



## Probiotics in oral health: Review article

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### Abstract

Microbial cultures have been used for thousands of years in food and alcoholic fermentations, and in the past century have been investigated for their ability to prevent and cure a variety of diseases. This has led to the coining of the term probiotics, or “pro-life”. Endorsed by the Food and Agriculture Organization and the World Health Organization. Considering the particular activities of probiotics and their inhibitory effect on the growth of pathogens, research interest has been extended to the oral cavity where probiotics may also exert their therapeutic or preventive effect on the development and progression of common oral disease. Within the limits of this systematic review it can be concluded that although existing evidence suggest that probiotics may have certain therapeutic value in treating periodontal disease, this field is in its infancy and more clinical and basic science research is needed.

**Keywords:** probiotics, prebiotics, lactobacillus

### 1. Introduction

Probiotics as defined are the live microorganisms which when administered in adequate amounts confer health benefits on the host. Most of the species prescribed as having probiotic properties belong to the genera *Lactobacillus* and *Bifidobacterium*, and these bacteria are generally regarded as safe (GRAS).

In gastro-intestinal applications, it has been recommended for probiotics to be combined with prebiotics, thus forming a symbiotic composition with proven health benefits. Prebiotics are non-digestible food ingredients such as fructooligosaccharides (FOS), lactulose and inulin that beneficially affect the host by selectively stimulating growth and/or increase activity of a limited number of probiotic like bacteria in a colon. The most commonly used prebiotics are carbohydrate substrates (e.g. dietary fiber) with the ability to promote the components of the normal intestinal micro flora which may evince a health benefit to the host [1].

Periodontal disease result from mixed bacterial infections, in which both host resistance barriers and bacterial interactions are important. For the maintenance of periodontal health, the equilibrium between the microbial attack and the host defence is a determining factor. The oral bacteria lives in harmony with its host, but under specific conditions (increased mass

and/or pathogenecity, suppression of beneficial bacteria and/or reduced host response), disease can occur. Probiotic bacteria, may favour periodontal health if able to establish themselves in oral biofilm and inhibit pathogen growth and metabolism. So, periodontitis could benefit from orally administered probiotics. The presence of periodontal pathogen could be regulated by means of antagonistic interactions.

With increasing understanding that beneficial microbes are required for health, probiotics may become a common therapeutic tool used by health care practitioners in the not-too-distant future [2].

### Criteria of an ideal microorganism used as Probiotics [3].

Since the etiology of periodontal disease is attributed to specific plaque microorganisms and the host inflammatory response, an oral probiotic should be able to modulate host response and influence the types of bacteria present in the biofilm.

1. Non toxic and non pathogenic preparation.
2. Produce beneficial effect.
3. Should withstand gastrointestinal juice.
4. Should have good shelf life.
5. Should replace and reinstate the intestinal microflora.

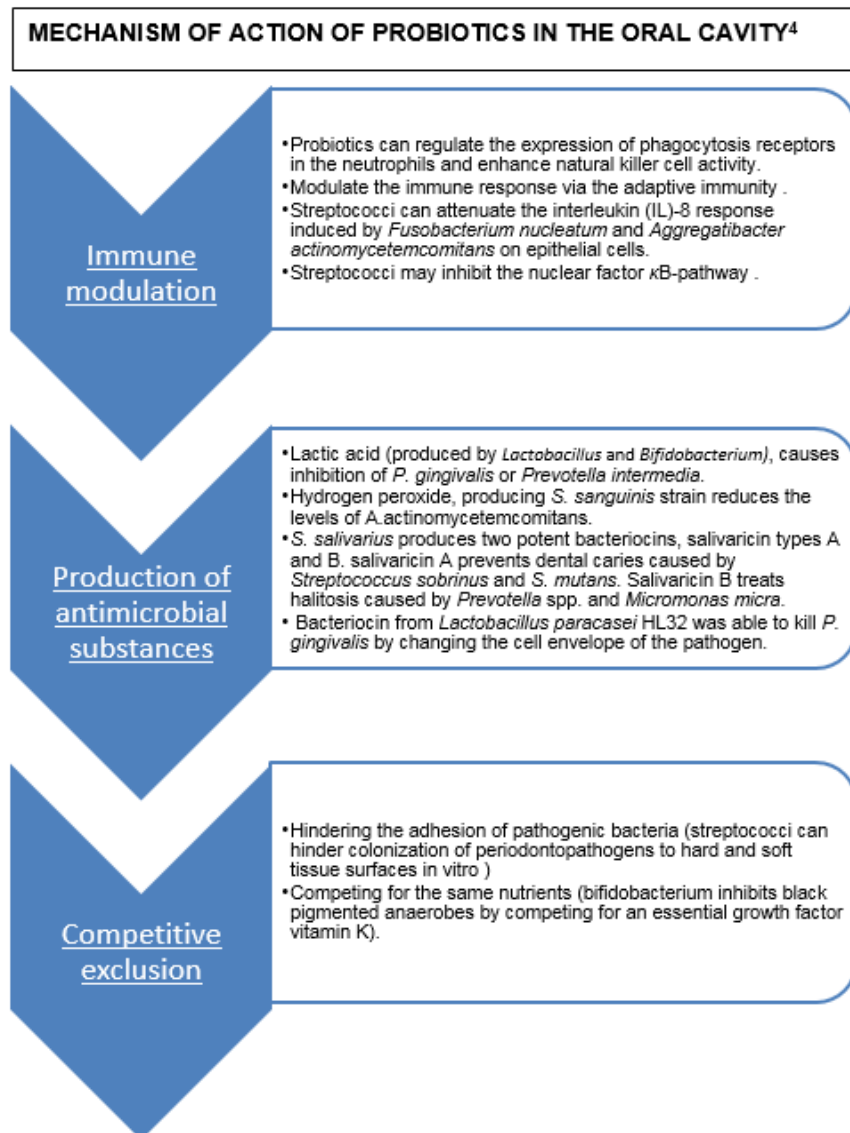


Fig 1

### Probiotics and periodontal diseases<sup>[5]</sup>

Gingivitis and periodontitis are the most common diseases with a microbial aetiology affecting the periodontium. Periodontitis is characterised by a progressive destruction of the supporting structures of the teeth. It is the result of inflammatory responses to dental plaque in a susceptible host. Bacteria may also directly cause tissue damage due to virulence factors, such as toxins and enzymes. Furthermore, the capacity of micro-organisms to induce the production and / or activation of matrix metalloproteinases in host tissues is important in the pathogenesis of periodontitis (Okamoto *et al.*, 1997, De Carlo *et al.*, 1997)<sup>[6]</sup>. The inflammatory response including an increased flow of GCF and a rise in pH favours the Gram-negative, proteolytic species thus leading to an ecological shift as suggested by the ecological plaque hypothesis (Marsh, 2003)<sup>[7]</sup>.

### Residence time of probiotics in oral Cavity<sup>[8]</sup>

Residence time of probiotics in oral cavity after treatment withdrawal was studied by Çağlar *et al.* (2008). A reduced *S.*

*mutans* level was shown after a two-week use of a *L. reuteri*-enriched yogurt; effects were observed during use and for a few days after discontinuation. A loss of *L. reuteri* colonization was observed by Wolff *et al.* (1994) two months after having discontinued probiotic use. Permanent colonization of probiotic bacteria in oral cavity is unlikely and it has suggested the use of probiotic on a regular basis<sup>[9]</sup>. Latency time of probiotic *S. salivarius* K12, 4 tablets/day for 3 days, was assessed in several oral cavity areas in a 35-day follow-up study, by Horz *et al.* (2007). Probiotic could be found on oral mucous membrane, tongue and in stimulated saliva for more than 3 weeks. And *S. salivarius* K12 had gradually reduced 8 days after treatment withdrawal<sup>[10]</sup>.

### Safety aspects

Although no serious adverse events have been described in clinical trials, systemic infections associated with specific probiotics have been noted. Major and minor risk factors for probiotic-associated sepsis have been identified. Major risk factors include immunosuppression (including a debilitated

state or malignancy) and prematurity in infants. Minor risk factors are the presence of a central venous catheter, impairment of the intestinal epithelial barrier (such as with diarrhoeal illness), cardiac valvular disease (*Lactobacillus* probiotics only), concurrent administration with broad-spectrum antibiotics to which the probiotic is resistant and administration of probiotics via a jejunostomy tube. Therefore, Boyle and colleagues (2006) recommend that probiotics should be used cautiously in patients with one major risk factor or more than one minor risk factor<sup>[11]</sup>.

Probiotics can alter the immune response to vaccines. There is evidence that some specific probiotics can alter monocyte and natural killer cell function in the blood. Evidence is also accumulating that taking some specific probiotics can boost antibody responses to oral and systemically administered vaccines. This area needs further investigation<sup>[12, 13]</sup>.

### Conclusion

The probiotics are body's own resident flora so are most easily adapted to host. With fast evolving technology and integration of biophysics with molecular biology, designer probiotics poses huge opportunity to treat diseases in a natural and non-invasive way. To conclude, although existing evidence suggest that probiotics may have certain therapeutic value in treating periodontal disease, this field is in its infancy and more clinical and basic science research is needed.

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