Editorial

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MOLECULAR MECHANISMS OF ORAL MICROBIOME–HOST INTERACTIONS IN THE PATHOGENESIS OF PERIODONTAL DISEASE

Periodontal disease remains one of the most prevalent chronic inflammatory conditions worldwide, affecting the supporting structures of teeth and compromising oral health. Its pathogenesis is driven by a complex and imbalanced interaction between the periodontal microbiota and the host inflammatory response. Beyond its local consequences, Periodontal disease is not just a problem for the gums—it has also been linked to serious health issues like diabetes, heart disease, and bowel disorders, making it an important global health concern. The World Health Organization has recognized severe periodontal disease as a major public health issue due to its high prevalence (20%-50 %) and its impact on quality of life.

Periodontal health depends on both internal and external factors. Internal factors include the strength of tissue barriers, differences in how cells drive immune responses, the effects of ageing, and how the body's immune system (both innate and adaptive) reacts to microbes and environmental challenges. Underlying systemic diseases can increase the body's vulnerability to periodontal breakdown. External factors involve the oral microbiome—its balance and diversity—as well as lifestyle habits such as diet and smoking. These factors determine how well the body can protect itself against periodontal disease. Clinically, periodontitis is graded from slow to rapid bone loss (Grades A–C), reflecting how microbial deposits interact with risk factors such as diabetes and smoking.

Understanding the molecular mechanisms of oral microbiome–host interactions is therefore essential not only for advancing periodontal therapy but also for addressing its systemic implications. As research continues to uncover these pathways, integrating microbiological, immunological, and clinical perspectives, it will provide a pivotal role in developing preventive and therapeutic strategies that protect both oral and overall health.

Dr. Nighat Shafiq
Associate Professor
Managing Editor
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