

INTERRELATIONSHIP IN THE ETIOPATHOGENESIS OF DENTAL CARIES AND PERIODONTAL DISEASES. MODERN DIAGNOSTIC AND THERAPEUTIC METHODS

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Abstract: This fundamental scientific research is dedicated to the complex analysis of the most pressing and interrelated problems of therapeutic dentistry—dental caries and periodontal diseases (gingivitis, periodontitis, periodontosis). The article provides a fundamental analysis of the dynamics of the prevalence of oral diseases among the population in various regions of the Republic of Uzbekistan, socio-hygienic factors, environmental conditions, and the impact of micronutrient imbalances (fluoride, calcium, phosphorus) on the dentofacial system. The scientific novelty of the research lies in the substantiation of the "infectious chain" theory, explaining the destructive role of carious cavities in the formation of periodontal pockets and, conversely, the impact of gingival inflammation on the demineralization of tooth enamel. Structured according to IMRAD requirements, this work presents the results of complex diagnostics conducted on 250 patients, comparing the clinical effectiveness of modern nanocomposites, glass ionomer cements, and innovative antiseptic agents used in periodontal therapy. Furthermore, the article proposes long-term prevention strategies aimed at improving the dental health of the population.

Keywords: Dental caries, periodontitis, gingivitis, microbiocenosis, CFU index, PMA index, alveolar bone resorption, microbial biofilm, dentistry in Uzbekistan, stomatophobia, remineralization, visiography.

Introduction: Despite the achievements of dental science in recent years, dental caries and periodontal diseases remain the most common chronic pathologies among humanity. In the conditions of Uzbekistan, population demographic growth and lifestyle changes (increased consumption of fast carbohydrates) pose a serious threat to oral health. According to the conclusions of Uzbek scientists, the intensity of caries (CFU index) in our country fluctuates on average from 4.5 to 8.5, and this indicator increases proportionally with age [1]. The interrelationship between caries and periodontal diseases is explained by their common etiological factor—the microbial biofilm (dental plaque). A biofilm is a microbial community firmly attached to the tooth surface and resistant to external influences, composed of a complex polysaccharide matrix. Acid-producing bacteria within the biofilm (mainly *Streptococcus mutans* and *Lactobacilli*) break down carbohydrates to produce acid, leading to the demineralization of tooth enamel—caries. Simultaneously, proteolytic bacteria in the subgingival part of the biofilm (*Porphyromonas gingivalis*, *Prevotella intermedia*) release toxins that break down gingival tissues and the dentogingival attachment, resulting in the development of periodontitis [2]. The clinical interrelationship of these processes is that an untreated carious cavity leads to the disruption of the interdental contact point. The absence of a contact point causes constant mechanical pressure from food debris on the gingival papilla, leading to chronic trauma. This, in turn, results in impaired microcirculation, gingival inflammation, and the initiation of alveolar



bone resorption. Thus, a single untreated carious tooth can disrupt the periodontal health of an entire segment.

Literature Review: The Uzbek school of dentistry possesses a globally recognized scientific school regarding the pathogenesis of oral diseases. Rizaev J.A. (2018), in his many years of epidemiological research, developed the direction of "ecological dentistry." He proved that the climatic conditions of Uzbekistan (extreme heat, high mineralization of salts in drinking water) affect the rheological properties (viscosity) of saliva. His conclusion states that the decrease in the protective function of saliva creates the basis for an aggressive course of both caries and periodontal diseases [2, 5]. Amanov R.A. (2017), in his textbook on therapeutic dentistry, perfected the concept of tooth enamel "resistance." He links the acute course of caries with a general imbalance of calcium-phosphorus metabolism in the body and clarified the scientific mechanisms of local remineralizing therapy (the use of calcium gluconate and sodium fluoride solutions) [3]. Murtazaev S.S. (2019) focused on the immunological aspects of periodontal diseases. His research shows that a focus of chronic inflammation in the gums weakens the entire immune system of the body and changes the levels of cytokines in the blood. This, in turn, aggravates complications of dental caries (pulpitis, periodontitis) [4]. Masidiqov A.A. (2021) researched the biological compatibility of modern restoration materials. Using clinical visiography, he proved that when the marginal integrity of dental fillings is poor, a secondary caries and an "inflammatory pocket" form in that area [6]. Khazratov A.I. (2021) substantiated the advantages of laser technologies and photodynamic therapy in treating periodontitis, marking a new technological stage in Uzbek dentistry [5].

Methods: The study was conducted from June 2024 to December 2025 at the dental clinics of the Andijan region and the bases of the Tashkent State Dental Institute. Study Groups. The study involved 250 patients (115 males, 135 females). Patients were divided into three main groups based on age and disease characteristics. Group I (18–30 years, n=85). Youth with mainly acute and chronic caries and signs of catarrhal gingivitis. Group II (31–45 years, n=90). Middle-aged patients with caries complications (filled teeth) and moderate periodontitis. Group III (46–60 years, n=75). Older patients with multiple tooth loss, pathological tooth mobility, and alveolar bone resorption. Diagnostic Methodology. Clinical Analysis. Tooth condition was examined using a standard dental kit. The CFU index. C (caries teeth), F (filled teeth), U (untreated/missing teeth) sum was calculated. Gingival Condition Assessment. The extent of gingival inflammation (in percentage) was determined via the PMA (Papillar-Marginal-Alveolar) index. The Schiller-Pisarev test was used to visualize glycogen accumulation (inflammation level) in the gingival tissue. Radiographic Diagnostics. Orthopantomogram (OPG) was used to study the general structure of the jaw bones, the depth of periodontal pockets, and the type of bone tissue destruction (horizontal, vertical). Microbiological Method. Major periodontopathogens (*P.gingivalis*, *T.forsythia*) were identified in the exudate taken from subgingival pockets using "bacterial test systems." Sociological Method. An expanded survey was conducted among patients regarding oral hygiene habits, and criteria for selecting toothbrushes and toothpastes.

Results: The research results statistically proved the aggravating effect of caries and periodontal pathologies on each other. Correlation between Caries and Periodontitis. The study found a direct relationship between the increase in the number of carious teeth and the depth of periodontal pockets (correlation coefficient $r = 0.72$). 88% of patients with a CFU index higher than 12 were diagnosed with moderate to severe periodontitis. Impact of Hygienic Condition and its Complications. Patients with a "poor" score according to the Green-Vermillion index (those



who brush their teeth only once a day according to the survey) had an average PMA index of $58.4 \pm 4.2\%$. This indicates extensive gingival inflammation and bleeding. Differences by Age Groups. In Group I, the prevalence of caries was 92%, but periodontal tissues were mainly in the reversible stage of gingivitis. In Group III, an average of 7.4 missing teeth per patient was recorded. Bone tissue resorption reached 1/2 and 2/3, leading to a 60% decrease in chewing function. Clinical Effectiveness. In patients where a complex approach was applied (professional hygiene + photopolymer restoration + local remineralization), the PMA index dropped to 12% after 6 months, and the growth rate of caries decreased by 2.8 times compared to the control group.

Discussion and Conclusion: The obtained results confirm the existence of a "pathological cascade" between dental caries and periodontal diseases. Untreated dental caries serves as a focus of infection, constantly bombarding the gingival margin with harmful exotoxins. Main Scientific Conclusions. Necessity of Complex Diagnostics. During a dental examination, it is mandatory to evaluate not just a "hole in the tooth," but the color and density of the gums and the bone condition on X-rays as a whole. Priority of Prevention. In the climate of Uzbekistan, brushing teeth alone is not sufficient to prevent caries and periodontitis. It is necessary to widely promote the use of dental floss and interdental irrigators among the population. Clinical Recommendation. Professional hygiene (removal of dental calculus) must be performed before filling any caries. Otherwise, dental calculus at the filling margin will condemn the tooth to secondary caries and the gums to chronic inflammation. Strategic Approach. Strengthening the "School Dentistry" and "Family Doctor-Dentist" systems at the national level will allow for a 55% reduction in caries complications and a 45% reduction in tooth loss.

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