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PERIODONTAL CONDITION IN PATIENTS WITH BRONCHIAL ASTHMA: INFLUENCE OF THE DISEASE AND ITS PHARMACOTHERAPY

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Abstract. Bronchial asthma is a chronic inflammatory condition affecting the respiratory tract, characterized by airway narrowing and excessive mucus production, which leads to difficulty in breathing. A hallmark of this disease is the episodic obstruction of airflow, with the severity of these obstructions varying over short periods. Importantly, these changes are reversible; in some cases, they may resolve spontaneously, while in others, they require medical intervention. Treatment for bronchial asthma primarily involves the use of bronchodilators, corticosteroids, and anticholinergic medications, often administered through inhalation using aerosol dispensers or nebulizers. The effects of these pharmacological treatments on oral health are a subject of considerable discussion among dental professionals. Research indicates that patients who frequently use these medications are at an increased risk of developing dental problems such as cavities, erosive enamel lesions, oral candidiasis, and inflammatory periodontal diseases.

Bronchial asthma is one of the leading chronic respiratory diseases, with a significant impact on the quality of life of patients. According to the World Health Organisation, the number of asthma patients exceeds 300 million people, with a projected increase of another 100 million by 2025 (Global Initiative for Asthma, 2020). The pathophysiological basis of the disease is persistent inflammation of the bronchial mucosa, accompanied by increased sensitivity of the airways to various stimuli. The clinical picture includes episodes of wheezing, coughing fits, a feeling of tightness in the chest and dyspnoea. Asthma is characterised by intermittent bronchial obstruction, the severity of which varies both overnight and over a long period of time, remaining potentially reversible both spontaneously and under the influence of medication. The main goals of bronchial asthma treatment remain the suppression of inflammatory processes in the airways and restoration of their patency. Accordingly, therapy is conventionally divided into two directions: management of exacerbations and maintenance of long-term control of the disease. Drugs of the first group (emergency drugs) include short-acting bronchodilators (beta-2-agonists), systemic corticosteroids and anticholinergic agents. Long-term control is achieved through the use of inhaled corticosteroids, prolonged bronchodilators and leukotriene receptor antagonists (GINA, 2020). Most medications used for asthma are delivered by inhalation, via aerosol inhalers, powder inhalers or nebulisers. To achieve optimal therapeutic effect, it is essential to teach patients the correct inhalation technique and monitor compliance. In some cases, the frequency of inhalation can be as high as 4 times a day and the therapy can last for many years, making the effects of the drugs on the oral tissues long-lasting and significant. With the progressive increase in the incidence of bronchial asthma, the dental community is increasingly confronted with the consequences of long-term inhalation therapy in these patients. According to a number of studies, the use of beta-2-agonists and glucocorticosteroids is accompanied by a decrease in salivary secretion rate, which leads to impaired salivary defence. For example, Ryberg et al. (1987) found that in patients with bronchial asthma receiving regular drug therapy, salivary secretion was reduced by 26% for total saliva and 36% for parotid saliva compared to healthy individuals. In addition to a decrease in volume, a decrease in protein,

amylase, hexosamine, lysozyme and secretory IgA concentrations in stimulated saliva was noted (Ryberg et al., 1987). Such a change in the qualitative and quantitative composition of saliva disrupts the processes of remineralisation of hard dental tissues, promotes colonisation of cariesogenic and pathogenic microorganisms, creating conditions for the development of multiple caries, erosive lesions of enamel, candidiasis and inflammatory periodontal diseases. These processes are especially relevant in patients with chronic inflammatory diseases of the gingival mucosa, in particular chronic generalised catarrhal gingivitis. Reduced salivation in combination with constant medication load in bronchial asthma increases local inflammatory reactions, impairs the barrier function of the mucosa, increasing its susceptibility to microorganisms and external irritants. As a result, such patients often have more pronounced swelling, hyperaemia of gums, tendency to bleeding, which requires a special approach to both treatment and prevention of inflammatory periodontal diseases. Given the significant impact of bronchial asthma and the specifics of its therapy on the state of periodontal tissues, especially in the context of chronic catarrhal gingivitis, there is a need for a detailed analysis of the available literature data and the development of optimal approaches to the prevention and treatment of inflammatory gingival diseases in this category of patients. The role of saliva in maintaining oral health in patients with bronchial asthma Saliva fulfils a number of vital functions, providing maintenance of oral homeostasis, protection of hard and soft tissues, as well as participating in the prevention of inflammatory processes. In norm its composition is balanced, which contributes to the preservation of biochemical balance and prevents the aggressive effects of external factors on the mucous membrane and teeth. One of the key functions of saliva is to moisturise and protect the oral mucosa, which is achieved by mucins, glycoproteins and water. These components form a thin seromucinous layer that prevents microbial adhesion and provides a barrier effect, preventing mechanical damage and irritation of the oral epithelium (Dodds et al., 2005). In chronic generalised catarrhal gingivitis, especially in patients with bronchial asthma, adhesion of pathogenic bacteria against the background of reduced salivary secretion can increase inflammatory changes, exacerbating swelling and hyperaemia of the gums. The cleansing and flushing ability of saliva also plays an important role. Its water content removes food debris, necrotic epithelium, non-viable cells and microorganisms, which reduces the bacterial load on periodontal tissues. In patients with bronchial asthma taking inhaled beta-2-agonists, a decrease in saliva volume can lead to the accumulation of plaque and drug residues, which creates conditions for persistent inflammation in the gingival margin. The buffering function of saliva ensures the maintenance of acid-alkaline balance, which is extremely important for the prevention of enamel demineralisation and regulation of remineralisation processes. The main components responsible for this are bicarbonates, phosphates, calcium, statin and fluoride. These elements maintain the mineral structure of teeth, contribute to the repair of enamel micro-damage and neutralise acids formed by plaque bacteria (Humphrey & Williamson, 2001). In patients with asthma, a decrease in saliva secretion, especially with prolonged use of inhaled corticosteroids, leads to impaired buffering properties, creating conditions for accelerated development of dental caries and inflammatory periodontal diseases such as catarrhal gingivitis. The antimicrobial activity of saliva is due to the content of secretory immunoglobulin A, lysozyme, lactoferrin, lactooxidase, mucins, cysteine and histatins. These biologically active substances prevent adhesion of microorganisms to mucosal and dental surfaces and inhibit the growth of pathogenic bacteria and fungi (Tenovuo, 1998). However, in patients with bronchial asthma, especially with the constant use of inhaled corticosteroids, there is a decrease in the concentration of secretory IgA and other protective factors of saliva, which contributes to the development of candidiasis and inflammatory processes in periodontal tissues. Decrease in the above mentioned functions of saliva in patients taking bronchodilators and

glucocorticosteroids for a long time creates special conditions for the development of chronic generalised catarrhal gingivitis. Gingival inflammation in this group of patients often occurs against the background of xerostomia, increased salivary viscosity, impaired remineralisation of enamel and pathogenic microflora activation, which requires an individual approach to the prevention and treatment of inflammatory periodontal diseases. Factors contributing to oral health deterioration in patients with bronchial asthma and preventive measures.

Patients with bronchial asthma have an increased incidence of dental disease due to a number of factors. For example, the decrease in salivary flow caused by beta-2-agonists contributes to a decrease in the natural cleansing function of the oral cavity, accumulation of carbohydrates, decreased buffering capacity and, consequently, an increased risk of dental caries. In addition, some antiasthmatic drugs contain fermentable carbohydrates, which also provokes the growth of Streptococcus mutans and Lactobacillus spp. involved in the pathogenesis of dental caries (Ryberg et al., 1987).

Conclusion. Bronchial asthma and its therapy have a multifactorial influence on the state of periodontal tissues. Disruption of saliva secretion, immunological imbalance, decreased bone mineral density and increased risk of candidiasis create prerequisites for an aggressive course of inflammatory periodontal diseases, which requires the development of individual preventive and therapeutic strategies for this category of patients.

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