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USE OF PROBIOTICS IN ORAL DISEASES

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ABSTRACT Probiotics are microorganisms, basically bacteria, that when ingested would confer health benefit beyond the basic nutrition. The microbes mostly involved are *Lactobacillus acidophilus* or cocci e.g. *Streptococcus salivarius, S. Lactis, Entrococcus faecium*, and yeast e.g. *Saccharomyces cerevisiae*, *Aspergillus nigere* and *Candida pintolopesii*. Ingestion of probiotics in any form, such as in food stuff (cheese, yogurt, fermented milk, fruit juice, or chewing gum) or contained in tablets and capsules, has been shown to reduce the incidence of dental caries, to manage priodontitis, halitosis and oral candidal infection. Probiotics act through competing with pathogenic microorganism for adhesion sites and nutrients on the host surface. They are also able to stimulate the immune system, secrete antimicrobial substances and alter the pH milieu of the host.
However, more research is still needed in this field.

KEYWORDS : .

Introduction

According to the currently adopted definition by FAO/WHO, probiotics are "living microorganisms, principally bacteria that are safe for human consumption and, when ingested in sufficient quantities, have beneficial effects on human health, beyond the basic nutrition.[1] The term "probiotic" is derived from the Latin preposition pro ("for") (bios, "life").[2] A human being is ingesting bacteria daily either non-intentionally as contaminants of e.g. vegetable, fruits and environment, or intentionally associated with processed food such as yogurt, fermented milk or cheese. Reviewing the literature revealed several reports for a beneficial effect of probiotics in treating systemic infection such as diarrhea,[3] uro-genital infections[4] and some systemic diseases such as liver disease,[5] Crohn's disease and cancer.[6] The vast majority of probiotics are bacteria bacilli e.g. *Lactobacillus acidophilus* or cocci e.g. *Streptococcus salivarius*, *S. lactis*, *Entrococcus faecium*, and yeast e.g. *Saccharomyces cerevisiae*, *Aspergillus nigere*, *Candida pintolopesii*.

Not any bacteria can act as probiotics. For a microorganism to be called probiotic has to be microbiologically characterized and subjected to randomized clinical trials. Principally it has to be of human origin, scientifically demonstrate beneficial physiological effects, to proof of being safe for human use, and stable in acid and bile. In addition, it has to be effectively able to adhere to the intestinal mucosa or the target tissue.[7]

Generally, there are multiple mechanisms explaining the effect of probiotics. By microbial adhesion to the target tissue, the probiotics compete with the pathogenic microbes on adhesion sites and nutrients. Once adhered, they secrete several antimicrobial substances such as bactreiocins, hydrogen peroxide and organic acids. The later can farther modify the pH and the oxidation-reduction potential in a way adversely affects the pathogenic microbes and facilitates their elimination. In addition, probiotics can stimulate the non-specific immunity and modulate the cellular and humeral immune response.[6] In the oral cavity, probiotics are able to form a biofilm that lines and hence protects the oral mucosa or tooth surface from the invading bacteria.In addition probiotics compete with cariogenic bacteria, periodontopathogens, and bacteria associated with halitosis.

Probiotics and Oral Disease

Despite the wide-spread use of probiotics in the management of systemic infections and disease, its use in oral disease may be still in its infancy and limited to the management of caries, periodontal diseases and halitosis.

Probiotics and Dental Caries

The vast majority of the attention on the effect of probiotics in preventing or reducing the incidence of dental caries was directed towards the cariogenic bacteria *Streptococcus mutans*. Several clinical trials have show that the inclusion of *Lactobacillus rhamnosus GG* in milk[8] or processed cheese[9] was associated in reduction of the incidence of dental caries in children. *Bifidobacterium lactis* in ice cream reduced oral *S. mutans* count.[10] Nikawa *et al*. reported reduction in *S.mutans* count and subsequently dental caries incidence in children fed with cow milk fermented with *Lactobacillus reuteri*.[11] Similar results were achieved when children ingested fluids or capsules containing probiotics.[12] The sugar substitute xylitol has been proved to reduce the incidence dental caries. In one study, *S. mutans* count was reduced comparably in children who used xylitol- enriched or probiotics-enriched chewing gum.[13]

Probiotics and Periodontal Disease

The recent research has shown that taking tablets containing *L. salivarius* WB21 significantly reduced the periodontal pathogens in subgingival plaque[14] and improved the periodontal health in volunteers.[15]Also *L. reuteri* reduced the gingival index and bacterial plaque in the treated subjects.[16] When this bacteria was incorporated in chewing gum it also resulted in improvement of the gingival conditions manifested in reduction of the crevicular fluid volume and gingival bleeding, as well as the inflammatory mediators TNF-α and interleukin-8 level.[17]

Probiotics and Halitosis

Halitosis (malodor) is a common problem with multiple local and systemic etiological factors. The main local etiologies include periodontitis, poor oral hygiene, deep dental caries, tongue coating and faulty restorations.

"Physiologic" is a term used to describe halitosis as the result of imbalance of the microbiota in the oral cavity without any organic lesion, in contrary to "pathologic" halitosis where patients usually presented with organic lesion most commonly periodontitis.A recent study has shown that patients with genuine physiologic or pathologic halitosis benefited significantly from two-week therapy with tablets containing *L. salivarius* WB21 in addition to a significant reduction in the level of the volatile compounds and gingival bleeding on probing from periodontal pockets.[18] *Lactobacillus salivarius* TI2711 bacteria was also able to reduce the count of the oral black pigmented bacteroides, the bacteria that is strongly associated with production of the volatile sulphur compounds responsible for halitosis.[19]*Weissella cibaria*[20] and *L. salivarius*[21] were able to reduced levels of volatile sulfide components produced by competing for colonization areas with volatile sulfide- producing species.

Probiotics and Oral Candidiasis

Candida species constitute part of the commensal oral flora in about 50% of healthy subjects, but able to cause a clinically apparent lesion if the immune defences were breached either on the local or systemic level.[22]One study has shown that the subjects who consumed cheese containing the probiotic *L. rhammnosus GG* exhibited reduction in the prevalence of oral *Candida*[23] which subsequently may confer protective effect against oral candidosis. However, others investigated the effect of various lactobacilli and could not find an effect on oral *Candida*.[24] This may be partly explained by the finding of the *ex vivo* experiment which demonstrated a profound but variable abilities of commercially available strain of lactobacilli probiotics to inhibit the growth of *C. albicans* possibly due to the low pH milieu produced by the lactobacilli.[25] Relevant to this is the laboratory study which demonstrated that the *Candida*-infected mice which were fed with *L. acidophilus* exhibited accelerated clearance of *C. albicans* from the mouth.[26]

Conclusion

Probiotics used for the management of oral disease may reduce the cost of the conventional therapy and prevention programs. In addition they provide a reasonable evasion from the antibiotic resistance or allergy. However, more research is needed in the field of probiotics and oral diseases and some questions still need to be answered. Efforts should be made to increase the awareness of the general dental practitioners with this aspect of oral disease therapy and encourage the implementation of the concept of "food rather than medicine".

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