ABSTRACT

Probiotics, bacterial cultures or living microorganisms, upon ingestion in certain quantity promote and enhance health benefits. An International Life Science Institute Europe consensus document proposed a simple and widely accepted definition of probiotics as ‘viable microbial food supplements which beneficially influence the health of human’. These bacteria should also adhere to the intestinal mucosa and finally should have the ability to inhibit the gut pathogens.

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INTRODUCTION

Probiotics are dietary supplements containing potentially beneficial bacteria or yeasts. They are administered in different quantities that allow for colon colonization. These products help in stimulating health promoting flora and also suppressing the pathologic colonization and disease spread.

The use of probiotic plays an important aspect in dentistry too ever since the oral infections occupied the prime space among the other infections affecting the humans. This concept of microbial ecologic change both for medical and dental changes has accumulated a lot of evidence in recent times. But to date no substantial literature and use has been postulated.

There are claims that probiotics strengthen the immune system to combat allergies, stress, exposure to toxic substances and other diseases. There are reports of their beneficial use in HIV infection and cancers, mostly the colorectal carcinomas. Their use in premalignant and malignant oral disorders is yet to be probed.

Probiotics are nondigestible food ingredients, such as fructo-oligosaccharides (FOS), lactulose and inulin that beneficially effect the host by selectively stimulating the growth and/or increase activity of a limited number of probiotic like bacteria in the colon.

Species and Health Benefits

Recently, there are reports of usage of lactic acid bacteria in microbial infections and cancer due to their immune-stimulatory properties. These microorganisms can inhibit the biofilm and actually protect oral tissue from disease. They also have cariostatic activity, help in preventing candidal colonization and act as antioxidants.

Probiotics can be varied. They can be yeast, bacteria or molds. But, most commonly bacterial species are predominant. Some of the species are as follows:

1. **Lactic acid-producing bacteria (LAB):** Lactobacillus, Bifidobacterium, Streptococcus.
2. **Nonlactic acid-producing bacterial species:** Bacillus, Propionibacterium.
3. **Nonpathogenic yeasts:** Saccharomyces.
4. Nonspore forming and nonflagellated rod or coccobacilli.

The Lactobacillus species help in production of enzymes to digest and metabolize proteins and carbohydrates. They aid in synthesis of vitamin B and vitamin K and facilitates breakdown of bile salts.

More than 100 species of *L. acidophilus, L. brevis, L. casei, L. rhamnosus* and *L. salivarius* have been identified. They are usually dispensed in gel, paste, powder and liquid forms. They enhance innate and acquired immunity as well as help in inhibition of proinflammatory mediators. More recently, a study demonstrated that long-term consumption of milk caused a significant reduction of caries risk.

Bifidobacterium species are strictly anaerobic and predominate the large intestine. The benefits from these
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include metabolization of lactose, generate lactic ions from lactic acid, synthesize vitamins, ferment indigestible carbohydrates, produce beneficial short chain fatty acids, reduce antibiotic-associated diarrhea, traveler’s diarrhea, relieve constipation, alleviate inflammatory bowel disease and prevent DNA damage. Finally, they may prevent or delay the onset of cancers.8

Streptococcus thermophilus and Lactobacillus bulgaricus are primary cultures used in yoghurt production. Benefits of this are to metabolize lactose, improve lactose intolerance and antimicrobial activity.9

Saccharomyces boulardii: It is a noncolonizing lactic acid-producing yeast. It prevents antibiotic-associated diarrhea, C. difficle associated disorders, acute diarrhea, traveler’s diarrhea, AIDS-related diarrhea and to prevent relapse of Crohn’s disease. Most of the beneficial species enhance vitamin production and reduce serum cholesterol level and have anticarcinogenic activity.8,9

SELECTION OF PROBIOTICS

The criteria for considering certain products should be:
1. They should be nontoxic and nonpathogenic preparation.
2. Produce beneficial effect.
3. Should withstand gastrointestinal juice.
4. Should have good shelf life.
5. Should replace and reinstate the intestinal microflora.

PROBIOTICS AND HIV

Recently it has been postulated that the probiotic bacteria may slow down AIDS progression. Lin Tao and his colleagues screened hundreds of bacteria taken from the saliva of volunteers. The results showed that some Lactobacillus strains had produced proteins capable of binding a particular type of sugar found on HIV envelope, called mannose. The binding of the sugar enables the bacteria to stick to the mucosal lining of the mouth and digestive tract, forming colonization. One strain secreted abundant mannose-binding protein particles into its surroundings, neutralizing HIV by binding to its sugar coating. They also observed that immune cells trapped by lactobacilli formed a clump. This configuration would immobilize any immune cells harboring HIV and prevent them from infecting other cells.10

PROBIOTICS AND CANCER

Individuals who consume high amounts of animal protein and fats apparently showed increased risk of colon cancer. The refined diet has also been implicated in causation of breast and prostate cancer. It has been postulated that microflora of gastrointestinal (GI) tract are involved in inducing colorectal carcinoma. Evidence is cropping up that probiotics can interfere at various stage of cancer process, more so by interference with chromosomal and DNA damage.11,12

PROBIOTICS AND CALCIUM ABSORPTION

Milk is considered to be abundant with calcium apart from other dietary sources. Individuals with lactose intolerance may probably develop osteoporosis due to decreased consumption of milk containing diet. So, if probiotics are fed to lactose intolerance patients, then milk lactose is hydrolyzed by probiotic strains and favors calcium absorption.13

PROBIOTICS AND ORAL HEALTH

Mouth represents the first part of the GI tract. Probiotics have been successful for treating digestive-related diseases. These can be introduced into the oral cavity at much higher concentration with minimum loss in number. Many of the beneficial bacteria are destroyed by the hydrochloric acid in the stomach. The way to avoid this pitfall is to freeze the bacteria and put them in a pill.14

It should also be noted that as most probiotics are in dairy forms containing high calcium, possibly reducing demineralization of teeth. It is possible that these act as biofilm to keep pathogens away and occupy a space that might otherwise be occupied by a pathogen. Probiotic should adhere to dental tissues to establish a cariostatic effect and thus should be part of the biofilm to fight the cariogenic bacteria. The duration of their stay locally also is important for beneficial effect. Ideal vehicles of probiotics installation are yogurt, milk and cheese. Some of the hypothetical mechanism of probiotics action in the oral cavity is by:15,16

• Direct interaction in dental plaque
• Involvement in binding of oral microorganisms to proteins
• Action on plaque formation and on its ecosystem by competing and intervening with bacterial attachments
• Involvement in metabolism of substrate and production of chemical that inhibit oral bacteria.

Indirect probiotic actions are also featured as follows:
• Modulating systemic immune function
• Effect on local immunity
• Effect on nonimmunologic defense mechanisms
• Regulation of mucosal permeability
• Probiotics as antioxidants and produce antioxidants
• Prevent plaque formation by neutralizing the free electrons.

Lactic acid bacteria are considered detrimental to dental health because they ferment sugars and lower pH of these
bacteria. When lactic acid bacteria are consumed in milk products, the buffering capacity of milk influences the acidity. Presence of calcium and other constituents may also protect tooth surface and inhibit the adherence of dental pathogens. Russian scientists have reported that probiotic bifidobacterium species reduce gingival and periodontal inflammation.17-19

Even though there is a good number of studies indicating anticarcinogenic effect in intestines, there are no studies done over the effect of probiotics on premalignant and malignant conditions of the oral cavity.20,21

STATUS OF PROBIOTICS IN INDIA

In India, Sporlac, *Saccharomyces boulardii* and yogurt are the most common ones used. Lactobacilli solution is an example of a probiotic, usually given to pediatric patients. The latest and recent addition to the list of probiotics in India is made up of genetically modified *Bacillus mesentricus* which act as an alternative to B-complex capsules. Only sporulating lactobacilli are used with some of the antibiotic preparations.1,4

CONCLUSION

Probiotics are emerging as a fascinating field in oral medicine. This concept prompts a new horizon on the relationship between diet and oral health. Clinical trials should be directed to access the method of probiotic administration in oral cavity and dosages for different therapeutic uses. Research should be directed toward the action of probiotics on oral cavity and also on its pathological conditions.

REFERENCES


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