

**OSTEOPOROSIS AS A CAUSE OF INFLAMMATORY
PERIODONTAL DISEASES**

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Annotatsiya: Osteoporosis is a common systemic skeletal disease of the group of metabolic osteopathies , the characteristic manifestations of which - a decrease in bone mass and a violation of its microarchitectonics - cause a decrease in bone strength and an increased risk of fractures [9,11,54,95]. Currently, osteoporosis is one of the urgent problems of clinical medicine. This is primarily due to the high prevalence of this pathology in the modern population [87,95,96,213].

Keywords: Background, Modern, Violation, Recently.

Among children and adolescents, the incidence of osteopenic conditions is very high. According to the generalized data of L.A. Shcheplyagina et al . (2002), a decrease in bone mineral density below acceptable values and, accordingly, 30 to 50% of people in these age categories have osteopenic syndrome [126]. Today, no one doubts the fact that the origins of osteoporosis in adults should be sought in the period of intensive growth and differentiation of bone tissue, since the maximum increase in tissue mineral density occurs in the childhood and adolescent periods of ontogenesis [62,75,145,196]. According to T.A. Korotkova (1999), the adolescent period of a person's life is decisive for the influence of various factors on the formation of the so-called bone mass peak [61]. Recently, dentists have shown increasing attention to the problem of osteoporosis [142], but there are few works devoted to this problem. Studies by a number of authors [37,38,42] have established that systemic osteoporosis can be a risk factor for the development of generalized periodontitis, and generalized periodontitis, in turn, is one of the early signs of systemic osteoporosis. However, the age criteria for the formation of osteoporosis in children have not yet been established due to the fact that until recent years, the study of this pathology was carried out only in the elderly. As you know, in the complex of periodontal tissues, one of the components is the alveolar bone. In a generalized process, collagenases , elastase , cathepsins , and other components of neutrophil granules are actively secreted into the lesion , leading to bone tissue destruction [9,11,19,27,76,108,147]. It is quite clear that slowing down this process is the main task of the dentist to prevent tooth loss. The unity of the periodontal tissue complex is due to the commonality of their ontogenetic development. The formation of the alveolar bone, interdental bony septa, the formation of the dental alveoli coincide in time with the formation of the tooth root. During the period of eruption of temporary teeth, modeling of the alveolar bone takes place, in which remodeling processes prevail

over resorption, providing an increase in its bone mass. The final maturation of the alveolar bone coincides with the closure of the apexes of the roots of permanent teeth, which gives reason to consider the alveolar bone as the youngest in the body, dynamically responding to the adverse effects of external and internal factors. The processes of formation of the alveolar ridge, its modeling continue up to 18-20 years [15].

During the period of maturation of the alveolar bone and after its completion, bone tissue mineralization is observed, with the participation of calcium, phosphorus, trace elements (fluorine, magnesium, aluminum, iron), as well as vitamins C, B2, A, E and others, an increase in bone mass and density bones. An important role in the development of the alveolar bone, its ossification is played by hormones of the adrenal glands, pituitary gland, gonads, as well as enzymes - alkaline and acid phosphatases, proteases [42, 43].

Violation of the functional state of the "hypothalamus - pituitary - gonads" system contributes to the deterioration of the processes of mineralization of the bone tissue of the skeleton and alveolar bone, leading to the formation of a low peak of bone mass [59,76]. It has been established that changes in periodontal tissues in most adolescents during puberty develop against the background of diencephalic disorders [85]. Juvenile osteoporosis, juvenile gingivitis, and periodontitis are also common during puberty in adolescents [59].

Thus, the formation of peak bone mass and the occurrence of its disorders, that is, the possibility of developing an osteopenic state, are influenced by numerous factors, including heredity, the course of puberty, the pace of physical development, hormonal imbalance, nutritional errors, the level of physical activity, bad habits and etc.

The decrease in bone mass in osteopenia and osteoporosis occurs due to an imbalance in remodeling processes. There are 2 main directions of bone metabolism [85]. There may be a situation in which high resorption is not compensated by an adequate increase in osteogenesis (osteoporosis with high bone turnover). With another mechanism for reducing bone mineral density, on the contrary, the intensity of synthetic processes decreases with a normal level of resorption of the newly formed bone tissue (osteoporosis with low metabolism). One and the same patient may have signs of both types of osteoporosis at the same time.

A feature of osteopenic conditions in childhood and adolescence is the absence of specific clinical symptoms when they occur [59]. Therefore, in the diagnosis of these conditions, bone densitometry plays a huge role, which makes it possible to diagnose a symptom of a decrease in bone mineral density very early. Modern densitometers make it possible to recognize a loss of 2–5% of bone mass [96].

Biochemical research methods are used to assess the state of osteogenesis, which help to identify markers of bone metabolism in blood serum and urine. Among them

are non-specific (parathyroid hormone, calcium, phosphorus, 25 (OH) - vitamin D, alkaline phosphatase activity) and highly specific indicators that are characteristic of bone tissue. These include: osteocalcin, bone fraction of alkaline phosphatase, C-terminal telopeptides, hydroxyproline [77,78,129].

According to L.A. Shcheplyagina et al. (2003) the determination of the listed biochemical parameters is essential for the diagnosis of osteopenia in children and adolescents [125], since they make it possible to assess:

- the functional state of bone-forming and bone-destroying cells, and thus, the final changes in resorption or neoplasm of osteoid tissue;
- the effectiveness of treatment, prevention and prognosis of the course of the disease.

Among the markers listed above, osteocalcin and C-terminal telopeptides are considered the most informative. The first of them reflects the intensity of bone formation processes, the second - resorption [101].

Osteocalcin is one of the most common bone matrix proteins, belonging to non-collagen proteins. It includes 49 amino acids and contains 3 gammacarboxyglutamic acid residues capable of binding calcium ions. This protein is synthesized mainly by osteoblasts and its level correlates with the processes of bone tissue formation [172].

C-terminal telopeptides are a degradation product of type 1 collagen (the most common variant of this protein, characteristic of bone tissue). Its concentration in blood serum reflects the functional activity of osteoclasts and indicates the intensity of the process of bone resorption [78,172].

Data on the determination of the above markers of bone metabolism in inflammatory periodontal diseases in children and adolescents were not found in the available literature. However, studies of these indicators in gingivitis and periodontitis, in our opinion, will allow us to identify additional mechanisms for the formation of chronic, difficult-to-treat periodontal diseases, assess their severity and justify the use of additional methods of treatment.

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