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IP International Journal of Periodontology and Implantology

Journal homepage: https://www.ijpi.in/

Editorial

Role of antimicrobial proteins in periodontal disease

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Keywords: Antimicrobial peptides (AMPs), Periodontal disease, Antibiotic-resistant microbes

Received: 01-03-2025; **Accepted:** 27-03-2025; **Available Online**:25-04- 2025

1. Introduction

Low molecular weight proteins called antimicrobial peptides are part of the innate immune response in eukaryotes and offer protection against a variety of gram-positive and gram-negative bacteria, viruses, and fungi. Saliva and gingival crevicular fluid (GCF) in the oral cavity include at least 45 distinct antimicrobial peptides from several biological types. The creation of AMPs, which have a promising future in medicine, food, animal husbandry, agriculture, and aquaculture, was prompted by the rise of antibiotic-resistant microbes and growing concerns regarding the usage of antibiotics.[1]

More than 45 antimicrobial proteins (AMPs), ranging in size from small cationic peptides to big agglutinating proteins, are found in human saliva and gingival fluid. These proteins work together to prevent microbial invasion of oral tissues and preserve oral homeostasis. Because different periodontal bacteria regulate AMP expression differently, the functional variety of AMPs allows for focused therapies to certain infections.

Proteomic research has revealed significant variations in AMP expression between healthy controls and patients with periodontal disease. Lacto transferrin and PSP/SPLUNC2 levels, for example, are changed in aggressive periodontitis and return to normal after treatment.

In a similar vein, LL-37 correlates with clinical indicators such as bleeding indices and probing depth and is markedly increased in chronic periodontitis. These results demonstrate how salivary AMPs may be used as periodontal disease diagnostic markers. The antibacterial activity of AMPs against oral bacteria varies. Streptococcus gordonii, for instance, is resistant to hBD-3 and LL-37, although certain strains are susceptible at particular doses. Knowing these differences could help guide treatment plans and enhance the control of periodontal disease.[2]

2. Antimicrobial protein deficiency and periodontitis

A higher risk of periodontitis is associated with a number of systemic disorders, which are frequently linked to changes in the expression of the antimicrobial protein (AMP).

Even in children with diabetes, there is an up-regulation of HNP-1,2,4 and S100A9 and a decrease in AMPs like statherin, proline-rich peptides, and histatin. People with diabetes may be more susceptible to periodontal disease as a result of these alterations. Despite adequate lactoferrin levels, severe congenital neutropenia, such Morbus Kostmann illness, is linked to severe periodontitis because to LL-37 deficits and decreased α-defensins. Periodontal disease remains unsolved after granulocyte-colony-stimulating factor treatment, which increases neutrophil counts but not LL-37 levels. In one case, LL-37 and periodontal health were both restored after receiving a bone marrow transplant. Similarly, low LL-37 levels are seen in patients with Papillon-Lefèvre and Haim-Munk syndromes because of mutations in the CTSC gene that affect how its precursor is processed. These

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https://doi.org/10.18231/j.ijpi.2025.001

results highlight the function of particular AMPs in preserving dental health as well as the systemic effects of their dysregulation.[3]

3. Conclusion

A promising approach to fighting multidrug-resistant bacteria and tackling issues in food safety, agriculture, and medicine worldwide is the use of antimicrobial peptides (AMPs). Notwithstanding their promise, they are still important obstacles to be addressed, including stability, economical manufacturing, and clinical use. Understanding their mechanisms, improving design, and increasing efficacy require interdisciplinary research and cutting-edge technologies. With further development and investigation into a variety of uses, AMPs have the potential to be extremely useful instruments for enhancing sustainability and human health.

4. Conflict of Interest

None.

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Cite this article: Mutthineni RB. Role of antimicrobial proteins in periodontal disease**.** *IP Int J Periodontol Implantol* . 2025;10(1):1–2