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Periodontal Inflammation in Patients with Iron Deficiency

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Abstract
iron deficiency in the body is an important medical and social problem, causing the development of such a common pathology as iron deficiency anemia, in which the metabolism of proteins and minerals is disrupted, which leads to functional and morphological changes in all organs, including the tissues of the mucous membrane oral cavity and periodontium. In addition, the number of cases of iron deficiency is increasing, which also leads to a hypoxic state in the body, as a result of which the trophism of the oral mucosa, including organs and systems, is disrupted, resulting in the development of caries and periodontal diseases that affect the quality of life of patients.

Keywords: chronic generalized periodontitis, iron deficiency anemia, ferritin, transferritin, iron deficiency.

Considering the widespread incidence of iron deficiency among various population groups (1.1-80%), it can be assumed that this disorder of microelement metabolism affects the course and development of inflammatory diseases in the body as a whole, including in the tissues of the oral cavity (5, 7).

When examining the oral cavity of patients in this group, attention is paid to the presence of angular cracks, “adhesions” in the corners of the mouth. Glossitis - characterized by pain in the tongue and a feeling of cracking, redness of its tip, and then atrophy of the papillae ("lacquered" tongue); in most cases there is a tendency to periodontal disease and caries.

The purpose of the study is to study the role of iron deficiency in the diagnosis of chronic generalized periodontitis and to improve treatment and preventive measures.

Object and methods of research.

As the object of the study, 100 patients with chronic periodontal pathology in an iron deficiency state and its underlying condition were taken, as well as to justify the questionnaire we developed, in which examination and treatment were carried out. When implementing the assigned tasks, dental,

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general medical, laboratory and instrumental, biochemical, and statistical research methods were used.

Results and discussion.

The oral cavity has a close anatomical and physiological interaction with various body systems. When homeostasis is disturbed and various somatic diseases occur, pathogenetically limited lesions of the oral mucosa occur. The stability of the chemical composition is one of the important and inevitable conditions for moderate activity of the body, and the oral mucosa can be an indicator or mirror of pathological processes occurring in general. Diseases caused by environmental, occupational, climatic and geographical factors, with deviations from the chemical elements contained in the human body, accordingly, lead to widespread health problems, including the condition of the oral mucosa, sometimes even before the main clinical signs of the pathological process (8.3).

Iron is considered an essential element; it is part of hemoglobin, myoglobin, cytochromes, participates in a number of redox reactions, and plays an important role in hematopoietic processes. The average adult human body contains about 3-4 g of iron (about 40 mg Fe/kg body weight in women and about 50 mg Fe/kg body weight in men). Most of this trace element (60%, or 2 g more) is contained in hemoglobin (Hb), about 9% in myoglobin, about 1% in the enzymes gem and nogem . 25-30% of iron ferritin protein is also deposited in the reserve (4.9), in combination with hemosiderin.

In patients with iron deficiency anemia, there is insufficient saturation of organs and tissues with oxygen. Because of this, their trophism is disrupted and the function of the salivary glands is disrupted. This leads to a decrease in its secretion and a decrease buffer capacity. This condition, in turn, provokes a tendency to dental caries. As a result, various dental signs are noted, in particular, the number of carious teeth increases, pigmentation and pathological abrasion of the enamel are noted, paresthesia of the oral mucosa, dryness, atrophy of the mucous membrane of the tongue are observed, as well as cases of occurrence of pathologies of the hard tissues of the tooth, periodontal and oral mucosa .

In addition, the discomfort and pain associated with dental caries, in turn, causes difficulty in eating, which leads patients to consume less of certain foods that contain iron, a condition that causes the development of TCC. According to a number of authors, the observed incidence of dental caries in 5-year-old children is 51.9%, and in 12-year-old children - 53.8% (1.10).

One of the vital microelements of the human body is iron. Iron deficiency in the body is an important medical and social problem, which is the cause of the development of pathologies such as iron deficiency anemia and cases of iron deficiency. In such cases, protein and mineral metabolism is

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disrupted, which leads to functional and morphological changes in all organs, including the mucous membranes of the oral cavity and periodontal tissues.

Cases in which there is a deficiency of iron in the body are observed in approximately half of the world's population. According to the World Health Organization, about 4 billion people suffer from various levels of iron deficiency, representing more than 60% of the world's population. Of these, iron deficiency anemia accounts for about 2 billion, making it the most common disease in the world and the most common type of various anemias (90%), contributing to the important role of humans among the 38 most common diseases (1,3).

The need for iron in the body increases during growth, pregnancy, and during blood loss (including during menstruation). Malnutrition can also occur when not enough is taken in food (eating disorders, etc.), in stool, with chronic diarrhea, after gastrectomy, including bleeding from the stomach and duodenum, which is associated with gastric ulcers and duodenum, etc. Iron deficiency is defined as a deficiency of its total amount, associated with an increase in the need for iron in the body, leading to a negative balance, and a discrepancy between its intake or loss (4.7).

Iron is an essential element; it is part of hemoglobin, myoglobin, cytochromes, participates in a number of redox reactions, and plays an important role in hematopoietic processes. In the adult human body, the average iron content is about 3-4 g (about 40 mg Fe/kg body weight in women and about 50 mg Fe/kg body weight in men). Most of this trace element (60%, or 2 g more) is contained in hemoglobin (Hb), about 9% in myoglobin, about 1% in enzymes. 25-30% iron ferritin protein, and also in reserve in combination with hemosiderin.

Even individuals with iron deficiency will have insufficient amounts of iron and will not be able to maintain moderate physiological function in tissues that depend on this trace element.

According to the literature, the effect of IDA on the functioning of the body has been studied in sufficient detail and described in numerous studies. But the impact of cases of iron deficiency on human life, including the development of pathology of the oral mucosa, as well as the exacerbation of the disease, has not been sufficiently studied.

Iron deficiency condition - this is the “underwater, invisible” part of the iceberg, the general part of iron deficiency , in which there is a hidden deficiency of the microelement, a decrease in its reserve and insufficient composition in the tissues, but still no anemia is observed (2.6).

In patients with IDA, there is insufficient saturation of organs and tissues with oxygen, therefore, their trophism is disrupted, the function of the salivary glands is disrupted, which leads to a decrease in salivary secretion and a decrease in buffering capacity, this condition, in turn, provokes a tendency to dental caries. As a result of this, various dental signs are noted, in particular, the number of carious teeth increases, discoloration and pathological washing away of the enamel are noted, paresthesia

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and dryness of the oral mucosa, atrophy of the mucous membrane of the tongue are observed, as well as cases of the appearance and severity of pathologies of hard dental tissues, dysfunction teeth.

An association between dental caries and IDA has been observed in several studies. According to one Canadian study, about 80% of children undergoing dental surgery for severe early caries had low ferritin levels, 28% had low hemoglobin, 6% were classified as iron deficient, and 11% had IDA. Although the term is often used interchangeably, there are differences between iron deficiency and anemia. Anemia is a condition in which there is a low level of red blood cells or hemoglobin, which indicates poor nutrition and is usually diagnosed when the concentration of hemoglobin is low, which, incidentally, is sometimes used as an indirect indicator of iron deficiency.

Diagnosis of IDA should be based primarily on laboratory parameters. The most informative indicators for determining IDA are the level of hemoglobin in capillary blood, the number of red blood cells and the hematocrit index, ferritin in the blood serum, the percentage of transferrin saturation with iron (coefficient), the number of red blood cells in hypochromia . Less reliable indicators are the level of iron in the membrane and determination of the total iron-binding capacity of the membrane (1, 4).

Condition of the oral mucosa with iron deficiency

Iron deficiency is secondary in most cases. In general, two groups of cases can be distinguished that lead to iron deficiency. The first group includes physiological and pathological conditions associated with a high need for iron in the body. These include periods of strong growth of children, pregnancy, breastfeeding, acute and chronic blood loss, etc. The second group of reasons are conditions associated with insufficient intake of iron into the body: insufficient nutrition of iron “with heme ”, hunger, malabsorption in the intestines and etc. Among the causes of iron deficiency, the following pathological conditions are also important. For example, infectious diseases, mainly chronic and recurrent forms, can slow down iron absorption. Some parasitic diseases: nematodes, trichuriasis, amoebiasis, schistosomiasis can lead to chronic blood loss, which causes iron deficiency. A stroke or childbirth can lead to acute and chronic blood loss with subsequent development of iron deficiency and anemia. The nutritional factor has a great influence on the prevalence of iron deficiency. A diet low in iron, or rather its sufficient composition, foods with low biological absorption, insufficient supply of nutrients necessary for the creation of blood, in its composition - folic acid, vitamins A, C, protein, copper, etc., often lead to the occurrence of iron deficiency in the body. The same nutritional factor is considered the most common cause of iron deficiency among populations of low socioeconomic status (3, 5).

One of the important problems of deficiency in young women is the peculiarities of nutrition: follow a “diet”, exclude or significantly limit the consumption of foods containing essential iron from the diet, overeat on foods that inhibit the absorption of iron (chocolate, tea, coffee, cereals, etc.). .

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Diagnosis of iron deficiency anemia is usually not difficult. But before the TCC phase, iron deficiency is determined satisfactorily.

Latent iron deficiency is characterized by a decrease in the iron content in the reserve (ferritin level decreases); subsequently, a deficiency of transported iron is added (the percentage of transferrin saturation with iron decreases, the ability of the blood membrane to bind iron increases). The reserve ends completely, and erythropoiesis has the character of “iron deficiency” (the content of hypochromic erythrocytes and the concentration of protoporphyrin in erythrocytes increases). At all stages, peripheral blood counts are moderate, which significantly complicates the diagnosis of iron deficiency. Only in the final stages does IDA develop (clinically pronounced iron deficiency).

Ferritin is considered an important indicator for assessing iron stores in the body. Normally, its concentration is about 40 µg/l, with a content of at least 60-140 µg/l. a value of less than 15 mcg/l, although other indicators are normal, indicates the presence of iron deficiency.

Low ferritin values in combination with low red blood cell and hemoglobin levels indicate that anemia is of the nature of iron deficiency. In an inflammatory response, it should be noted that the detectable serum ferritin level may be either “falsely moderate” or “falsely high,” since ferritin and acute phase proteins are affected equally. Therefore, it is recommended to paralyze S-reactive protein levels along with ferritin levels. For this reason, ferritin indications cannot provide information beyond 6 weeks postpartum (3, 8).

When the amount of hemoglobin, including red blood cells, decreases, anemic syndrome and a decrease in iron reserves appear; transient iron deficiency cases lead to insufficient supply of tissues, including the oral mucosa, with oxygen. Patients complain of general malaise, rapid fatigue, decreased performance, dizziness, tinnitus, rotation of “tiny flies” before the eyes, rapid heart rate, hangover during physical exertion, the appearance of fainting situations, decreased mental performance, memory, and drowsiness. The complaints of patients do not always correspond to the level of hemoglobin or red blood cells, since the body becomes fatty due to iron deficiency, and patients get used to their own malaise, linking it with fatigue at work, psycho-emotional stress, and some other factors.

When examining the object, the skin and visible mucous membranes appear to be flowing; it may also have a green tint ("chlorosis"). The skin has a yellowish, waxy tint, sometimes only felt around the mouth (chlorotics have a "yellow fur" trait). Characteristic will be the absence of redness in the cheek area. In the morning, swelling is observed - “bags” above and under the eyes, bolts, hens, swelling in the face. The development of anemia against the background of ID leads to myocardial dystrophy syndrome. There is a predisposition to arterial hypotension. Changes in the cardiovascular system occur when N levels decrease to 80-70 g/l; when N concentrations are less than 40 g/l, the likelihood of developing an anemia cluster is higher.

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Sideropenic syndrome occurs due to ID in tissues. Taste disorders - there is a slight irresistible desire to add something unusual or edible to food (chalk, tooth powder, coal, clay, sand, ice), as well as to eat raw dough, perch, cereal, this symptom is often found in children and adolescents, but older women also have a lot of trehride ; there is a tendency to eat hot, salty, hot, spicy foods. Smell is a violation of cognitive ability - a tendency to smells (smells of gasoline, kerosene, acetone, varnish, paint, etc.), which are perceived by others as unhappy. Severe muscle weakness and fatigue, muscle atrophy and decreased muscle strength are caused by a deficiency of myoglobin and enzymes involved in tissue respiration. Dystrophic changes occur in the skin and its parts (dryness, irritability, tendency to rapid formation of cracks in the skin; brittle hair, fragility, loss, early whiteness; thinning of nails, fragility, cross scratches, fragility; a sign of koilonixia - spoon-shaped destruction of nails).

It has been established that inflammatory diseases of the oral mucosa develop due to microcirculation disorders; they are called hypoxia and severe disorders of tissue metabolism, in which the accumulation of peroxidation products of free oxygen radicals and lipids, toxic to tissues, occurs. For this reason, there has been increased interest in the use of antioxidants in the treatment of periodontal diseases). Data are provided on the successful use of immunostimulating drugs in the treatment of periodontitis (5,8,13).

Prevention and treatment of pathologies of oral tissues due to iron deficiency.

Iron is the main method of preventing cases of deficiency and is considered a complete diet and a sensible agenda. In addition to foods high in iron, your diet should include foods that contain iron supplements, such as copper, zinc, folic acid, vitamin B12, as well as caffeine and ascorbic acid. In accordance with the modern theory of iron absorption from foods, precious iron, that is, iron contained in products of animal origin, has maximum bioavailability. The richest sources of temirga are rabbit, beef, and machine gun (tongue, liver). In plant foods, as well as in milk and fish, iron is found in the form of nohemes , which are considered poorly biosorbable . It should be taken into account that plant products may contain factors that inhibit intestinal ferrosorption . Such factors include soy protein, tannins, oats, phytates , phosphates, dietary fiber, polyphenols. In turn, ferrosorption is promoted by substances such as milk and ascorbic acid, folic acid, copper, and selenium.

When it comes to the oral mucosa, periodontal diseases are difficult to treat and lead to a significant decrease in the functionality of the dental jaw, which is characterized by a long rehabilitation period.

Complex treatment should be aimed at moderate restoration of homeostasis of periodontal tissues, which allows the patient to save teeth and prevent relapse of the disease. Periodontal treatment should include mechanical, antimicrobial, and anti-inflammatory therapy that addresses local and systemic risk factors (4, 13). Treatment is based on an understanding of the etiological factors and pathogenesis of the disease. Predicting the course of periodontal diseases and the effectiveness of

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their treatment involves assessing a number of components: the patient's age, his immune status, genetic predisposition, the presence and nature of concomitant pathology, bad habits, socio-economic conditions, the patient's attitude towards the disease, and the individual's ability to maintain adequate oral hygiene.

Professional oral hygiene is one of the elements of the basic treatment of periodontal diseases, it includes stimulating the patient to daavalash , correction of individual oral hygiene, remineralization of the gums and underdevelopment of the gums, subsequent monitoring of the level of hygiene at all stages of treatment. Tooth extraction is carried out using hand instruments (hooks, curettes), ultrasonic devices (Piezon , vector), air-abrasive systems (Air- Flow), rotary instruments (bars, brushes). These measures ensure optimal treatment of the root surface and are defined as scaling and root planning. At this stage of treatment, it is necessary to get rid of all plaque factors: cavities in the neck, hanging lateral fillings, orthopedic structures that do not work. Oral hygiene should be performed at every appointment to monitor maintenance of dental wear (11,12).

The pathogenetic treatment stage involves local anti-inflammatory therapy and general treatment. Loss of inflammatory conditions through drug treatment is one of the most challenging problems in the treatment of periodontal disease. It must be prescribed on the basis of anti-inflammatory means and, limiting in time, taking into account the characteristics of the pathological process. Currently, steroidal and non-steroidal anti-inflammatory drugs, keratoplastics , immunomodulators, and enzyme agents are actively used. The most rational forms of drugs for dental preparations are films and gels, which ensure long-term communication of drugs with the mucous membrane of the gums, uniform and long-term access of drugs to the periodontium. Numerous studies have been conducted to examine the effects of various antibacterial drugs on periodontal pathogens : doxycycline , clindamycin , metronidazole, and chlorhexidine-retaining antiseptic combinations. In order to have a reliable bacteriostatic and bactericidal effect, it has been proven that antibacterial therapy must be carried out only in full courses, since taking them without a system or in an insufficient period of time can lead to increased stagnation of the microflora and the occurrence of treatment complications. When laser antibacterial photodynamic therapy began to be used in the treatment of periodontitis, new possibilities emerged, based on which photosensitized microorganisms were absorbed in a very short time - in the range of 60-120 seconds - under the influence of low-intensity laser radiation. This method appears to be more effective than standard drug therapy (6, 12).

It has been established that inflammatory diseases of the oral mucosa develop due to microcirculation disorders; they are called hypoxia and severe disorders of tissue metabolism, in which the accumulation of peroxidation products of free oxygen radicals and lipids, toxic to tissues, occurs. For this reason, there has been increased interest in the use of antioxidants in the treatment of

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periodontal diseases. There is evidence of the successful use of immunostimulating drugs in the treatment of periodontitis (3, 8).

In addition to the above, in order to accelerate the elimination of the pathological process on the oral mucosa, complex treatment of patients with IDA should be aimed at the maximum possible elimination of the main causes leading to the development of anemia, as well as at the rapid restoration of iron content in the body. When treating IDA, you must adhere to the following basic principles:

1. restoration of iron deficiency only with the help of diet therapy is impossible without iron supplements;
2. IDA should be treated with iron, especially oral medications;
3. After a moderate increase in the level of ferritin in IDA, in order to restore the iron reserve in the body, treatment should be continued for at least another 4-8 weeks.
4. In addition to local treatment of the oral mucosa, IDA is associated with improvement of IDA, tissue trophism and reduction of hypoxia, improvement and acceleration of faster recovery and regenerative processes (10, 12).

Conclusions.

Thus, the collected foreign and domestic data on the prevalence of cases of iron deficiency indicate that it is fraught with many and a number of factors: gender, age, environmental factors, socio-economic living conditions, and the presence of pathological conditions. All practicing doctors, including dentists, should remember this for the purpose of early treatment, for timely diagnosis of suspicions and diagnosis. The state of iron deficiency does not bypass the oral mucosa, including periodontal disease. Dentists often encounter various forms of periodontal pathology and iron deficiency conditions, sometimes they suspect that there is a state of iron deficiency in patients who are among the first.

The results of the study show that in patients with iron deficiency there is a decrease in functional metabolic activity, manifested structural and cytochemical changes in the granularity of the cytoplasm of neutrophil leukocytes.

All of the above changes in oral tissue were observed in patients with iron deficiency anemia and iron deficiency status. In the case of iron deficiency, there is not enough information in the modern scientific literature about changes in the mucous membrane and periodontal tissues. Therefore, in order to early identify iron deficiency in the body and prevent its consequences, as well as improve dental treatment methods for patients in this group, we set ourselves the task of in-depth study of the

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condition of the periodontium, including the oral mucosa, and tissues of patients in which it is present.

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