



## Probiotics in Prosthodontics: A Paradigm Shift in Oral Health

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Probiotics are live microorganisms, typically bacteria and yeasts, that offer positive health benefits when administered in sufficient quantities. They are frequently associated with gut health, but they have also been recognised for their positive impact on oral health. Probiotics are beneficial bacteria that suppress infections, promote bone tissue homeostasis, aid in tissue regeneration, and regulate immune-inflammatory levels. These characteristics render them extremely relevant in the administration of dental care. In recent years, probiotics have emerged as a novel approach in addressing microbial imbalances, improving treatment outcomes, and enhancing patient satisfaction. Probiotic bacteria include *Lactocaseibacillus rhamnosus*, *Lactobacillus acidophilus*, *Lactiplantibacillus plantarum*, *Lactocaseibacillus casei*, *Limosilactobacillus reuteri*, *Lactocaseibacillus paracasei*, *Bifidobacterium longum*, *Bifidobacterium infantis*, and *Bifidobacterium animalis*. Probiotics exert their effects through various modes of action, including competitive exclusion of pathogens by occupying adhesion sites, the production of antimicrobial substances like bacteriocins, modulating local and systemic immune responses and promoting beneficial species to restore microbiome equilibrium.<sup>1,4,6</sup>

The therapeutic applications of probiotics in prosthodontics encompass:<sup>2,3,5,7,8,11</sup>

- A prevalent problem among denture wearers is denture-related stomatitis, which is mostly brought on by *Candida albicans*. Probiotics with antifungal properties, such as *Lactobacillus* and *Bifidobacterium* species, have been shown to decrease the incidence and severity of this condition. Probiotics could eventually be incorporated into topical treatments or denture cleansers as a standard preventative approach.
- Patients who are elderly or have physical or cognitive impairments frequently struggle to maintain proper oral hygiene. Probiotics, administered via tablets, lozenges, or probiotic-enriched meals, offer a practical approach to maintain oral health in these populations.
- Patients with prosthetic restorations are at risk of developing caries and periodontal disease due to changes in oral hygiene practices and plaque accumulation. Probiotics such as *Lactobacillus rhamnosus* may reduce cariogenic bacteria like *Streptococcus*

mutans and plaque biofilm formation. Their anti-inflammatory properties benefit gingival tissues, minimising the risk of periodontal problems.

- Halitosis (oral malodor) is a common concern among individuals wearing prosthesis. Probiotics can neutralise volatile sulphur compounds (VSCs) produced by anaerobic bacteria in the oral cavity, consequently reducing bad breath. *Streptococcus salivarius* K12 strains have proven to be particularly effective in the management of halitosis.
- Probiotics can help to minimise the adhesion of pathogenic biofilms to prosthetic surfaces, which are susceptible to bacterial and fungal colonisation. This minimises the danger of infection and increases the lifespan of prosthesis.
- Probiotics have demonstrated potential in reducing peri-implant inflammation by inhibiting the growth of pathogens such as *Porphyromonas gingivalis*. Their ability to promote a stable microbiota around dental implants may improve implant longevity. Probiotics in implant-supported prosthetics could enhance healing and tissue integration by modulating immune responses and reducing inflammation. Probiotic use has been linked to improved peri-implant health in patients, potentially enhancing the success rate of implant therapies.
- Probiotics can reduce inflammatory cytokines, hence alleviating chronic conditions like mucositis in denture wearers.
- Probiotics may increase salivary flow and pH, making them advantageous for people with xerostomia or dry mouth.
- Probiotics may reduce irritation and create a healthier oral environment, thus enhancing

prosthetic comfort and functionality.

Probiotic strains, including Lactobacillaceae and Bifidobacterium, have been shown in animal and human trials to improve bone trabecular characteristics, increase osteogenic differentiation, and expedite fracture repair. According to current research, Probiotics may help reduce the effects of diseases including diabetes and osteoporosis. Probiotic supplementation have similar benefits to vitamin D and calcium supplements, making it a potential treatment option for osteoporosis patients. Probiotic strains from the gut help to promote jawbone health and stability. Furthermore, probiotics that aid in nutrient digestion and absorption are beneficial to the skeletal system. Probiotics such as *Lactobacillus acidophilus*, *Lactocaseibacillus casei*, *Limosilactobacillus reuteri*, and *Bifidobacterium longum* enhance the absorption of calcium, vitamin D, and vitamin K.<sup>2,3,4,7,8,11</sup>

Despite mounting data favouring probiotics in prosthodontics, obstacles persist. These include variations in individual responses, the necessity for standardised probiotic formulations, and guaranteeing probiotic stability and viability in oral preparations. Probiotics immunomodulatory effects may give rise to an exaggerated immune response. Some reports have revealed an increased risk of allergic rhinitis, asthma and atopic allergies after using probiotics. Research is underway to create targeted probiotic medicines and delivery technologies, including probiotic lozenges, denture adhesives, and prosthetic device coatings. Standardising dosages, identifying appropriate strains, and assuring product stability are crucial areas for future research. Furthermore, educating prosthodontists and patients on the advantages and proper usage of probiotics is essential for more widespread acceptance.<sup>9,10,11</sup>

Utilising probiotics as an intervention has inherent value due to its minimal safety risk and non-invasive

nature. Probiotics are beneficial and should be used more widely. However, various issues must be addressed prior to their formal use in clinical practice. Probiotics boost the efficacy of prosthodontic therapies as well as patients' overall quality of life by treating microbial imbalances and encouraging oral health. As research continues to unveil probiotics' full potential, they are poised to become an essential component in modern prosthodontic treatment. This editorial invites clinicians and researchers alike to embrace this paradigm shift, leveraging the power of probiotics to redefine oral healthcare in prosthodontics.

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**Dr Vivek V. Nair**  
Editor, IPS Kerala