

Concept of Probiotics in Oral Health: An insight

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ABSTRACT

Since last five decades, diseases of Oral Cavity have remained a major health issue. This may be related to the emergence of multiple drug resistant bacteria and greater incidence of oral diseases. The prevailing situation has led the researchers to look for latest and modern oral health rehabilitation approaches such as Probiotics. Probiotics involve introduction of specific viable species of microorganisms to The concept of probiotics involves the introduction of specific viable microbial species in order to functionally benefit the host via numerous mechanisms. The modulation of the microbiota for maintaining health has led to development of Probiotic, which are bacterias with beneficial effects for humans and animals. Numerous studies have shown beneficial effects in various oral diseases including halitosis, gingivitis, periodontitis, dental caries & oral candidiasis.

KEYWORDS: Probiotics, Antibiotics, Micro-organisms, Bacteria, Randomized Controlled Trial (R.C.T.)

INTRODUCTION

Human Oral Biota may have more than 700 species of microorganisms, which play role in plaque formation thereby leading to pathogenesis of different oral diseases like periodontal disease. 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 which led to the use of beneficial species in oral cavity as treatment option resulting in replacement of pathogenic species. With time the antimicrobial resistance is emerging as a major global challenge, which include a number of strains, such as commensal and pathogenic oral bacteria that are becoming resistant to antibiotics.¹ This has led scientists to seek alternate means of fighting infectious oral diseases.² The concept of Probiotics involve 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.

The term Probiotics introduced by Kollath in 1953³ which has been derived from two Greek words, 'Pro' meaning 'for' and 'bios' meaning 'life' i.e. 'for life'.

HISTORY OF PROBIOTICS

Classical Roman literature cites evidence of ancient application of microorganisms to promote health. It was an Ukraine bacteriologist and Nobel laureate Ilya Metchnikoff who discovered the Concept of Probiotics in 1900. It was in 1898, when Stamen Grigoroff⁴ isolated bacterium *Lactobacillus Bulgaricus*, from yogurt and reported to Metchnikoff that there were numerous centenarians living in Bulgaria who mentioned the use of

home-made yoghurt on daily basis for their longevity. Then, Metchnikoff began to conduct studies on *Lactobacillus Bulgaricus* and believed that it could successfully establish itself in the gastro-intestinal tract, prevent further multiplication and decrease the number of putrefactive bacteria. In the early 1900's it was reported that *L. Bulgarians* had a long life-span, moreover, four out of every thousand people lived more than 100 years of age.⁴

It was Henry Tissier who observed low number of "bifid" bacteria in the stools of Diarrhoea affected children as compared to healthy children. These bacteria would displace the proteolytic bacteria that cause diarrhoea. So, administration of bifidobacteria was recommended for infants suffering from this symptom.⁵

Roy Fuller stressed on the requirement of viability for probiotics and brought the idea regarding beneficial effects of Probiotics on host.⁶

PROBIOTICS CONCEPT

Human body is inhabited by a complex ecosystem of bacteria in our skin, genital areas, mouth and especially intestines. Even though they are considered hazardous to health, they aid in various physiological processes like digestion, growth and self defense.⁷

There remains a proper balance between beneficial bacteria and pathogenic bacteria, which helps in preventing various diseases. Alteration/Shift in normal equilibrium in human body leads to a condition called as Dysbiosis. Thus, it is important to gain the lost balance by introduction of "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 probiotics are⁹:

- Lactobacillus
- Bifidobacterium

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- Escherichia
- Enterococcus
- Bacillus
- Streptococcus

Lactobacillus and *Bifidobacterium* species are the most common microbes used as probiotics. Probiotic bacterial strains produce lactic acid, and hence are called as Lactic Acid producing Bacterias (LAB). *Lactobacillus*, *Lactococcus*, *Streptococcus thermophiles* are also included in this group. Certain strains of *E. coli*, spore-formers, and yeasts are considered as not lactic acid bacteria used as Probiotics.⁹

PROBIOTICS PROPERTIES

Following should be the acceptable features of Probiotics should be¹⁰:

- Non-toxic and non-pathogenic preparation
- Produce beneficial effect
- Withstand gastrointestinal juice
- Have a good shelf life
- Reinstatement and replace the intestinal micro flora.

SOURCES OF PROBIOTICS

Probiotics are delivered through products in four basic ways¹¹:

- As a culture concentrate added to a beverage or food (such as fruit juice).
- Inoculated into probiotic fibres.
- Inoculated 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 HEALTH AND DISEASES

Dental caries, the most commonly found dental disease is a multifactorial and complex disease occurring between the enamel surface and dental biofilm. Several experiments have been conducted to alter the cariogenicity of the biofilms leading to dental caries, and among those "Probiotics" has shown potential as one of the beneficial methods to treat caries and is being worked upon continuously. Probiotics, that involve selectively removing harmful pathogen from oral micro-flora without disturbing the remaining oral ecosystem, has proved as a beneficial preventive agent. One of the replacement therapy options involve the application of a genetically engineered "effector strain" of *S. mutans* that replaces the cariogenic or "wild strain" to prevent or arrest caries and promote optimal remineralization of tooth surfaces that have been demineralized but that have not become cavitated. BCS3-L1 is a genetically modified effector strain of *S. Mutans* designed for use in replacement therapy to prevent dental caries. In BCS3-

L1, Recombinant DNA technology was used to delete the gene encoding lactate dehydrogenase, 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

Halitosis (Foul smell) originates from sulphur compounds (VSC) like 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. Probiotics can be used for reduction of Halitosis generating Microbes in the oral microflora.¹³

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

CONCLUSION

Oral environment sees an inter-related process of microbial species to species interaction and thus proves a health area for health promoting probiotic bacteria to develop. Probiotics plays a significant role in dealing with issues like antibiotics overuse and antimicrobial resistance. With this alternative in hand, it seems as the apt time to change the way of dealing with bacteria. Further studies are needed to understand probiotic bacteria's abilities to survive, grow, and other dental therapeutic advantage they can provide. This may help to fix the doses and schedules of administration of probiotics. Hence, R.C.T.s (Randomized Controlled Trial) and systematic studies are indispensable to find out the best strains of Probiotics and for finding the various means of their oral administration for sound oral health.

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