International Journal of Applied Dental Sciences 2019; 5(3): 219-221

ISSN Print: 2394-7489
ISSN Online: 2394-7497
IJADS 2019; 5(3): 219-221

www.oraljournal.com
Received: 04-05-2019
Accepted: 07-06-2019

Dr. Ashish Pandey
Head of the Department of Prosthodontics, Daswani Dental College & Research Centre, Kota Rajasthan, India

Dr. Vivek Singhai
BDS.MPH.PGDHHM Private Practitioner, Bhopal, Madhya Pradesh, India

Dr. Anmol Bagaria
BDS (Bharati Vidyapeeth Deemed to be University's Dental College & Hospital, Navi Mumbai) Private Practioner, Mumbai, India

Dr. Shahroz Raza
BDS (Faculty of Dentistry Jamia millia islamia New delhi) Private Practitioner Jangalia, New Delhi, India

Chayanika Chandra
BDS-3rd year (Faculty of Dentistry Jamia millia Islamia New Delhi, India

Correspondence
Dr. Anmol Bagaria
BDS (Bharati Vidyapeeth Deemed to be University's Dental College & Hospital, Navi Mumbai) Private Practioner, Mumbai, India

Probiotics in dentistry

Dr. Ashish Pandey, Dr. Vivek Singhai, Dr. Anmol Bagaria, Dr. Shahroz Raza and Chayanika Chandra

Abstract
Probiotics are dietary supplements, which have been advocated for the prevention and the treatment of a wide range of diseases. These products consist of beneficial micro-organisms, which stimulate health promoting flora thus, suppressing the pathologic colonization and disease spread. Since the last decade, several investigators have also suggested the use of probiotics for oral health purposes. The present review focuses on the role of probiotics in dentistry.

Keywords: dentistry, probiotics

Introduction
"Probiotics" are with us since the time people have been eating fermented milk; however, its relation with health benefits drew attention only when Metchnikoff in 1907 observed that bacteria in the fermented milk competed with the micro-organisms that are injurious to health. Lilley and Stillwell in 1965 described these beneficial micro-organisms in fermented milk using the term "probiotic [1, 3]."
The most commonly used probiotic bacterial strains belong to the genera Lactobacillus and Bifidobacterium. Lactobacilli and bifidobacteria are generally regarded as safe, and, since the early writing of Metchnikoff, even more fermented food products have been associated with health benefits. In respect to normal microbiota and oral health, there seem to be differences in the ability of lactobacilli isolated from caries-active or healthy subjects to inhibit Streptococcus mutans in vitro. In addition, the species composition of both Lactobacillus and Bifidobacteriummicrobiota is different between patients with periodontitis and those who are periodontally healthy [4, 6].

Composition of Probiotics
Probiotics can be yeast, bacteria or moulds. Most commonly they are bacteria. Some of these bacterial species are:
- Lactic acid producing bacteria (LAB): Lactobacillus, Bifidobacterium, Streptococcus.
- Non-LAB species: Bacillus, Propionibacterium
- Nonpathogenic yeasts: Saccharomyces
- Non-spore forming and non-flagellated rod or Coccobacilli[7]

Probiotics and their role in oral cavity infections
The oral cavity has recently been considered as a target for the application of probiotics because several studies carried out with the purpose of demonstrating the probiotic effectiveness of bacteria on infections belonging to the oral cavity have begun to show results in: Prevention of caries, reduction of the number of oral candida colonies, reduction of the microflora associated with halitosis, periodontal health and in different types of oral cancer. Probiotics have the ability of adhesion and integration within the biofilm structure. The ability to adhere to the surfaces where the saliva circulates and also manages to support the environmental conditions and defense mechanisms of the oral cavity allowing colonization and proliferation [8].
The oral cavity is among the most diverse microbiomes of the human body where different niches occur in the plaque, saliva and epithelial mucosa, thus eliciting dysbiosis by fungi and

Bacteria. These dysbiotic infections could affect mucosal surfaces of the oral cavity and esophagus, and may become systemic. Under certain stress conditions of debilitated patients, candidiasis would be life threatening and cause "diseases of the diseased". Considering the slowdown in antifungals development coupled with little number of new antibiotics available as well as the increased rate of emerging resistant fungal and bacterial strains, it has become very inviting to researchers and health professionals to extend the probable adoption of probiotics as an option in oral cavity care where probiotics may exert therapeutic or preventive effects on common oral diseases. Nevertheless, in vitro studies have several limitations and they never exactly mimic the microbiota of the oral cavity [9, 11],

Dental caries

Dental caries is an infectious disease affecting most of the population. This multifactorial and complex disease process occurs along the interface between the enamel surface and dental biofilm. Several methods may be used to alter the cariogenicity of the biofilms responsible for dental caries. Researchers are developing "probiotic" methods to treat the caries causing infection. Probiotic, mechanisms are employed to selectively remove only the harmful pathogen while leaving the remainder of the oral ecosystem intact. One of the replacement therapy options entails the application of a genetically engineered "effector strain" of S. mutans that will replace the cariogenic or "wild strain" to prevent or arrest caries and to promote optimal remineralization of tooth surfaces that have been demineralized but that have not become cavitated. S. mutans strain BCS3-L1 is a genetically modified effector strain designed for use in replacement therapy to prevent dental caries. Recombinant DNA technology was used to delete the gene encoding lactate dehydrogenase in BCS3-L1 making it unable to produce lactic acid. This effector strain was also designed to produce elevated amounts of a novel peptide antibiotic called mutacin 1140 that gives it a strong selective advantage over most other strains of S. mutans [12, 15].

In a randomized double-blind study, it was demonstrated that the administration of the probiotic Lactobacillus paracasei SD1 in milk increased the levels of the peptide HNP1-3, which seems to be interested in the reduction of the presence of caries in children. These human neutrophils peptides as HNP1-3 are antimicrobial peptides cationic that provide the first line of host defense against a broad spectrum of microorganisms. These are released by the submandibular salivary glands and secreted into the saliva. They are also present and release in the gingival crevicular fluid. The preventive role of HNP1-3 against dental caries was suggested by the finding of a significant increase in levels of HNP1-3 salivary in children with the absence of caries. Since one of the mechanisms of probiotics has been involved in the regulation of the immune system of the host, it was therefore assumed that the administration of probiotics may help to prevent dental caries through their ability to increase and modulate the production of salivary HNP1-3 [14, 16].

Probiotics in periodontal health

P. gingivalis, A. actinomycetemcomitans, T. denticola and T. forsythia are the main periopathogens. Probiotics decrease the pH of the oral cavity so that plaque bacteria cannot form dental plaque and calculus that causes the periodontal disease. Probiotic mouth wash has been demonstrated to reduce the incidence of plaque formation and gingivitis in 6-8 year old children. In vitro study of L. salivarius TI 2711 behaviour isolated from a healthy human volunteer showed inhibitory action on P. gingivalis, Prevotellaintermedia and Prevotellanigrescens after 6-12 hrs coculturing [17].

In one recent study, the prevalence of lactobacilli, particularly Lactobacillus gasseri and L. fermentum, in the oral cavity was greater among healthy participants than among patients with chronic periodontitis. Various studies have reported the capacity of lactobacilli to inhibit the growth of periodontopathogens, including P. gingivalis, Prevotellaintermedia and A. actinomycetemcomitans. Together, these observations suggest that lactobacilli residing in the oral cavity could play a role in the oral ecological balance [18].

Probiotics and Halitosis

Halitosis has many causes (including consumption of particular foods, metabolic disorders, respiratory tract infections), but in most cases it is associated with an imbalance of the commensal microflora of the oral cavity. More specifically, halitosis results from the action of anaerobic bacteria that degrade salivary and food proteins to generate amino acids, which are in turn transformed into volatile sulphur compounds, including hydrogen sulphide and methanethiol. Authors from past studies have reported the capacity of various strains of W. cibaria to inhibit the production of volatile sulphur compounds by F. nucleatum. They concluded that this beneficial effect resulted from the production of hydrogen peroxide by W. cibaria, which inhibited the proliferation of F. nucleatum. These authors also found that gargling with a solution containing W. cibaria was associated with a net reduction in the production of hydrogen sulphide and methanethiol and consequently a reduction in bad breath [19, 20].

Conclusion

Probiotics have got immense potential in dealing with dental caries as revealed by the studies conducted recently in this discipline. More studies are needed to explore the use of probiotics appropriately in the field of dentistry.

References

1. Parvez S, Malik KA, Ah Kang S, Kim HY. Probiotics and their fermented food products are beneficial for health. J Appl Microbiol. 2006; 100:1171-85.
2. Anuradha S, Rajeshwari K. Probiotics in health and disease. JIACM. 2005; 6:67-72.
3. Caglar E, Kargul B, Tanboga I. Bacteriotherapy and probiotics' role on oral health. Oral Dis. 2005; 11:131-7.
4. Bhushan J, Chachra S. Probiotics: Their role in prevention of dental caries. J Oral Health Comm Dent. 2010; 4:78-82.
5. Henker J, Schuster F, Nissler K. Successful treatment of gut-caused halitosis with a suspension of living non-pathogenic Escherichia coli bacteria-a case report. Eur J Pediatr. 2001; 160:592-594.
6. Iwanicka-Grzegorek K, Lipkowska E, Kepa J, Michalik J, Wierzbicka M. Comparison of ninhydrin method of detecting amine compounds with other methods of halitosis detection. Oral Dis. 2005; 11(1):37-39.
7. Burton JP, Chilcott CN, Moore CJ, Speiser G, Tagg JR. A preliminary study of the effect of probiotic Streptococcus salivarius K12 on oral malodour parameters. J Appl Microbiol. 2006; 100:754-764.
8. Kang MS, Kim BG, Chung J, Lee HC, Oh JS. Inhibitory

effect of Weissellacibaria isolates on the production of volatile sulphur compounds. J Clin Periodontol. 2006; 33:226-232.
9. Busscher HJ, Mulder AF, van der Mei HC. *In vitro* adhesion to enamel and in vivo colonization of tooth surfaces by lactobacilli from a bio-yoghurt. Caries Res. 1999; 33:403-404.
10. Yli-Knuuttila H, Snall J, Kari K, Meurman JH. Colonization of Lactobacillus rhamnosus GG in the oral cavity. Oral Microbiol Immunol. 2006; 21:129-131.
11. Meurman JH, Antila H, Salminen S. Recovery of Lactobacillus Strain GG (ATCC 53103) from saliva of healthy volunteers after consumption of yoghurt prepared with the bacterium. Microbial Ecology in Health and Disease. 1994; 7:295-298.
12. Caglar E, Topcuoglu N, Cildir SK, Sandalli N, Kulekci G. Oral colonization by Lactobacillus reuteri ATCC 55730 after exposure to probiotics. Int J Paediatr Dent. 2009; 19:377-381.
13. Horz HP, Meinelt A, Houben B, Conrads G. Distribution and persistence of probiotic Streptococcus salivarius K12 in the human oral cavity as determined by real-time quantitative polymerase chain reaction. Oral Microbiol Immunol. 2007; 22:126-130.
14. Matsumoto M, Tsuji M, Sasaki H, Fujita K, Nomura R, Nakano K. *et al*. Cariogenicity of the probiotic bacterium Lactobacillus salivarius in rats. Caries Res. 2005; 39:479-483.
15. Pham LC, van Spanning RJ, Roling WF, Prosperi AC, Terefework Z, Ten Cate JM. *et al*. Effects of probiotic Lactobacillus salivarius W24 on the compositional stability of oral microbial communities. Arch Oral Biol. 2009; 54:132-137.
16. Faran Ali SM, Tanwir F. Oral microbial habitat a dynamic entity. J Oral Biol Craniofac Res. 2012; 2:181-7. [PMC free article] [PubMed] [Google Scholar]
17. Jadad AR, Moore RA, Carroll D, Jenkinson C, Reynolds DJ, Gavaghan DJ *et al.* Assessing the quality of reports of randomized clinical trials: is blinding necessary? Control Clin Trials. 1996; 17:1-12.
18. Laleman I, Yilmaz E, Ozcelik O, Haytac C, Pauwels M, Herrero ER *et al*. The effect of a streptococci containing probiotic in periodontal therapy: a randomized controlled trial. J Clin Periodontol. 2015; 42:1032-41.
19. Morales A, Carvajal P, Silva N, Hernandez M, Godoy C, Rodriguez G *et al*. Clinical Effects of Lactobacillus rhamnosus in Non-Surgical Treatment of Chronic Periodontitis: A Randomized Placebo-Controlled Trial With 1-Year Follow-Up. J Periodontol. 2016; 87(8):944-52.
20. Wattanarat O, Makeudom A, Sastraruji T, Piwat S, Tianviwat S, Teanpaisan R *et al.* Enhancement of salivary human neutrophil peptide 1-3 levels by probiotic supplementation. BMC Oral Health. 2015; 15:19.