



PROBIOTICS IN PERIODONTITIS: FROM MICROBIAL BALANCE TO CLINICAL APPLICATION

Periodontology

Dr. Muskan Gupta* Independent researcher, Vivekanand Puri, North Delhi 110007, India. *Corresponding Author

Dr. Fathah Ali Khan Independent researcher, Thrissur, Kerala 680506, India.

Dr. Riya Raj Independent researcher, Simri Bhakthiyarpur 852129, India.

Dr. Shreetapa Chand Independent researcher, Mysuru, Karnataka 570015, India.

ABSTRACT

Periodontal diseases are chronic inflammatory conditions linked to microbial dysbiosis and a modified host immune response. The mainstay of traditional periodontal therapy is mechanical debridement of the supra- and sub-gingival plaque and calculus, however total eradication of pathogenic microbes is frequently challenging. A promising supplemental strategy for reestablishing microbial balance and regulating host responses is probiotics. Probiotics are live microorganisms that, when taken in sufficient quantities, provide positive health effects. Commonly utilized strains in periodontology, such as *Lactobacillus* and *Bifidobacterium*, produce antibacterial compounds, modulate the host immune response, and competitively suppress periodontal infections. Clinical research has shown benefits in periodontal parameters, including as decreased gingival inflammation, plaque accumulation, and probing depth. The use of several delivery methods in periodontal therapy has been investigated, including mouthwashes, tablets, and lozenges. Despite promising outcomes, there are still issues including strain specificity and a dearth of long-term data. In addition to their growing importance in host regulation, this study underlines the relevance of probiotics as a possible adjuvant in periodontal care.

KEYWORDS

Probiotics, Periodontal Disease, Oral microbiome, Host Modulation Therapy, Periodontal Therapy

INTRODUCTION

The host immune system and dysbiotic subgingival bacteria interact intricately to cause periodontal diseases, which is a long-term inflammatory disease. A major factor in the development and progression of periodontitis, which results in the devastation of periodontal tissues, is the transition from symbiosis to dysbiosis. Although mechanical debridement is the mainstay of conventional periodontal therapy, total eradication of harmful microbes is still difficult, and disease recurrence is frequent [1,2].

According to the ecological plaque hypothesis, the presence of particular pathogens alone does not cause periodontal disease; rather, an imbalance in the microbial community does. As a result, new therapeutic approaches to microbial equilibrium restoration are being investigated. Because they have antibacterial and host-modulatory properties, probiotics have become a promising addition in periodontal therapy. [2,3].

1. THE PAST: CLASSICAL METHODS IN PERIODONTAL THERAPY

In the past, the goal of periodontal therapy has been to lower the microbial burden by scaling and root planing, as well as by using systemic antibiotics and antiseptics as adjuncts. Although these methods are successful in decreasing periodontal infections, they frequently fall short in getting rid of microbes that live in tissue reservoirs and deep periodontal pockets [1].

Furthermore, there are possible negative consequences, changes to the normal microbiota, and the emergence of antibiotic resistance linked to the use of systemic antibiotics. These drawbacks emphasize the necessity of alternate strategies that address the host inflammatory response in addition to microbial dysbiosis [4].

2. THE PRESENT: PROBIOTICS IN PERIODONTAL THERAPY

Probiotics are live bacteria that help the host's health when given in sufficient quantities. By encouraging good bacteria and inhibiting harmful ones, probiotics in periodontology seek to restore the equilibrium of the oral microbiome [3,5].

Lactobacillus, *Bifidobacterium*, and *Streptococcus* species are frequently employed probiotic strains in oral health because they have been shown to colonize the oral cavity and have positive effects [5,6].

Action Mechanism

Probiotics work via a variety of biological pathways (Fig 1):

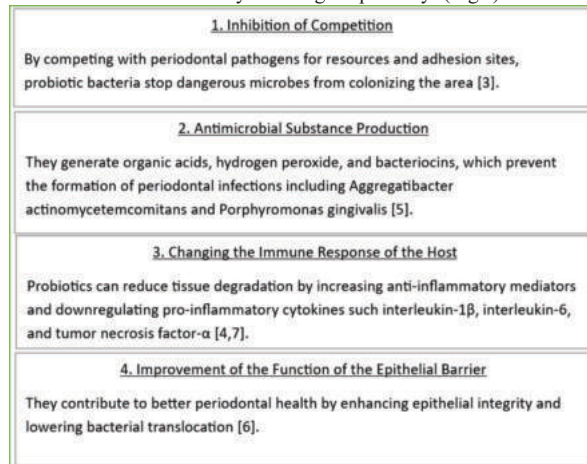


Fig 1- Action Mechanisms Of Probiotics

Clinical Applications Of Probiotics:

Probiotics have been investigated as supplements for a number of periodontal conditions, including:

- Gingivitis
- Chronic periodontitis
- Peri-implant mucositis
- Halitosis

Probiotic supplementation has been shown in clinical trials to significantly enhance clinical parameters, including clinical attachment level, bleeding on probing, probing depth, plaque index, and gingival index [5,8].

Additionally, it has been demonstrated that probiotics lower the concentrations of key periodontal pathogens, improving the microbial balance [6].

Systems Of Delivery

For the purpose of administering probiotics in periodontal therapy,

several delivery methods have been investigated:

- Both tablets and lozenges
- Mouthwashes
- Chewing gum
- Toothpastes
- Systems for local medication delivery

By keeping probiotic concentrations in the oral cavity at appropriate levels, these formulations improve the therapeutic efficacy of probiotics [5,9].

The Benefits And Drawbacks Of Probiotics

BENEFITS	DRAWBACKS
Safe and non-invasive	Strain-specific effects
Minimal adverse effects	Short-term colonization in the oral cavity
Ability to restore microbial homeostasis	Lack of standardized dosage and protocols
Potential for long-term use	Limited long-term clinical evidence
No risk of antimicrobial resistance	

These elements emphasize the necessity of additional study to develop uniform recommendations for the use of probiotics in periodontology [3,10].

3. THE FUTURE: PROBIOTICS AS HOST MODULATION THERAPY

The focus of periodontal therapy is moving toward ecological management of the oral microbiome and host modulation. Since probiotics address both host inflammatory reactions and microbial dysbiosis, they are an important part of this paradigm shift [7]. The creation of customized probiotic treatments based on unique microbial profiles may be made possible by developments in microbiome research. In order to improve therapeutic results, more recent ideas such as postbiotics, which are metabolic products of probiotics and synbiotics, which are a combination of probiotics and prebiotics are also being investigated [10].

Another exciting field of study is the genetic engineering of probiotic strains to improve their immunomodulatory and antibacterial qualities. Clinical results in periodontal therapy may be further enhanced by combining probiotics with host modulation techniques and regenerative therapies [7,11].

DISCUSSION

By treating the human and microbial variables that contribute to the course of the disease, probiotics provide a novel approach to periodontal therapy. Probiotics, as opposed to traditional antibacterial methods, work to restore microbial balance rather than indiscriminately eradicate germs. This is in line with contemporary theories of host modulation and ecological plaque control [2,3].

Even though a number of clinical trials have documented positive results, it is difficult to draw firm conclusions due to variations in study designs, probiotic strains, and treatment regimens. Therefore, to prove the effectiveness of probiotics in periodontal therapy, carefully planned randomized controlled trials with long-term follow-up are needed [8,10].

CONCLUSION

Because probiotics can alter the host immune response and dental microbiome, they have become a promising adjunct in periodontal therapy. Even if there is currently proof of their positive effects, more study is required to standardize their application and assess long-term results. Future periodontal therapy may benefit greatly from the use of probiotics as a component of an all-encompassing host modulation approach.

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