

The Role of Probiotics in Oral Health

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Introduction

- Probiotics are living microorganisms that are naturally present in foods such as fermented milk and yogurt.
- These bacteria belong to the genera Lactobacillus, Bifidobacterium, Propionbacterium, and Streptococcus.
- They have been implicated in the treatment of certain systemic and infectious diseases such as acute diarrhea, Crohn's disease and some forms of immunotherapy. Other studies have applied the use of probiotics in cardiovascular disease, urogenital infections, oropharyngeal infections and cancers. It is also useful in addressing systemic issues arising the use of antibiotics.
- The potential benefits of probiotics on oral pathology have only had limited study

How Probiotics Work

- They compete with pathogenic bacteria for adhesion on mucosal sites
- Modify surrounding environment by affecting the pH and the oxidation-reduction potential which limits pathogens ability to become established
- Can stimulate the non-specific immune system and modulate the hosts cellular immune response

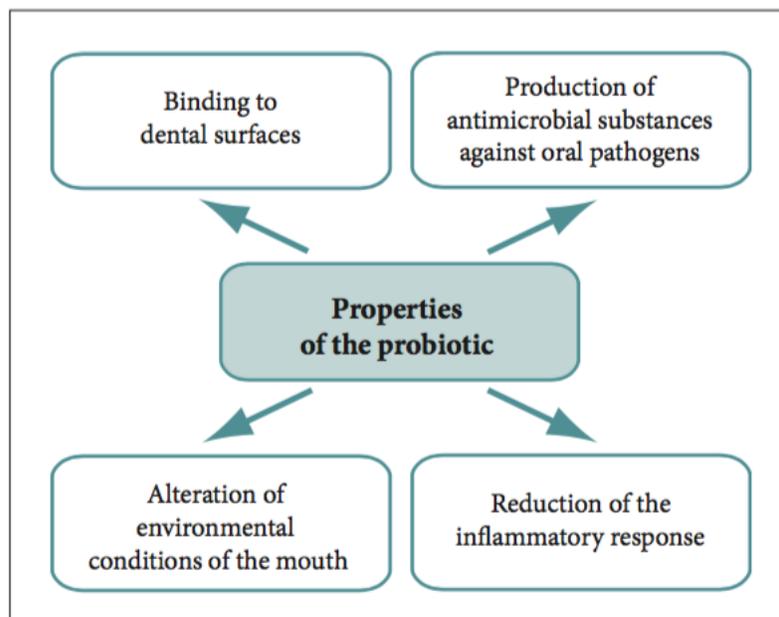


Figure 1: Ideal properties of a probiotic intended for use in disorders of the mouth.

Application of Probiotics on Oral Health

- Lactobacilli constitute about 1% of cultivable oral microflora in humans – species most often found in saliva are: *Acidophilus*, *casei*, *fermentum*, *plantarum*, *rhamnosus*, *salivarius*.
- Sookkhee and colleagues isolated 3790 strains of lactic acid bacteria and found *Lactobacillus paracasei ssp. paracasei* and *rhamnosus* as having a high capacity to antagonize *S. mutans* and *P. gingivalis*
- *Weisella cibaria* secretes hydrogen peroxide and coaggregates with *F. nucleatum* which can limit the proliferation of this pathogenic bacterium
- Dairy products have been shown to adhere to surfaces of teeth and oral mucosa. For example, it has been reported that people who consumed yogurt containing *L. rhamnosus* on daily basis have had this organism present in the saliva for up to 3 weeks post discontinuing yogurt consumption.

Probiotics and Dental Caries

- To have an effect on limiting dental caries by adhering to dental surfaces and antagonizing the effects of cariogenic bacteria and proliferation.
- Probiotics can metabolize food grade sugars and neutralize acidic conditions. It has been shown from previous studies that cheese prevents demineralization and promotes remineralization
- There is evidence that certain strains of probiotics can integrate into the biofilm on the HAP surface, have bacteriocidal effects on *S. mutans*, and that regular consumption of probiotic products reduce the number of cariogenic streptococci found in saliva and dental plaque.
- When the diet of 3-4 year olds was fortified with *L. rhamnosus*, it was found that compared to controls, these children had significantly fewer dental caries and lower salivary counts of *S. mutans*.

Probiotics and Periodontal Disease

- The main pathological agents of PD are *P. gingivalis*, *T. denticola*, *T. forsythia*, and *A. actinomycetemcomitans* – they have a variety of virulent properties that allow them to colonize subgingival sites, escape host defence systems, and cause tissue damage.
- Various studies have shown that lactobacilli can inhibit growth of periodontopathogens. This indicates that lactobacilli can play a role in restoring the oral ecological balance.
- In patients with chronic periodontitis, the treatment of delivering probiotics through sucking lozenges over a 4-day period was evaluated. It was found that there was a significant reduction of salivary levels of prostaglandin E₂, and MMPs.
- Lactobacilli strains can also increase osteoblastic activity which can reduce bone resorption found in patients with periodontal disease

Current Oral Probiotic Products

- Gum PerioBalance (Sunstar, Etoy, Switzerland)
 - This probiotic was specifically formulated to fight periodontal disease. Gum PerioBalance contains 2 strains of *L. reuteri* which are known to fight cariogenic bacteria and periodontopathogens. Each lozenge is used after a meal or in the evening after brushing. The premise is for these probiotics to spread around the oral cavity and attach to dental surfaces. Long term studies are needed to evaluate the long-term effects of these products.



- Prodentis (Biogaia, Stockholm, Sweden)
 - This probiotic lozenge contains a blend of two *Lactobacillus reuteri* strains. No studies were found on the long-term effects of this product.

Precautions

- Most probiotics are generally safe. The side effects are mainly mild and digestive related. For patients who are immunocompromised, probiotics can lead to infections, or cause unhealthy, overactive metabolic activity.
- Some strains of *Lactobacillus* have also caused bacteremia in patients with short bowel syndrome. Caution should also be exercised in patients who are lactose intolerant, have central venous catheters, or are on broad spectrum antibiotics which the probiotic is resistant to.

Take Home Message

- The consumption of probiotics to help live a healthy life is a well-accepted concept. Certain strains have been shown to reduce the cariogenicity of *S. mutans* and neutralize *P. gingivalis* – hallmark pathogens in caries and periodontal disease.

- There is limited scientific evidence to back the use of oral probiotics as acceptable ways to reduce dental caries and serve the needs for periodontal health prophylaxis
- Current products are trying to increase exposure time in the oral cavity through the form of lozenge or chewing gum tablets.
- Controlled clinical trials and long-term studies are required to investigate the concentration of probiotic bacteria in the specific means of administration being proposed in the market today.

References

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