

Probiotics and Oral Health

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ABSTRACT

Oral Infectious diseases remain a major health problem despite the use of antibiotics since over 50 years. This may be due to emergence of multiple drug resistant bacteria and increase in orfal infection rate. The spread of these infectius oral diseases had led researchers to look for newer approaches of oral health rehabilitation. The concept of probiotics involves the introduction of specific viable microbial species in order to confer health benefits upon a host by functioning via different mechanisms. The modulation of the microbiota for maintaining health has led to development of Probiotic which are bacteria's with beneficial effects for humans and animals. Several studies have proven their beneficial effects in various oral diseases including halitosis, gingivitis, periodontitis, dental caries & oral candidiasis.

KEYWORDS: Probiotics, Antibiotics, Micro-organisms

INTRODUCTION

More than 700 species of oral micro-biota have been detected in the human mouth. These micro-organisms are the reason for Plaque formation, which plays role in the pathogenesis of various oral diseases and more commonly, periodontal disease. Recent treatment options propose altering ecology of niches. This idea led to the discovery of using beneficial species in oral cavity as treatment option to replace the pathogenic species. Furthermore, the emergence of antimicrobial resistance is currently posing a major global challenge, with an increasing number of strains, including commensal and pathogenic oral bacteria, becoming resistant to commonly used antibiotics.¹ This unfortunate development has led scientists to seek alternate means of combating infectious diseases.²

The probiotics concept involves the introduction of specific microbial species with an aim to confer health benefits upon a host by functioning via different mechanisms. Several clinical trials have proven their beneficial effects in various oral diseases including halitosis, gingivitis, periodontitis, dental caries & oral candidiasis.

HISTORICAL ASPECT

The term Probiotics was derived from Greek word- 'Pro'-(mean 'for') and 'bios' (mean-'life') i.e. 'for life', the antonym of the term antibiotics. This term was 1st introduced by Kollath (1953).³

The use of microorganisms to promote health is very ancient concept and can be traced back to the classical Roman literature. Probiotics were introduced in 1900 by Ukraine bacteriologist and Nobel laureate Ilya

Metchnikoff. Stamen Grigoroff (1898)⁴ isolated bacterium *Lactobacillus Bulgaricus*, from yogurt and reported to Metchnikoff that there were numerous centenarians living in Bulgaria who attributed their longevity to their daily habit of eating home-made yogurt. Metchnikoff began to study *Lactobacillus Bulgaricus* and believed that it could successfully establish itself in the intestinal tract and prevent multiplication and even decrease the number of putrefactive bacteria. He reported that Bulgarians had an exceptionally long average life-span in the early 1900s and four out of every thousand people lived past 100 years of age.⁴

In 1907 Henry Tissier observed that children with diarrhea had in their stools a low number of "bifid" bacteria as compared to healthy children. These bacteria would displace the proteolytic bacteria that cause diarrhea and recommended the administration of bifidobacteria to infants suffering from this symptom.⁵

Roy Fuller emphasized the requirement of viability for probiotics and introduced the idea that they have a beneficial effect on the host.⁶

PROBIOTICS CONCEPT

Human body is more like a complex ecosystem containing trillions of bacteria that inhabit our skin, genital areas, mouth and especially intestines. The Microbes not only threaten us but offers vital help with basic physiological processes—from digestion to growth to self defense.⁷

A balance is maintained between beneficial bacteria & pathogenic bacteria to prevent us from getting the disease. Dysbiosis occurs when there is an alteration in the normal balance of the micro-flora or organisms of the

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human body. Thus, it becomes imperative to control dysbiosis by fortifying the body with "good bacteria", known as Probiotics.⁸ Probiotics are live microbes that can be formulated in foods, drugs, and dietary supplements. Various bacterial genera commonly used in probiotic preparations are⁹:

- Lactobacillus
- Bifidobacterium
- Escherichia
- Enterococcus
- Bacillus
- Streptococcus

Species of *Lactobacillus* and *Bifidobacterium* are most commonly used as probiotics. Most of probiotic bacterial strains are the lactic acid producing bacteria (LAB). Species of *Lactobacillus*, *Lactococcus*, and *Streptococcus thermophilus* are included in this group. Probiotics such as certain strains of *E. coli*, spore-formers, and yeasts used as probiotics are not lactic acid bacteria.⁹

PROPERTIES OF PROBIOTICS

Following should be the acceptable features of Probiotics¹⁰:

- Should be non-toxic and non-pathogenic preparation
- Should produce beneficial effect
- Should withstand gastrointestinal juice
- Should have a good shelf life
- Should reinstate and replace the intestinal microflora

SOURCES OF PROBIOTICS

Probiotics are provided in products in four basic ways¹¹:

- As a culture concentrate added to a beverage or food (such as fruit juice).
- Inoculated into prebiotic fibers.
- Inoculants in a milk-based food (dairy products such as milk, milk drink, yogurt).
- As dietary supplements in concentrated and dried cells packaged (non-dairy products).

PROBIOTICS IN ORAL DISEASES

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

Foul smell originates mainly from sulphur compounds (VSC), especially hydrogen sulphide, methylmercaptan, dimethylsulphide. *Porphyromonas gingivalis*, *Prevotella intermedia*, *Fusobacterium nucleatum*, *Micromonas micros*, *Campylobacter rectus*, as well as various species of *Bacteroides*, *Eubacterium* are largely responsible for the production of the VSC that are the principal contributors to halitosis.¹³

Candidiasis can be treated by Bacteriotherapy, by its action of competitive elimination of harmful yeast from tissue surfaces.

CONCLUSION

The oral cavity with a well-maintained symposium of species- species interaction and may prove to be healthy source for health-promoting probiotic bacteria. Probiotics plays an indispensable role in combating issues with overuse of antibiotics and antimicrobial resistance. It is the apt time to change the way bacteria are treated in today's new technological era. Further studies are required to better know the ability of probiotic bacteria to survive, grow, and have a therapeutic effect when used for treatment or when added to foods, to fix the doses and schedules of administration of probiotics. Hence, randomized controlled trials and systematic studies are extremely essential to find out the best probiotic strains and means of their administration in different oral health conditions and oral health promotion.

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