PROBIOTICS IN DENTISTRY: AN OVERVIEW

Nadia Khan MDS*; Neha Shrivastava MDS**; Tarun Vijay Shrivastava MDS#

*Reader, Department of pedodontics and preventive dentistry, Carrer post graduate institute of dental and medical sciences, Lucknow.
**Sr Lecturer, Deptt of pedodontics and preventive dentistry, Carrer post graduate institute of dental and medical sciences, Lucknow.
#Sr Lecturer, Dept of conservative dentistry and endodontics, Saraswati dental college and hospital, Lucknow.

Address for correspondence: Dr Nadia Khan, Department of pedodontics and preventive dentistry, Carrer post graduate institute of dental and medical sciences, Lucknow
Telephone No.: +91-9936631823
Email: nadiakhan76@gmail.com

Abstract: There has been a shift towards an ecological and microbiological approach to understanding of oral diseases. There have been attempts to develop approaches to therapy and the possibility to develop strategy through manipulation of the occupant oral microbiota has prompted the role of probiotics in dentistry. Past studies have shown that harmless bacteria in the fermented products compete with pathogens injurious to health. The increased attractiveness of using probiotic bacteria and/or supplements to recover gastrointestinal health has provoked interest in the efficacy of this approach for oral diseases. Evidence now suggests that probiotics may function by direct inhibition of pathogenic micro-organisms. This paper comprehensively deals with the use of probiotics in dentistry.

Keywords: dentistry, oral probiotics

Introduction

Probiotics are live microbial feed supplement that beneficially affects the host animal by improving its intestinal microbial balance as documented in clinical trials. These bacteria must belong to the natural flora in order to survive the acid environment during transit to the intestines. Probiotic bacteria can be active through numerous paths: they prevent cellular adhesion and invasion of pathogenic bacteria, alter the intestinal environment by a reduction in pH as a result of fermentation products, and they interact and modulate the local and systemic inflammatory immune response. In this article, we will review the data on the use of probiotics for oral care or disease prevention.

Methodology

The papers or articles dealing with probiotics were shortlisted using pubmed search. Inclusion criteria was those articles dealing with probiotics in oral health. Randomised controlled trials and well performed cohort
studies were taken into consideration because of high level of evidence.

**Current application of probiotics**

Most of the applications and research into the mechanisms of action of probiotics and prebiotics concentrate on their roles in influencing intestinal health and function. There is also evidence to support further investigation of the use of probiotics and prebiotics in the treatment of illnesses affecting sites other than the intestinal tract, e.g. urinary tract infections, vaginal infections, arthritis, atopic eczema, pharyngitis and otitis media. (2,3)

**Mechanism of action**

- Prevention of adhesion of pathogens to host tissues.
- Stimulation and modulation of the mucosal immune system, e.g. by reducing production of pro-inflammatory cytokines through actions on NFkB pathways, increasing production of anti-inflammatory cytokines such as IL-10 and host defence peptides such as b-defensin 2, enhancing IgA defences and influencing dendritic cell maturation.

- Modulation of cell proliferation and apoptosis through cell responses to, for example, microbially produced short chain fatty acids.
- Improvement of intestinal barrier integrity and upregulation of mucin production.
- Killing or inhibition of growth of pathogens through production of bacteriocins or other products, such as acid or peroxide, which are antagonistic towards pathogenic bacteria.

**Probiotics and prevention of caries and periodontal diseases**

The oral health applications of either probiotics or ‘replacement therapy’ with Streptococcus mutans strains of attenuated virulence and increased competitiveness were first suggested for prevention of dental caries more than 20 years ago. Clinical studies have indicated that bacteria with established probiotic effects (lactobacilli and bifidobacteria) have some promise for prevention of caries. There are fewer experimental studies exploring probiotic use in periodontal diseases, partly reflecting a poorer understanding of the precise aetiology of the disease and
of the conditions that promote health. However, patients with moderate to severe gingivitis who were given either one of two L. reuteri formulations had reduced plaque and gingivitis scores compared to a placebo group Recently, a bacteriocin purified from Lactobacillus casei killed P. gingivalis but its use was proposed as a novel chemotherapeutic agent rather than as strain development for probiotic applications.(4)

**Vehicles for probiotic delivery:**
Probiotic bacteria (natural inhabitants of the intestinal flora) are usually extracted from the healthy humans or from the fermented food. Probiotics have increased interest in replacement therapy. Probiotics are delivered either in the form of concentrates in various forms of liquid diet, milk based products or dietary supplements. Dairy products are considered the natural means to ingest probiotic bacteria.(5) Since the milk and milk products contain various essential minerals like calcium and phosphorus and also various milk proteins like casein, they are usually preferred.(6)

**Probiotic therapy in children**
Lactobacillus species have been the primary organism for research in the field of probiotics. Various studies have reviewed the evidence based use of probiotic therapy in children. It has been reported that the use of probiotics has been linked to the prevention of many bowel related disorders and allergies in children. Probiotics have been shown to significantly reduce the duration of rotavirus induced diarrhoea in children.(7,8)

**Prebiotics:**
Prebiotics are the non-digestible oligosaccharides which primarily affect the proliferation of resident commensal bacteria, thereby exerting probiotic effects.(9) Several studies concerning the general health effects of prebiotics have been conducted but there is still lack of studies pertaining to their effects on oral cavity. Prebiotics work by bringing the compositional changes in the resident microflora.(10)

**Potential risks:**
Probiotics may sometimes pose potential risks associated with some strains. Several strains used as probiotics are being employed for many years and have shown excellent results without any adverse effects.(11,12)
Some possible adverse effects have been reported like degradation of host tissue components (13), bacteremia in immunocompromised patients (14) and predisposition to endocarditis (15). Some probiotic strains of lactobacillus like L.salivarius have been shown to cause caries.(16) An increase in the counts of salivary lactobacilli have been reported after administration of probiotics (17) and some studies have reported that there is no effect of probiotics on salivary levels of lactobacilli (18). It is very essential to take care that the use of probiotics is done very judiciously keeping in mind the risk factors associated with them, particularly the type of probiotic to be used and the time for which they are being administered.

Conclusion

In conclusion, the use of probiotics for use in oral care applications is gaining momentum. There is increasing evidence that the use of existing probiotic strains can deliver oral health benefits.

References


