



Review Article

Probiotics in periodontal therapy- A review

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ABSTRACT:

Chemical agents have been in use for prevention and treatment of infections caused by various microorganisms. The inappropriate and faulty use of antibiotic prescription had led to the increase in the resistance level of the various subgingival microbes of periodontitis adult patients. The occurrences of these events have made the necessity of alternative drugs and approaches in healthcare. There is stronger recent evidence pointing to the development of various bacteria promoting health. The incorporation of the probiotic use in oral health care is still at the early stages for development. As these probiotics contain various strains of streptococci, lactobacilli or bifidobacteria, they have been recommended and suggested therapeutic products to improve gastrointestinal health. This preventive action could be slowly incorporated in improving oral health.

Keywords: Probiotics, periodontitis, bifidobacterial, lactobacilli, useful microbes

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INTRODUCTION

Probiotics has been developed from a live active culture of bacteria which improves the balance of the gut microbiota composition to specific effects. Probiotics can be classified into Lactobacillus and Bifidobacterium [1]. It is known to stimulate the host immunity both systemically and locally. They have been in use for many years for the treatment and management of respiratory tract infections, inflammatory bowel disease, vaginal infections and prevention of allergies. Probiotics have been used over many years in the treatment for inflammatory bowel disease, allergies prevention, management for vaginal infections and for prevention of respiratory tract infections [2]. Besides the usage of probiotics in periodontal therapy, it can also be used for treating dental caries and halitosis. According to the definition given by the World Health Organisation in 2001, probiotics are microorganisms, which survive the passage through the acidity of the stomach alive, and when consumed in adequate amounts, confer a health benefit on the host [3]. The interaction of the probiotic with the mucosal immune system of the host and the other microorganisms results in not a local response but a systemic response modulating the entire systemic response regulating the inflammatory actions in the other body parts. It ensures good health and increased longevity. The term 'probiotics' was given in 1965 by Lilly and Stillwell. Probiotics are considered to be safe and resistant to the bile and acidic environment that survives in the intestine, that survive in the gut and produce bacteriocin in order to block the intestinal cells of enteroinvasive bacteria to invade. It could be noticed that probiotics are of good research interest in recent times [4]. Probiotics give a compelling elective way which is affordable and normal to battle periodontal disease. These probiotics have evolved over many years and have been providing good results on oral health. Periodontal disease is a biofilm related polymicrobial disease that includes an intricate transaction between the pathogenic microbes and the host [5]. It is a common inflammatory process affecting soft and hard tooth supporting tissues which are responsible for the tooth loss after the prevalence of caries. This condition arises from the severe plaque accumulation and gingivitis which ultimately leads to the formation of deep pocket depths, bleeding on probing and clinical attachment loss due to loss of supporting structures which leads to tooth mobility and exfoliation [6]. The risk factors of periodontitis are smoking, quantitative or functional reductions of polymorphonuclear leukocytes, immunosuppressant drugs, diabetes and genetic polymorphisms. Usually, the treatment planning for periodontitis is thorough subgingival scaling and root planing [7]. These treatments include the use of antibiotics and antiseptics that has given a greater success rate in decreasing the rate of periodontal infection. Nonsurgical periodontal therapy is regarded as the noninvasive therapy that involves complete removal of dental plaque, calculus and to smooth the root surfaces. The most common microorganisms causing periodontitis are *Actinobacillus actinomycetemcomitans*, *Prevotella intermedia*, *Campylobacter rectus*, *Porphyromonas gingivalis*, and *Bacteroides forsythus* [8]. Many researches reveal that periodontitis can enhance the risk of creating certain systemic diseases which could be coronary heart disease, atherosclerosis, stroke, diabetes, respiratory conditions etc.

MECHANISM OF ACTION OF PROBIOTICS

There are various mechanisms of probiotics that are proposed in which one main mechanism is to modulate host immunity both systemically and locally. These probiotics animate dendritic cells (antigen producing cells) bringing about articulation of Th 1 (T-partner cell 1) or Th 2 (T-aide cell 2) reaction, which adjusts insusceptibility [9].

Probiotics improves inborn resistance and regulate microorganisms actuated aggravation through “Toll like receptors” on dendritic cells [10,11]. Other proposed components incorporate glycoprotein- starch cell surface mediated by inter species association. Another mechanism is through apoptosis in which these probiotics would stimulate the apoptosis of the tumor cells through their final product formation. It has also been researched that they are capable of inhibiting the apoptosis of mucosal cells. Apart from these mechanisms, two other types of action by these probiotics are seen in the oral cavity: direct and indirect. Direct action involves the binding of oral microbes with these proteins through biofilm formation, intervening with the bacterial attachments along with its action on plaque formation and inhibition of oral microbiota with the produced chemicals [12]. Indirect probiotics actions in the oral cavity involve modulating systemic immune function, showing response towards the non-immunological defence mechanism and in the regulation of mucosal permeability.

PROBIOTICS IN PERIODONTAL INFECTIONS

Plaque induced gingivitis is the result of the bacterial biofilm adhered around the tooth producing gingival inflammation which left untreated consequently lead to other periodontal problems. Periodontal disease affects plenty of people in different age groups, gender, race and severity of gingivitis. Both gingivitis and periodontitis are regarded to have inflammation as its origin [13]. Bacterial biofilm is formed immediately after a tooth erupts, wherein the surface gets exposed to the oral cavity and in intimate contact with the gingival margins. The virulence of the oral microbiota and biofilm play an important role in activation of humoral and cellular immune responses. It is believed that gingivitis in young individuals for a long period of time does not lead to any damage to the periodontal bone or ligament. Micro-organisms responsible for causing periodontal disease are *Porphyromonas gingivalis*, *Aggeratibacter actinomycetemcomitans*, *Tannerella forsythia* and *Treponema dentiola* [14]. The probiotic bacteria present in the oral cavity engage and destroy the supporting tissue, becoming the hard non-shedding surfaces and gets incorporated into the biofilm. They tend to ferment sugars which lowers the pH, thereby resulting in caries. Probiotics have become the main topic of research in recent times. Time has come to move the worldview of treatment from a particular bacteria elimination to modification through probiotics. Hence, probiotics defines an alternative way in treating periodontal disease economically. Various studies have given lactic acid inhibition of oral bacteria results in combating periodontal diseases. Etiology of periodontal disease is based on three main factors, ie. susceptible host, pathogens and beneficial bacteria [15]. The entire treatment method involved for periodontitis is to decrease the subgingival flora yet recolonisation of these microorganisms after therapy is conceivable so reestablishing these diminished quantities of valuable microbes by means of probiotics may be considerable interest in the therapy of plaque related periodontal infection. Probiotics not only decrease the count of endogenous microbes or prevent the super infection with exogenous pathogens, but also protect us by creating beneficial host responses [16]. A periodontal dressing usually has collagen and *L.casei* which is said to show action on the subgingival microorganisms of periodontal pockets. *L.salivarius* is generally used as the effective one to suppress the periodontal pathogens and to improve periodontal health [17]. Gingival bleeding decreased with the application of *L.reuteri*. The growth of *Porphyromonas gingivalis* is inhibited by the presence of *Lactobacilli* flora and *Prevotella intermedia*. Probiotics and imbalance of the oral biological system, halitosis, the oral rottenness, is a

condition typically attributed to upset commensal microflora balance. *Streptococcus salivarius*, additionally a potential possibility for an oral probiotic, has exhibited inhibitory impact on Volatile sulphur Compounds [18]. *Lactobacilli*, the main resident in the intra oral region, plays a vital role in the balance of the oral environment. The inhibitory movement displayed by the homofermentative lactobacillus against periodontal microorganisms was primarily connected with their development of corrosiveness, and not to H₂O₂ or bacteriocin production. It could be seen that *bifidobacterium* suppresses a few dark pigmented anaerobe counts. Consequently, probiotics help in making various antioxidants to reduce plaque formation resulting in great maintenance of the oral cavity.

PROBIOTIC BACTERIA

Common probiotic bacteria used are *L.acidophilus*, *L.casei*, *L.reuteri* and *Bifidobacterium bifidum*. These probiotic bacteria are concentrated into the various culture media which in turn is incorporated into various beverage drinks or food as the prebiotic fibers packaged and sold as various dietary supplements. The combination of different bacteria makes it a better probiotics for clinical use. Different bacteria used in making the probiotic, makes it a better competitor to these pathogens. The presence of the bacteria is essential for breakdown of the 4 dietary substances such as carbohydrates, proteins, fats and fiber and gases such as sulphur, nitrogen and phosphorus [19]. The presence of antioxidants is essential as the oxidation products are the main causative factor for stains, plaque and malodors. The reduction of pH as an action of the fermentation bacteria makes all the pathogens disappear [20]. The infection from the resistant bacteria can be prevented in emergency using the antibacterial agents. The cariostatic effect of the probiotics adhered to the oral cavity aids in the fight against the cariogenic bacteria. Thus, these probiotics should be instilled in the oral cavity for a long period of time. Daily products that are in use like yogurt, milk and cheese are advised to be taken since they are known to reduce the risk of dental caries. They are related to casein phosphopeptides and other milk derived materials as they would play a role in bio-mineralisation. Gum periobalance was the first probiotic to be introduced and contains two strains of *L.reuteri*. Another probiotic, prebiotic, known for all natural, fluoride free oral hygiene supplements contains *Lactobacillus paracasei*. *bifidumbacterin*, acilact, vitanar is made up of five live lyophilized lactic acid bacteria used for gingivitis and mild periodontitis. Wakamate D is also another probiotic tablet which has *L.salivarius* and xylitol used for intestinal microbial balance. Prodentis is made up of two *L.reuteri* is again another probiotic introduced in recent times. Probiotics are usually available in the form of lozenges, toothpaste, chewing gums or mouth wash. Hence, before marketing, these products are tested and made safe for human oral and vaginal use. New strains and products are being proved safe for use which provides additional benefits.

CONCLUSION

Probiotics have paved their entry into the oral healthcare arena and further should be investigated in the future studies. Despite the knowledge of various pathogen-host activities, beneficial bacteria in controlling the pathogenic species establishment and oral health maintenance are still unknown. The role of oral beneficial microbiota, the identification of useful bacteria and the conduct of proper large scale studies on the use of probiotics to maintain or improve oral health are needed as soon as possible.

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