of axillary surgery / A.B. Tadros, W.T. Yang, S. Krishnamurthy // JAMA Surgery. – 2017. – Vol.152. – №7. – P. 665–670.

СТОМАТОЛОГИЯ

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THE ROLE OF VITAMIN D IN DENTOFACIAL SYSTEM

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Abstract. The article describes the appearance of vitamin D hypo- and hypervitaminosis and its influences on dentofacial system including teeth, alveolar bone, parodontium, mucous membranes of the mouth etc. It says about molecular structure, sources, daily need, biological functions and pathological manifestations when hypo- or hypervitaminosis of vitamin D exists as this is one of the most important elements that directly influences on our teeth and bones.

Key words: vitamin D, hypovitaminosis, hypervitaminosis, impact, dentofacial system.

Introduction

A vitamin is an organic molecule (or a set of molecules) that is an essential micronutrient that our organism needs in small quantities in order to function well and for a proper metabolism. These nutrients cannot be synthesized in human organism, except for some vitamins in very small amounts. Therefore, they must be obtained through the diet and food. Vitamins have a very high biological activity, they take part in many important biochemical reactions and are required by the body in small quantities - from a few mcg to several mg per day. With a lack of vitamins from food, violation of their absorption or violation of their use by the body there is a risk of pathological conditions called hypovitaminosis. A condition, when there is a complete absence of any vitamin in the human body, is called avitaminosis. Excessive liposoluble vitamins result in hypervitaminosis.

Objectives – studying the biochemical functions of vitamin D as a group of fat-soluble secosteroids; studying the impact of vitamin D on dentofacial system; to find the symptoms of vitamin D hypo- and hypervitaminosis in dentofacial system and whole organism.

Materials and methods of researching

Theoretical analysis of impact vitamin D on dentofacial system. Criteria for the appearance of vitamin D hypovitaminosis and hypervitaminosis.

Results and discussion

Vitamin D (antirachitic vitamin, ergocalciferol, cholecalcirol, viosterolol, sunshine vitamin) belongs to the group of similar compounds – a derivative from steroids. Cholecalciferol (vitamin D3) is produced in the human body under the influence of sunlight from 7-dehydrocholesterol. It is considered as "true" vitamin D, while other members of this group (vitamins D1, D2 - ergocalciferol, D4, D5) are considered to be modified derivatives of vitamin D.

Vitamin is represented by two forms - ergocalciferol and cholecalciferol. Ergocalciferol differs from cholecalciferol chemically – it has a double bond in the molecule between C22 and C23 and the methyl group at C24.

Vitamin D3 is being transported to the liver with a specific protein after absorption in the intestine or after synthesis in the skin. It is hydroxylates on C25 and transports to kidney with a transport protein, where it hydroxylates once again on C1. The active form of the vitamin forms - 1,25-dihydroxycholecalciferol or, otherwise, calcitriol. The hydroxylation reaction in the kidneys is stimulated by parathyroid hormone, prolactin, somatotropic hormone and is inhibited by high concentrations of phosphates and calcium.

Talking about sources of vitamin D, few foods contain it naturally. These are liver, yeast, dairy products (butter, cream, sour cream), egg yolk (mainly vitamin D2), fish oil, cod liver (vitamin D3). Some foods are also fortified with vitamin D. Another way of getting vitamin D is that it is formed in the epidermis by ultraviolet irradiation from 7-dehydrocholesterol.

The daily requirement for infants and young children is 10-15 μg or 400-600 IU, for older children and adults 15-25 μg or 500-1000 IU (1 μg of vitamin D corresponds approximately to 40 IU).

Biological functions of vitamin D (D3) are very important.

1) It increases the concentration of calcium and phosphate in blood plasma: calcitriol in the target cells induces the synthesis of calcium-binding protein and components of Ca2+ - ATPase and as a result:

a. increases absorption of Ca2+ ions in the small intestine,

b. stimulates reabsorption of Ca2+ ions and phosphate ions in the proximal renal tubules.

2) It inhibits the secretion of parathyroid hormone by increasing the concentration of calcium in the blood, but on the other hand it increases its effect on the reabsorption of calcium in the kidneys.

3) The role of vitamin D in bone tissue can be positive and negative:

a. stimulates the mobilization of Ca2+ ions from bone tissue, as it contributes to the differentiation of monocytes and macrophages into osteoclasts, to the destruction of bone matrix, to the reduction of the synthesis of collagen type I by osteoblasts.

d. it increases the mineralization of the bone matrix, as it increases the production of citric acid, which forms insoluble salts with calcium.

4) In addition, as proved in the last decade, vitamin D, affecting the work of about 200 genes, it is involved in the proliferation and differentiation of cells of all organs and tissues, including blood cells and immunocompetent cells. Vitamin D regulates the immunogenesis and the reaction of the immune system, stimulates the production of endogenous antimicrobial peptides in the epithelium and macrophages, limiting the inflammatory processes through regulation of the production of cytokines.

Based on these biochemical functions of vitamin D we can identify the effects of vitamin on the structure of the dental system, learn its pathological physiology when it is hypovitaminosis or hypervitaminosis.

Hypovitaminosis can be acquired and manifested when it is insufficient intake of vitamin in the body with food and its insufficient formation in the skin under the influence of sunlight. It can be hereditary: caused by defects in genes encoding polypeptides that are involved in vitamin metabolism. The disease is called a family hypophosphatemic vitamin D-resistant rickets.

The main manifestations of vitamin D hypovitaminosis in dentofacial system start from the violation of calcium-phosphorus metabolism and demineralization of bones and are rickets, decalcification of the bones of the skeleton, including jaws, which leads to the malocclusion, violation of the sequence of teeth growth, lengthening the period of teeth growth, the delay of dentine development and disruption of the formation of enamel and dentin, which leads to the tooth decay.

The main manifestations of vitamin D hypervitaminosis in dentofacial system are demineralization of bones (jaws) that leads to the fragility and fractures. Speaking about other systems, these are hypercalcemia (plus hypercalciuria, focal calcification of kidney tissues, stalks of the blood vessels of the intestine, lungs, milcardia, which can lead to dysfunction of these organs, death), uremia, increased blood pressure and cardiac arrhythmias due to elevated concentrations of calcium in the blood, heart failure, changes in the neuropsychiatric status of the patient (apathy, drowsiness).

Conclusion

Summing it up, we need to say that vitamin D is one of the most important elements in our human body. It influences directly on our dental system, especially on maxilla and mandible as it takes part in calcium-phosphorus metabolism.

Using vitamin D supplements can be recommended as prevention under the dental treatment.

List of references:

1. Biochemistry Ed. Corr. RAS, prof. E.S. Severin. M.: LLC "Medical Information Agency", 2008. 123 p. (in Russian)

2. Lytvitsky P.F. Pathophysiology. Moscow, 2013. 2 t. - 397-421 p. (in Russian)

3. Kuznetsov S.L. Histology of oral organs. M.: GEOTAR-Media, 2012. 35-53 p. (in Russian)

4. What is vitamins? [Electronic resource] http://biokhimija.ru/vitaminy/svojstva-vitaminov.html (accessed 12 March 2019) (in Russian)

5. Biochemistry of nutrition. Vitamins. [Electronic resource] https://dendrit.ru/page/show/mnemonick/biohimiya-pitaniya/ (accessed 12 March 2019) (in Russian)

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INFLUENCE OF PROFESSIONAL PHYSICAL LOADS ON THE FUNCTIONAL INDICATORS OF DENTAL STATUS

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Annotation. The article presents the results of the assessment of occlusal-articulation parameters of the dentofacial system of athletes. During the study, the presence of a “chewing apparatus dysfunction” among athletes in 25.5% was found. According to T-scan III, occlusion disorders are characteristic of all athletes and manifest themselves in premature and super contacts when teeth are closed. The obtained results dictate the need for the development of new therapeutic and preventive methods of correction in athletes.

Key words:occlusion, athletes, dental status.

Introduction

According to the WHO recommendation, maintaining oral health is one of the leading aspects of the overall health and well-being of society [3].

Regular exercise is essential for health promotion. But at the same time, professional athletes are characterized by high physical and emotional stress during training and sporting events. This fact affects the state of the maxillofacial muscles, фthe temporomandibular joint, articulation and occlusion, the condition of the hard tissues of the teeth and periodontal. Taking into account the possible influence of the dental status on the general state of health,it seems relevant to assess the dental status of this category of persons [1, 2].

The aim of the study is to assess changes in occlusive-articulation parameters of the dentition of athletes.

Materials and methods

The study of dental status was conducted in 2016-2017 on the basis of a multidisciplinary dental clinic of USMU. During this period, 52 athletes of different levels of fitness were engaged in strength sports in different periods of the training