of vitamin D, which consists not only of its positive effects on the state of bone tissue, but also on many additional tissues. The importance of vitamin D for the human body has been proven not only in its effect on the processes of forming the skeletal system, but also in many extra-bone effects of cholecalciferol

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[2,3,15,16]. . According to modern concepts, vitamin D deficiency is associated with diabetes, hypertension, heart failure, peripheral arterial diseases, acute myocardial infarction, various forms of cancer, autoimmune and inflammatory diseases, decreased immune protection and increased mortality. The problem of vitamin D deficiency is one of the most urgent problems, because according to the results of many studies, its deficiency is noted in half of the world's population. Therefore, there is increasing interest in quantifying and understanding the mechanisms of vitamin D metabolism in the human body [5,7,8,10,].

Identification of vitamin D in the latest scientific research. According to a study by the Medical Institute of Georgia in the USA, very high doses of the vitamin (4000 international units per day instead of the recommended 400-600 IU) were observed to reduce the hardening of blood vessels by a record 10.4% over 4 months. 2000 XB reduced it by 2%, 600 XB caused a 0.1% deterioration. At the same time, the condition of blood vessels worsened by 2.3% in the placebo group. Overweight people, especially black people, do not get enough vitamin D in their bodies. Black skin absorbs less sunlight, and fat interferes with vitamin production [4,16].

According to a recent study by scientists from the Department of Oncology and Metabolism at the University of Sheffield, vitamin D supplements may help relieve painful irritable bowel syndrome. The study found that vitamin D deficiency was more common in patients with irritable bowel syndrome, regardless of their ethnicity. In addition, the effect of this vitamin on the symptoms of the disease was studied. Although scientists note that more research is needed, the results so far show that taking the vitamin in dosage form reduces the symptoms of irritable bowel syndrome, such as abdominal pain, bloating, diarrhea and constipation. “Research suggests that all people with irritable bowel syndrome should have their vitamin D levels checked. It is an understudied disease that directly affects the quality of life of patients. Currently, we still don't know what causes it and how to treat it, says study leader Dr. Bernard Corfi [3,6,17].

The results of a clinical trial published in the Journal of the American Osteopathic Association show that up to one billion people in the world may suffer from a complete or partial deficiency of vitamin D due to chronic diseases and regular use of sunscreens. Kim Pfotenhauer, PhD student at Touro University, commented on this topic, "We spend more time indoors and apply sunscreen when we go out, and eventually our bodies stop producing vitamin D." In addition, chronic diseases—type 2 diabetes, malabsorption, kidney disease, Crohn's disease, and celiac disease—have also been reported to

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significantly inhibit the absorption of vitamin D from dietary sources [9,12].

According to research from Queen Mary University of London (QMUL), taking vitamin D supplements can help protect against acute respiratory infections and the flu. The findings, published in the British Medical Journal, are based on clinical trials involving 11,000 participants in 25 clinical trials in 14 countries including the UK, US, Japan, India, Afghanistan, Belgium, Italy, Australia and Canada. It should be noted that individually, these trials showed conflicting results - some participants stated that vitamin D helped protect the body from ARVI, while others stated that it had no significant effect. "The reality is that the immune effects of vitamin D supplementation are most pronounced in patients with low vitamin D levels when taken daily or weekly." Vitamin D, often called the "sunshine vitamin," protects the body from airborne infections by increasing the amount of antimicrobial peptides—natural antibiotics—in the lungs. This finding may also explain why colds and flu are more common in winter and spring [10,13,14].

During these seasons, the level of vitamin D in the body is the lowest. In addition, vitamin D protects against asthma attacks caused by respiratory infections. Daily or weekly intakes of the vitamin below 25 nanomol/liter reduced the likelihood of developing ARVI. But those with enough vitamin D in their bodies also benefited, although the effect was much smaller (reduced risk by 10%). Overall, the reduction in the risk of catching a cold after taking vitamin D was equivalent to the protective effect of influenza vaccination [15,18].

Increased need for vitamin D

Although our body is able to produce vitamin D on its own, the need for it can be increased in several cases. First, the dark color of the skin reduces the body's ability to absorb ultraviolet radiation, which is necessary for vitamin production. In addition, using a sunscreen with an SPF factor of 30 reduces the ability to synthesize vitamin D by 95%. To stimulate vitamin production, the skin must be fully exposed to sunlight.

People who live in the northern parts of the world, in polluted areas, who work at night and spend the day at home, or who work at home should ensure that they get enough vitamins from food. Exclusively breastfed babies should receive a vitamin D supplement, especially if the baby has tanned skin or minimal sun exposure. For example, American doctors recommend giving babies 400 IU of vitamin D in the form of drops per day.

Physical and chemical properties of vitamin D

Vitamin D is a group of fat-soluble substances that help the body absorb calcium, magnesium, and phosphate through the intestines. There are five forms of vitamin D:

D1 (mixture of ergocalciferol and lumisterol),

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D2 (ergocalciferol),

D3 (cholecalciferol),

D4 (dihydroergocalciferol) and

D5 (cytocalciferol).

The most common forms are D2 and D3. When we say "vitamin D" without specifying a specific number, we are talking about these vitamins. These are secosteroids in nature. Vitamin D3 is photochemically produced from 7-dehydrocholesterol, a protosterol present in the skin epidermis of humans and most higher animals, under the influence of ultraviolet light. Vitamin D2 is found in some foods, especially portobello and shiitake mushrooms. These vitamins are relatively stable at high temperatures, but are easily destroyed by oxidizing agents and mineral acids.

Useful properties and its effect on the body

According to the European Committee on Food Safety, vitamin D has been proven to have clear health benefits. Among the positive effects of its use:

- normal development of bones and teeth in babies and children;
- maintaining the condition of teeth and bones;
- normal immune system function and healthy immune system response;
- reducing the risk of fractures, which are often caused after an injury, especially in people over 60 years old;
- normal absorption and effect of calcium and phosphorus in the body, maintenance of normal calcium level in the blood;
- such as normal cell division.

Table 1

Foods Highest in Vitamin D

	Composition (D2 + D3) (µg/100g)	Composition (XB/100 g)
Fish oil	250	10000
Mackerel	16.1	643
Salmon	11	441
Tunes	5.7	227
Egg yolk	5.4	218
Herring	4.2	167
Caviar (red, black)	2.9	117
Beef liver	1.2	49
Shiitake mushrooms	0.4	18

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Ricotta cheese	0.2	10
Crabs	0.1	2
Whole milk	0.1	2

It is worth noting that many European countries set their own vitamin D intake based on solar activity throughout the year. For example, in Germany, Austria and Switzerland, since 2012, 20 mcg of vitamin consumption per day is the norm, because in these countries, the amount obtained from food is not enough to maintain the necessary level of vitamin D in the blood plasma - 50 nanomol / liter. In the US, recommendations are slightly different: people over 71 are recommended to consume 20 mcg (800 IU) per day.

Many experts believe that the minimum amount of vitamin D should be increased to 20-25 mcg (800-1000 IU) per day for adults and the elderly. In some countries, scientific committees and nutrition societies have managed to increase the daily intake level to achieve the optimal concentration of the vitamin in the body [4].

Daily requirement of vitamin D

In 2016, the European Committee on Food Safety established the following recommended daily intake of vitamin D regardless of gender:

Table 2

Young	Recommended amount (mcg/day) (International units/day)
6-11 months	10 mcg (400 IU)
1-3 years	15 mcg (600 IU)
4-6 years	15 mcg (600 IU)
7-10 years	15 mcg (600 IU)
11-14 years old	15 mcg (600 IU)
15-18 years old	15 mcg (600 IU)
18 years and older	15 mcg (600 IU)

Application in official medicine

Vitamin D is essential for regulating the absorption and levels of the minerals calcium and phosphorus in the body. It also plays an important role in maintaining proper bone structure. Walking on a sunny day is an easy and reliable way for most of us to get the right

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dose of vitamins. When the face, arms, shoulders and legs are exposed to sunlight once or twice a week, the skin produces enough vitamins. Exposure time depends on age, skin type, time of year, day. It's surprising how quickly vitamin D stores can be replenished by exposure to sunlight. Only 6 days of intermittent sun exposure can make up for 49 days without sun. Fat reserves in our body serve as a storehouse for the vitamin, which is slowly released in the absence of ultraviolet rays. However, vitamin D deficiency is more common than you might expect. People living in northern latitudes are especially at risk. But this can happen even in sunny climates, because people in southern countries spend a lot of time indoors and use sunscreen to prevent excessive solar activity. In addition, deficiency often occurs in the elderly.

Symptoms of vitamin D deficiency

The vitamin D molecule is quite stable. A small part of it is destroyed during cooking, and the longer the product is exposed to heat, the more vitamins we lose. Thus, when boiling an egg, for example, 15%, when frying - 20%, and when cooking for 40 minutes, 60% of vitamin D is lost.

The main function of vitamin D is to maintain calcium homeostasis, which is necessary for the development, growth and maintenance of a healthy skeleton. With a lack of vitamin D, it is impossible to get complete absorption of calcium and meet the needs of the body. Vitamin D is necessary for efficient absorption of calcium from the intestines. Some people have no symptoms at all. But there are a number of general indicators that indicate a lack of vitamin D in the body:

- frequent infectious diseases;
- bone and joint pain;
- depression;
- long-term wound healing;
- hair loss;
- muscle pain.

If vitamin D deficiency persists for a long time, it can lead to:

- obesity;
- diabetes;
- hypertension;
- fibromyalgia;
- chronic fatigue syndrome;
- osteoporosis;
- Neurodegenerative diseases such as Alzheimer's disease.

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A lack of vitamin D causes the development of certain types of cancer, especially breast, prostate and colon cancer.

CONCLUSION

Taking into account the above, it can be noted that taking vitamin D at any age can prevent many metabolic diseases, including rickets, osteoporosis, endocrine diseases, and help lead a healthy lifestyle gives

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