

**DEVELOPMENT OF SECONDARY PREVENTION,  
TREATMENT AND PROTECTION OF DENTAL HEALTH FOR  
MILITARY PERSONNEL, NURSING STAFF AND EXTREME  
CLIMATIC CONDITIONS**

**Mirraximova S.Sh**

*Tashkent state medical university*

[mirraximovas@gmail.com](mailto:mirraximovas@gmail.com)

**Jaxonaliyev B.U**

*Tashkent state medical university*

[jaxonaliyevb94@gmail.com](mailto:jaxonaliyevb94@gmail.com)

<https://orcid.org/0009-0008-5474-2671>

**Abstract.** *The development of pathological processes in the periodontium is influenced by both local and systemic factors. Of the numerous local factors, the most important is the presence of plaque, the removal of which is essential for adequate treatment. Periodontal diseases of inflammatory origin are considered to be the main dental diseases, as for many decades they have been the most common among other diseases of the maxillofacial region.*

**Key words.** *Periodontium, individual oral hygiene, maladaptive processes, adhesion, sensitivity, bioactive substances.*

Periodontal diseases vary widely in their etiology, pathogenesis, and clinical manifestations. Chronic generalized periodontitis is characterized by the development of profound inflammatory and destructive processes, and the increasing incidence of these diseases necessitates the search for new treatment and prevention methods. Previous studies examining the etiopathogenesis of periodontitis allow for more effective prevention and the application of new treatment methods [6].

Both local and systemic factors influence the development of pathological processes in the periodontium. Among the numerous local factors, the most important is the presence of dental plaque, the removal of which is essential for adequate therapy. General factors include diseases of internal organs and systems, occupational hazards, various stress factors, consumption of coffee and tobacco, which disrupt oxidative processes, increase the permeability of biological membranes and change microhemodynamics in periodontal tissues, while local disturbances of blood flow in the periodontium are combined with systemic manifestations of endothelial dysfunction [9].

A study of dental diseases in patients with occupational exposures has revealed similarities in the pathogenesis of oral diseases. The high prevalence of inflammatory periodontal diseases is explained by poor oral hygiene and a large number of risk factors for dental diseases, including exposure to harmful occupational factors, including physical exertion, emotional stress, and hazardous work factors. Furthermore, the health of highly qualified specialists exposed to adverse occupational exposures is directly linked to their professional longevity; deterioration in health, including dental health, inevitably leads to a deterioration in professional performance [9].

According to domestic and international literature, stress, first described in dentistry by H. Selye in 1954, plays a significant role in the pathogenesis of periodontal diseases. Chronic psychophysical stress disrupts the body's adaptation and engages various levels of homeostasis regulation. This impacts the condition of the periodontium, where destructive processes occur, neurohumoral mechanisms are mobilized, and immunosuppression occurs [3].

Stressful exposure to the body leads to the development of muscular-articular dysfunctions, which, in turn, overloads periodontal tissues and triggers an inflammatory-destructive process. This disrupts hemodynamics and capillary permeability, leading to edema and diapedesis of blood cells,

erythrocyte aggregation, embolism, and vascular thrombosis. This results in periodontal tissue hypoxia, leading to structural disruption. Musculoskeletal dysfunctions of the maxillofacial region as a result of stressful working conditions are observed in employees of extreme professions, which leads to violations of occlusion, interalveolar distance and, ultimately, to overload of periodontal tissues [3,5].

In addition to stress, there are other occupational factors, such as toxic substances, vapors, industrial noise, vibration, and aerosols. Exposure to these factors leads to metabolic disturbances in the human body, which also causes pathological changes in the oral cavity [4].

As is known, the oral microbiota plays a key role in the pathogenesis of periodontitis and exists in two forms: film and planktonic. The biofilm contains virtually all members of the oral microbiota, with varying amounts in different individuals at different stages of life.

Biotope formation undoubtedly occurs as a result of the vital activity of oral microorganisms, but the state of the macroorganism, environmental factors, diet, lifestyle, and occupational hazards play a decisive role [5]. Current understanding of dental plaque classifies it as a typical variant of microbial biofilm (a symbiosis of various bacterial species) that forms in a liquid environment. Considering dental plaque as a microbial biofilm leads to the discovery of the most effective methods for its identification, study, and mechanisms of influence on the formation and destruction of formed biofilm [3].

The ecological advantages of biofilm include facilitated access of nutrients and metabolic cooperation of microorganisms within the biofilm, which are provided by a system of tubules surrounding bacterial microcolonies, improving access to nutrients and removing toxic metabolites, as well as the acquisition of resistance to antibacterial agents [8].

The thickness of the microbial biofilm layer can increase under the influence of various pathological factors or in the presence of additional retention points in the oral cavity in combination with poor oral hygiene. 21 Invasion, as a factor of aggression, is preceded by adhesion to cellular structures, and a sequential replacement of microorganisms occurs, which is one of the important forms of microbial interaction [5].

The fixation of periodontopathogenic microorganisms on periodontal tissues occurs after bacteria of other species create the necessary conditions for them [4]. Thus, some authors have described a certain pattern of microbial biofilm formation on the tooth surface, which is characterized as a "Spatiotemporal model of microbiocenosis formation", which implies the separation of dental plaque representatives depending on the time of surface colonization [5]. With the development of periodontal diseases, a change in the microbiocenosis occurs [6].

Moreover, in the absence of inflammation, the gingival sulcus contains a small number of mainly facultative, gram-positive bacteria, the largest group of which are cocci. Conditionally pathogenic representatives are defined as permanent taxa and can realize their pathogenicity when external conditions change [7].

With poor IGR, the accumulation of microbial biofilm leads to an inflammatory process, an increase in the volume of gingival fluid, changes in pH, oxidation-reduction potential, the composition of gingival fluid, and changes in the oral microbiota, which affects the clinical course of periodontal diseases. The high prevalence of periodontal diseases is an alarming fact, which reduces both the quality of life of patients and provokes the development of diseases of other organs and systems [12].

Numerous scientific studies have demonstrated that the prognosis for dental and many general somatic diseases depends on individual oral hygiene, and frequent recurrences of inflammatory periodontal diseases necessitate an

assessment of patients' somatic health. The decline in the functionality of the dental system due to tooth loss, the prevention of major dental diseases, and the condition of dental hard tissues are directly dependent on effective oral hygiene [18].

In addition to oral hygiene being an integral part of the treatment and prevention of dental diseases, the role of oral hygiene in combating microbial biofilm is considered by many scientific authors as a method for combating somatic diseases [6]. It is known that saprophytic microorganisms in the oral cavity often acquire pathogenic properties when introduced into a foreign environment [3].

Modern research has confirmed that there is a relationship between oral microorganisms and systemic diseases, namely, diseases of the cardiovascular and respiratory systems, Alzheimer's disease, diabetes mellitus, and premature birth. Microorganisms such as streptococci can lead to the development of infective endocarditis. In addition, streptococci can lead to the binding of fibrinogen by platelets, to their aggregation and, as a consequence, to the formation of a thrombus, and *Streptococcus sanguis* provokes an autoimmune response that leads to the development of arthritis, inflammatory processes of the periodontium, in combination with hypertension, lead to associated disorders of regional microcirculation[4].

It has been proven that periodontal pathogens such as *Porphyromonas gingivalis* penetrate into arterial endothelial cells, thereby causing an inflammatory reaction, stimulating the formation of "foam cells" from macrophages, which leads to the development of atherosclerosis. Patients with diabetes mellitus are at risk for infection of the oral mucosa, due to a significant decrease in its barrier and reparative function; in such patients, individual and professional oral hygiene is especially important. Undoubtedly, proper, regular individual oral hygiene maintains not only dental but also somatic health of a person, and in periodontitis, oral hygiene acquires therapeutic significance[5].

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