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Probiotics in the treatment of periodontal disease - A natural way to go!

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ABSTRACT

Probiotics have been defined as live microorganisms which when administered in adequate amounts confer health benefits upon the host. Lactobacillus and Bifidobacterium are the most common species ascribed with the probiotic properties. Mechanism of action explaining beneficial probiotic effects include modulation of host response leading to strengthening of the resistance to pathogenic challenge, alteration of the composition and metabolic activity of the host microbiota at the specific location. Although these organisms are naturally present in food and water, several teams of researchers have studied the potential application of probiotics for oral health by incorporating them in chewing gums or lozenges. Very few studies have been conducted on probiotics from the periodontal perspective. This article reviews the evidences for the use of probiotics for the prevention of periodontal diseases and also addresses the risk associated with their prolonged use.

Keywords: Probiotics, Periodontal disease, Bifidobacterium, Lactobacillus

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1. INTRODUCTION

The term "probiotic" is derived from the Greek word meaning "for life" and is currently used when referring to bacteria associated with the beneficial effects on humans and animals (Hamilton-Miller et al. 2003). The concept of "probiotics" stems from the work of the bacteriologist and Nobel Prize laureate Ilye Metchnikoff in the turn of the 20th century who introduced the idea that the lactic acid bacteria in yoghurt may neutralize deleterious effects of gut pathogens thus extending the life span. Probiotics are defined as "live microorganisms which when administered in adequate amounts, confer a health benefit on the host" (Sanders, 2008). Different organisms can be classified as probiotics, and the most common strains belong to the genera Lactobacillus and Bifidobacterium (Meurman et al. 2007).

Periodontitis is defined as "an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms or groups of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with pocket formation, recession, or both" (Newman et al. 2006).

Despite substantial improvements in the oral health status of populations across the world, periodontal disease still remains a significant social burden. The current view on the etiology of plaque related periodontal inflammation considers three factors that determine whether disease will develop in a subject: a susceptible host, the presence of pathogenic species and the reduction or absence of "beneficial bacteria". Probiotics focus is on the third etiological factor of plaque related periodontal inflammation, namely, the reduction or absence of so called "beneficial bacteria". Probiotics may also be a promising area of research on account of increase in the incidence of resistance to antibiotics used in periodontal therapy.

2. PROBIOTICS AND THE ORAL CAVITY

Probiotics include around 400 bacterial species, which play an important role in maintaining human health. They can be varied and include yeast, bacteria or moulds. Some of the species include (Suvarna et al. 2005).

a. Lactic acid producing bacteria (LAB): Lactobacillus, Bifidobacterium, Streptococcus.
b. Non lactic acid producing bacterial species: Bacillus, Propionibacterium
c. Non pathogenic yeasts: Saccharomyces
d. Non spore forming and non flagellated rod or coccobacilli
e. Nonpathogenic strain of E. coli, Clostridium butyricum.
f. Also under development are strains of bacteria that have been genetically engineered to secrete immunomodulators (such as Interleukin 10 or trefoil factors) which have the potential to favorably influence the immune system.

Commonly, most of the species ascribed as having probiotic properties belong to the genera Lactobacillus and Bifidobacterium. These bacteria are generally regarded to be safe (GRAS) because they reside in the human body causing no harm and on the other hand they are the key organisms in milk fermentation and food preservation. They are usually administered to our gastrointestinal tract through the foods we eat which include dairy foods like milk and yoghurt. They may be added in a form where they are allowed to grow and multiply in the food or they may be added once and the level is maintained depending on the suitability of the storage conditions.

3. MECHANISMS OF ACTION OF PROBIOTICS

1. Modulation of host immune response leading to strengthening of the resistance to pathoghenic challenge (Stamatova et al. 2009)
2. Alteration of the composition and metabolic activity of host microbiota at a specific location (Stamatova et al. 2009).

4. PATHOGENESIS OF PERIODONTAL DISEASE AND THE POSSIBILITIES FOR PERIODONTAL THERAPY

The bacterial biofilm that forms on all hard and soft oral tissues is considered to be the principal etiologic agent in many pathological conditions of the mouth. The accumulation of bacteria within the biofilm, facilitated by poor oral health maintenance, predisposes to allogenic shifts in microbial community, leading to the onset of periodontal inflammation. Probiotic therapy can be considered as a means of inhibiting oral biofilm development (Stamatova et al. 2009).

The proposed actions of probiotics which may affect periodontal health include:

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Inhibition of specific Pathogens:

a. Inhibition of pathogen adhesion, colonization and biofilm formation.
b. Inhibition of pathogen growth by various substances.

Effects on the host response:

a. Inhibition of collagenases and reduction of inflammation associated molecules.
b. Induction of expression of cytoprotective proteins on host cell surfaces.
c. Modulation of proinflammatory pathways induced by pathogens.
d. Prevention of cytokine induced apotosis.
e. Modulation of host immune response.

Various periodontal diseases like gingivitis, periodontitis and more common of all halitosis can be treated with the help of probiotics.

Role of probiotics in the treatment of gingivitis:

Krass and colleagues were the first ones who studied role of Lactobacilli reuteri in the treatment of gingivitis. Since date three mechanisms have been suggested (Talarico et al. 1988).

a. It secretes two bacteriocins reutuein and reutriocycin that have a role in inhibiting growth of a wide variety of pathogens.
b. It possesses a strong capability to adhere to host tissues, competing with pathogenic bacteria.
c. It has an anti-inflammatory action on intestinal mucosa which inhibits the secretion of proinflammatory cytokines.

Role of probiotics in the treatment of Periodontitis:

Lactobacilli has the ability to inhibit the growth of periodontopathogens, including P. gingivalis, P. intermedia and A. actinomycetemcomitans.

Role of probiotics in the treatment of Halitosis:

Halitosis, or bad breath, is the condition when breath has an unpleasant odor. Approximately 80-90% of the causes of bad breath originate in the mouth. Kang and colleagues reported the capacity of various strains of Weissella Cibaria to inhibit the production of volatile sulphur compounds by Fusobacterium nucleatum. They concluded that the beneficial effect resulted from the production of hydrogen peroxide by Weissella Cibaria, which inhibited the proliferation of Fusobacterium nucleatum. Another species Streptococcus salivarius, was detected among people without halitosis and therefore considered as a commensal probiotic of the oral cavity (Anilkumar et al. 2012). The use of gum or lozenges containing Streptococcus salivarius K12 reduced the level of volatile sulphur compounds among the patients diagnosed with halitosis.

5. RECENT ADVANCES

"PERIO BALANCE" is a chewing gum made to fight periodontal disease. It contains a combination of two strains of L. reuteri having a synergistic effect in fighting against carcinogenic bacteria as well as periodontopathogens.

6. SAFETY CONSIDERATIONS

As the probiotics are not regulated by the US Food and Drug administration (FDA), they are available without a prescription. They are classified as a nutritional product rather than a pharmaceutical product. Although administration of probiotics is generally considered safe, each strain of probioitic has a specific property that should be considered before its use in the patient. Following considerations are made for choosing a microorganism (Harish et al. 2006):

1. Isolation has to be the same as the host.
2. It should be beneficial to the host
3. Non pathogenicity
4. Survive through the gastrointestinal tract
5. Longer shelf life of microorganisms.

7. CONCLUSION

Probiotics or health beneficial bacteria have only recently been introduced in dentistry and oral medicine after of years of successful use in mainly gastro- intestinal disorders. The general goal of probiotics is to displace potentially pathogenic or disease promoting bacteria with those recognized as having beneficial effects. This prompts a new

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horizon in the relationship between diet and oral health. Although substantial research has been conducted on the effects of probiotics in humans, additional studies exploring their ability to treat diseases are needed.

REFERENCES

1. Anilkumar K, Monisha ALS. Role of friendly bacteria in oral health - a short review. *Oral Health Prev Dent*., 2012, 10, 3-8 [PMID: 22908082]
2. Hamilton – Miller JMT, Gibson GR, Bruck W. Some insights into the derivation and early use of the word "probiotic". *Br J Nutr*., 2003, 90, 845 [PMID: 14552330]
3. Harish K, Varghese T. Probiotics in humans- evidence based review. *Calicut Medical Journal*, 2006, 4(4), e3
4. Meurman JH, Stamatova I. Probiotics: Contributions to oral health. *Oral Dis*., 2007, 13, 443-51 [PMID: 17714346]
5. Newman MG, Takie H, Klokkevold PR, Carranza FA. Carranza´s Clinical Periodontology, 2006, 10th ed, Saunders-Elsevier, St. Louis
6. Sanders ME. Probiotics: definition, sources, selection, and uses. *Clin Infec Dis*., 2008, 46, 58-61 [PMID: 18181724]
7. Stamatova I, Meurman JH. Probiotics: Health benefits in the mouth. *Am J Dent*., 2009,22,329-338 [PMID: 20178208]
8. Stamatova I, Meurman JH. Probiotics and periodontal disease. *Periodontology*, 2009, 51, 141-151
9. Suvarna VC, Bobby VG. Probiotics in human health-a current assessment. *Current science*, 2005, 88, 1744-48
10. Talarico TL, Casas IA, Chung TC. Dobrogosz WJ. Production and isolation of reuterin, a growth inhiboitor produced by lactobacillus reutri. *Antimicrob Agents Chemother*., 1988, 32(12), 1854-58 [PMID: 3245697]

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