

## Yoghurt May Take the Bite Out Of Gum Disease: The Probiotic Way

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### Abstract

Probiotics is another branch of nutrition that could be further explored to provide us with foods that improve our health and quality of life. They are essentially helpful live organisms, usually bacteria, which are used to change or re-establish the intestinal or gut flora and improve our health. Probiotics are believed to be helpful in the prevention and the treatment of various diseases. They are usually administered to our gastrointestinal tract through the foods we eat. Dairy foods like milk and yoghurt are usually the most popular foods that probiotics are added to. These may be added in a form where they are allowed to continue to grow and multiply in the food or they may be added once and the level of probiotics in the food is maintained or falls depending on the suitability of the storage conditions. The use of probiotics plays an important aspect in dentistry too. The present review is an attempt to discuss briefly the growing role of probiotics in management of various periodontal diseases.

**Keywords:** Probiotics, gingivitis, periodontitis, nutrition.

### Introduction

The term "Probiotic" comes from the Greek word meaning "for life". These are live microorganisms that are similar to beneficial microorganisms found in the human gut. These are also called as "friendly bacteria" or "good bacteria". The concept of "Probiotic" stems from the work of the bacteriologist and Nobel Prize laureate Ilye Metchnikoff in the turn of 20<sup>th</sup> century who rightly stated that "the bacteria in fermented products could compete with microbes that are injurious to host and thus are beneficial for health".<sup>1</sup> Studying longevity and general health of a Bulgarian population dwelling in the Rhodopes Mountains and fed basically on dairy products, the scientist introduced the idea that lactic acid bacteria in yoghurt may neutralize deleterious effects of gut pathogens thus extending life span. He further contributed to the adoption of the name of the species, *Lactobacillus Bulgaricus*, one of the two essential yoghurt starter microorganisms. This also meant the birth of modern dairy industry.<sup>2</sup>

### What are probiotics?

Probiotics includes around 400 bacterial species, which play an important role in maintaining human health.<sup>3</sup> When ingested, these living microorganisms replenish the microflora in the intestinal tract. This results in the promotion of a number of health-enhancing functions, including enhanced digestive function. Probiotics are usually administered to our gastrointestinal tract through the foods we eat. Dairy foods like milk and yoghurt are usually the most popular foods that probiotics are added to. The probiotics 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. Yoghurts labeled "containing live active cultures" usually contain the probiotics *Lactobacillus bulgaris*, *Streptococcus thermophilus* or *L.acidophilus* which are used to start the fermentation process that creates yoghurt from milk.

Probiotics can be varied. They can be yeast, bacteria or

moulds.

Some of the species are:<sup>3,4</sup>

1. Lactic acid producing bacteria (LAB): *Lactobacillus*, *Bifidobacterium*, *Streptococcus*
2. Non lactic acid producing bacterial species: *Bacillus*, *Propionibacterium*
3. Non pathogenic yeasts: *Saccharomyces*<sup>5,6</sup>
4. Non spore forming and non flagellated rod or coccobacilli
5. Nonpathogenic strain of *E. coli*, *Clostridium butyricum*
6. 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.<sup>7,8</sup>

Commonly, most of the species ascribed as having probiotic properties belong to the genera *Lactobacillus* and *Bifidobacterium*. These bacteria are generally regarded as safe (GRAS) because they can reside in the human body causing no harm and, on the other hand, they are key microorganisms in milk fermentation and food preservation and used as such from the dawn of mankind. *Lactobacilli* found in raw milk and fermented dairy products such as cheese, yogurt and fermented milk are ubiquitous in the diet and are found in the gastrointestinal tract soon after birth.<sup>2</sup>

### How these work?

It modulates the host response improving the body defense mechanism system and alters the composition and metabolic activity of host microbiota at the specific location.

### Which to use and which not?

Following considerations are made for choosing a microorganisms:

- (1) Isolation has to be 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 the microorganisms<sup>9</sup>

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### Role of oral microflora

Probiotics can be introduced into the oral cavity at much higher concentration with minimal loss in number. It has been recently estimated that over 1000 bacterial species are present in the oral cavity.<sup>10</sup> Bacteria reside in the mouth either in free-floating state or in complex oral biofilm. Bacteria in biofilms tend to be much more resistant to environmental factors and antimicrobial agents. It is possible that the probiotics act at bio-film to keep pathogens away and occupy a space that might otherwise be occupied by a pathogen. Probiotics should adhere to dental tissues to establish an effect and thus should be a part of the bio-film to fight the bacteria. An ideal probiotic should have an adequate longevity to exert its action in the oral cavity. These can be delivered in the form of food products like cheese, milk and yoghurt or supplements as chewing gums, lozenges, capsules, tablets, mouth rinses, spray, etc.

### How probiotics can help in periodontal therapy?

Various periodontal diseases like Gingivitis, Periodontitis and more common of all Halitosis can be treated with the help of probiotics.<sup>11</sup> Various mechanisms by which these act have been proposed for the management of periodontal disease. These widely act by either by inhibiting the pathogen adhesion, colonization, biofilm formation and growth, which consequently have the following effects on the host response- inhibition of collagenase and reduction of inflammation associated molecules, inhibition of expression of cyto protective proteins on host cell surface, modulation of pro inflammatory pathways, prevention of cytokine induced apoptosis and modulation of host response.

### Role in 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-<sup>12</sup>

-It secretes two bacteriocins reutuein and reutriocycin, that have a role in inhibiting growth of wide variety of pathogens.

- It possess strong capability to adhere to host tissues, competing with pathogenic bacteria.

- It has an anti-inflammatory action on intestinal mucosa, which inhibits the secretion of proinflammatory cytokines.

### Role in the treatment of periodontitis

Lactobacilli has the ability to inhibit the growth of periodontopathogens, including *P.gingivalis*, *Prevotella intermedia* and *A. Actinomycetemcomitans*.<sup>11</sup>

### Recent advances

“PERIO BALANCE” is a chewing gum made to fight periodontal disease. It contains combination of two strains of *L.reuteri* having a synergistic effect in fighting against cariogenic bacteria as well as the periodontopathogens.<sup>11</sup>

### Safety considerations

The probiotics are not regulated by the US Food and Drug Administration (FDA) and are easily available without a prescription as they are classified as a nutritional product

rather than as a pharmaceutical product.<sup>9</sup> Numerous probiotics have a long history of safe use and no health concerns have been observed.<sup>13</sup> Although administration of probiotics generally can be considered safe, each strain of probiotic has specific properties that should be considered before its use in any patient.<sup>9</sup>

### Conclusion

Probiotics are emerging as a fascinating field in oral medicine. The general goal of probiotics is to displace potentially pathogenic or disease-promoting bacteria with those recognized as having beneficial effects. This concept prompts a new horizon on the relationship between diet and oral health. Scientific understanding of probiotics and their potential for preventing and treating health conditions is at an early stage, but evolving continuously. Only the general mechanisms by which they act are beginning to be understood. Substantial research has been conducted on the effects of probiotics in humans, although additional studies exploring their ability to treat disease are needed.

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