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The Relationship Between Oral Cavity Microbiome and Diseases

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Abstract: This article examines the disorders of the oral microbiota as a result of endogenous and exogenous influences, its effect on internal organs and related diseases. Although modern medicine increasingly recognizes the co-evolutionary role of the microbiome in human health, the oral microbiome remains a complex system that plays an important role in maintaining health and well-being. In healthy individuals, the oral microbiota maintains a symbiotic balance with the host organism, where pathogenic bacteria exist in small numbers that are not clinically significant.Nevertheless, external influences from the environment can easily disrupt the oral microbiome, leading to a dysbiotic state with an incorrect balance and diversity of microorganisms in the mouth. This environmental impact is a risk factor that can largely be controlled. Increasing evidence suggests that problems with the oral microbiota are not only limited to local effects but also can affect the risk of other chronic diseases, such as diabetes, atherosclerotic heart disease, and rheumatoid arthritis.

Keywords: Oral microbiome, pathogenic bacteria, external influences, dysbiotic conditions, risk factors, and chronic diseases.

Introduction: The oral cavity has the second largest and most diverse microbiota after the gut, housing over 750 species of bacteria. It supports numerous microorganisms that include bacteria, fungi, viruses, and protozoa. The mouth, with its various niches, is an exceptionally complex habitat where microbes colonize the hard surfaces of the teeth and the soft tissues of the oral mucosa. In addition to being the starting point for digestion, the oral microbiome is vital for maintaining oral health as well as systemic health. Due to the ease of sample collection, it has become the most studied microbiome to date. Previously, the study of the microbiome was limited to traditional culture-dependent methods, but the abundant oral microbiota could not be cultured. Therefore, studying the microbiome was a challenging task. The advent of new genomic technologies, including next-generation sequencing and bioinformatics, has revealed the intricacies of the oral microbiome. It has provided an effective method for analyzing the microbiome. Understanding the oral microbiome in health and disease will provide further guidance for investigating functional and metabolic changes associated with disease states and identifying molecular signatures for drug development and targeted therapies that will ultimately help in providing personalized and precision medicine. This review paper is an attempt to clarify various aspects of the oral microbiome in health. The anatomical structure and warm, humid environment of the mouth provide the microbiota with a wide range of opportunities for colonization and growth. From birth, infants have a simple oral microbial community, but as they grow and develop, after teething and influenced by other external factors, this community becomes more complex. Various characteristics of the macromorphisms and microorganisms help maintain the homeostasis of the oral microbial balance necessary for good health. Poor oral

hygiene can lead to a pronounced environmental pressure that can cause dysbiosis in complex microbial communities. This dysbiosis can lead to ecological shifts in the oral cavity, which can in turn contribute to the colonization and reproduction of pathogenic bacteria. As the number of these bacteria increases, the risk of developing oral diseases also increases. The routine activities of daily living, such as chewing, flossing, and brushing one's teeth, can potentially lead to bacteremia, a condition in which bacteria from the oral cavity enter the bloodstream. These bacteria, along with other inflammatory agents, can then circulate throughout the body, causing inflammation. In certain individuals, this process can result in systemic inflammation.

Objective of the research: To evaluate the characteristics of the oral microbiome and identify diseases resulting from its impact.

Materials and Methods: The studies conducted in 2019-2021 included the results of the identified diseases and the work carried out as a result of a violation of the oral microbiome.

Results and discussion**:** There is a significant amount of evidence in scientific literature suggesting that periodontal inflammatory lesions may be linked to diseases of internal organs. In particular, a number of studies have concluded that generalized periodontitis and atherosclerosis may be pathogenetically related to damage to the aorta and coronary and peripheral blood vessels. The association between infections of the dental system and diseases in other parts of the body has been known for over a hundred years. This has led to the search for shared etiological and pathogenic factors of these conditions. However, it was only with the development of molecular genetic techniques that the study of microorganisms (the microbiome) became a leading cause of inflammation and disease in the dental system. It is essential to consider this when treating diseases of the hard tissues of the teeth, such as periodontitis, and preventing inflammatory complications after dental procedures. Various microorganisms colonize the mucous membranes of the mouth, including the back of the tongue, gingival furrows, oral fluid, and plaque. These microorganisms obtain necessary proteins, carbohydrates, amino acids, minerals, and other substances from the oral environment. The microbiome of the oral cavity, which occupies only 0.03-0.05 square meters of the total area, includes representatives from 530 to 700 species that are stable over time.

In addition to the leading bacteria such as Actinomyces, Campylobacter, Capnocytophaga, Corynebacterium, Fusobacterium, Neisseria, Granulicatella, Prevotella, Streptococcus and Veillonella, as well as anaerobic proteolytic bacteria like Filifactor and Fusobacterium and Parvimonas and Porphyromonas and Prevotella and Tannerella and Treponema, the oral cavity also contains Candida, including Candida albicans, Candida tropicalis, Candida pseudotropicalis and Candida guilliermondii. Viruses like Paramyxoviridae and Herpesviridae, protozoa like Entamoeba gingivalis and Trichomonas tenax and mycoplasma like M. ovale and M. salivarium, archaea and other microorganisms accumulate in dental plaque, which is a combination of plaque and tartar. According to modern interpretation, dental plaque is nothing more than a biofilm composed of polymicrobial communities. These populations of microorganisms develop in dental plaque sequentially and are closely related to the internal environment and external environment of the host, reacting sensitively to its condition.

According to the World Health Organization (WHO), caries affects between 60 and 90% of young and adult people in most developed countries. In Asian and Latin American countries, this figure is closer to 100%. In Russia, more than 80% of the population suffers from caries. The more carious teeth a person has, and the longer they delay treatment, the greater the risk of periodontal damage. When the hygiene of the oral cavity deteriorates or somatic health problems arise, periodontitis can begin with minor symptoms such as bleeding when brushing, bad breath, and eventually progress to the complete destruction of periodontal tissues, leading to tooth loss and speech and chewing difficulties. Periodontal pockets can also become foci of infection, negatively affecting the body and potentially even threatening life. 98% of the adult population on the planet suffers from periodontitis. In Russia, only 12% of residents have intact

periodontitis, 53% have initial inflammatory phenomena, and 12% have moderate to severe lesions. The prevalence of periodontal disease among adults is 82%.

The development of periodontitis is mainly due to the action of a combination of bacterial and yeast infections, as well as anaerobic bacteria such as Aggregatibacter actinimycetemcomitans, Porphyromonas gingivalis, Tannerella forsythia, and Treponema denticola. These bacteria are characterized by their extreme aggressiveness and ability to parasitize inside the gingival epithelial cells and periodontal tissues. There is a wealth of evidence from the scientific literature suggesting that periodontal inflammation is linked to diseases of internal organs. Specifically, several researchers have concluded that generalized periodontitis and atherosclerosis, with damage to the aorta and peripheral vessels, are pathologically related. V.I. Haraszthy and colleagues, in their study of atherosclerotic plaques in human carotid arteries, used polymerase chain reaction (PCR) to detect Chlamydia pneumoniae, human cytomegalovirus, and bacterial 16S rRNA. T. forsythensis was detected in 79% of carotid artery plaque samples, F. nucleatum in 63%, P. intermedia in 53% and P. gingivalis in 37%. A. actinomycetemcomitans was also detected in 5% of samples. These bacteria have also been found in large and small arteries with atherosclerotic lesions. Later, it was reported that A. actinomycetemcomitans, Streptococcus mutans, S. sanguinis, P. gingivalis, and T. denticola were present in aortic plaques and heart valve plaques. Reports show that AIDS, lichen planus, pancreatic cancer, leukemia, osteoporosis, and other diseases are associated with oral pathology. Periodontitis can occur with hypo- and hyperthyroidism, diseases of the parathyroid glands and sex glands, diseases of the liver and kidneys, nervous system and endocrine system, ENT diseases, collagenoses and allergic conditions. In patients with periodontal disease, which is the sixth most prevalent disease globally, the formation of micro-regions in the epithelium and damage to the periodontal tissues increase susceptibility to bacteremia. As a result, inflammation originating from the periodontal region may spread to other parts of the body, leading to clinical pathology. Maintaining proper oral hygiene is therefore crucial to control bacterial growth in the mouth and maintain a symbiotic balance, helping to prevent the spread of bacteria from the oral cavity to other areas of the body and reducing the risk of systemic infection.

Conclusion: Consequently, the incidence of periodontal diseases has skyrocketed, becoming a significant public health issue. To date, there is a wealth of evidence indicating a correlation between chronic periodontal infections and various systemic illnesses. In addition to a thorough dental examination, dentists must consider not only the impact of external factors such as diet and climate, but also local factors like the presence of chronic oral infections. They must also collaborate with general practitioners and specialists to provide comprehensive care. Therefore, doctors of these specialties need to be aware of the quantitative and qualitative composition of microbiomes in individual human biotopes. When hospitalizing patients or when their condition deteriorates, they should exclude the possible negative impact of oral microorganisms on the course of somatic processes.

References

1. Khalikova, G. A. (2022). Evaluation of the effectiveness of the drug" genferon-lite" in acute bronchiolitis in children. *Web of Scientist: International Scientific Research Journal*, *3*(5), 1430-1439. https://wos.academiascience.org/index.php/wos/article/view/1714
2. Asatovna, K. G. (2022). Kodirova Markhabo Miyassarovna. Frequency of functional constipation in children of different ages. *Журнал гепато-гастроэнтерологических исследований*, *3*(3), 38-40. https://tadqiqot.uz/index.php/gastro/article/view/5269
3. Кодирова, М. М., & Холикова, Г. А. (2022). Samarqand xududida bolalarda miokarditning asosiy klinik simptomlarini uchrashi. *Журнал гепато-гастроэнтерологических исследований*, *3*(3), 57-60. https://tadqiqotlar.uz/new/article/view/2374
4. Sobirzhonovna, B. N., Bosimovich, M. B., & Asadovna, K. G. (2022). Comparative Evaluation of MMP and Cystatin C in Chronic Nephritic Syndrome in Children. *Eurasian*

Medical Research Periodical, 8, 122-124. https://geniusjournals.org/index.php/emrp/article/view/1548

5. Уралов, Ш. М., Жалилов, А. Х., Аралов, М. Ж., & Холикова, Г. А. (2022). Методы лечения острого стенозирующего ларинготрахеита у детей на современном этапе. *Scientific impulse, 1*(2), 19-28.
6. Уралов S., Аралов M. ., Гулноз H. ., & Нажимов S. . (2022). О СОВРЕМЕННЫХ МЕТОДАХ ЛЕЧЕНИЯ ОСТРОГО СТЕНОЗИРУЮЩЕГО ЛАРИНГОТРАХЕИТА У ДЕТЕЙ. *Международный журнал научной педиатрии, 1*(5), 25–31. https://doi.org/10.56121/2181-2926-2022-5-25-31
7. Kodirova, M. M., & Kholikova, G. A. (2023). Main Clinical Signs Of Non-Reumatic Myocarditis In Children Of Samarkand Region. *Evrazijskij zhurnal medicinskih i estestvennyh nauk, 3*(2). https://in-academy.uz/index.php/EJMNS/article/view/11408
8. Kholikova Gulnoz Asatovna. (2025). Prevalence Of Affected Bowel Syndrome Among Children Of Different Ages. *Eurasian Medical Research Periodical, 41,* 9–14. Retrieved from https://geniusjournals.org/index.php/emrp/article/view/6697
9. Шадиева , Х. ., Холикова , Г. ., & Абдукадирова , Н. . (2024). ОСОБЕННОСТИ ТЕЧЕНИЯ КАРДИОМИОПАТИЙ В ДЕТСКОМ ВОЗРАСТЕ. *Международный журнал научной педиатрии, 3*(4), 570–574. https://doi.org/10.56121/2181-2926-2024-3-4-570-574
10. Shadieva Khalima Nuridinovna, & Xolikova Gulnoz Asatovna. (2024). CLINICAL COURSE AND APPROACHES TO TREATMENT OF CONGENITAL COMPLETE ATRIOVENTRICULAR BLOCK IN CHILDREN. *American Journal of Technology and Applied Sciences, 23,* 39–44. Retrieved from https://americanjournal.org/index.php/ajtas/article/view/2053
11. Kholikova Gulnoz Asatovna, & Shadiyeva Halima Nuriddinovna. (2024). THE MATTER OF USING LASER THERAPY IN THE TREATMENT OF ACUTE HERPETIC STOMATITS IN CHILDREN. *World Bulletin of Public Health, 33,* 101-104. Retrieved from https://scholarexpress.net/index.php/wbph/article/view/4111
12. Xoliqova , G. (2024). TURLI YOSHDAGI BOLALAR ORASIDA TA`SIRLANGAN ICHAKLAR SINDROMINING TARQALISHI. *Евразийский журнал медицинских и естественных наук, 4*(11), 107–113. извлечено от https://in-academy.uz/index.php/EJMNS/article/view/39839
13. Kholikova Gulnoz Asatovna, Aminova Dildora Xudayarovna, & Samadova Makhfiza Kudratovna. (2023). PAYR'S SYNDROME AS ONE OF THE CAUSES OF CHRONIC CONSTIPATION IN CHILDREN. *British Journal of Global Ecology and Sustainable Development, 22,* 24–29. Retrieved from https://journalzone.org/index.php/bjgesd/article/view/417
14. Uralov Shukhrat Mukhtarovich, & Kholikova Gulnoz Asatovna. (2023). OCCURRENCE OF FUNCTIONAL CONSTIPATION IN CHILDREN OF DIFFERENT AGE. *British Journal of Global Ecology and Sustainable Development, 17,* 32–38. Retrieved from https://journalzone.org/index.php/bjgesd/article/view/351
15. Холикова, Г., & Бахриева , Д. . (2023). ЧАСТОТА ФУНКЦИОНАЛЬНЫХ ЗАПОРОВ СРЕДИ ДЕТЕЙ РАЗЛИЧНОГО ВОЗРАСТА. *Евразийский журнал академических исследований, 3*(5 Part 4), 257–261. извлечено от https://in-academy.uz/index.php/ejar/article/view/16008
16. Холикова , Г. ., & Кодирова, М. . (2023). ХРОНИЧЕСКИЙ ЗАПОР У ДЕТЕЙ. *Евразийский журнал медицинских и естественных наук, 3*(3), 104–109. извлечено от https://in-academy.uz/index.php/EJMNS/article/view/11407

17. *Холикова Г.А., Уралов Ш.М. Раббимова Дильфуза Тоштемировна.* БОЛАЛАРДА СУРУНКАЛИ КАБЗИЯТ. ПАЙР СИНДРОМИ. (Клиник Кузатув) (74-76) Гепато-гастроэнтеролог tadqiqotlar jurnali 2023 MAXSUS SON 3-том. https://www.sammu.uz/en/article/2255

18. Ibatova, S. M., Mamatkulova, F. K., Kholikova, G. A., & Mamatkulova, D. K. (2022). Some indicators of lipid and phosphorus-calcium metabolism in children with rickitis receiving conventional treatment. *International Journal of Health Sciences*, *6*(S4), 3628–3638. https://doi.org/10.53730/ijhs.v6nS4.9362