

PROBIOTICS AND THEIR BENEFICIAL ROLE IN HEALTH

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ABSTRACT

Probiotics- a culture of living micro-organisms, when ingested in sufficient quantities beneficially affects the health of the host. These are small organisms that help maintain the natural balance of other organism in the intestine. The largest group of probiotic bacteria in the intestine is lactic acid bacteria. Probiotics are widely used in many countries by consumers and in clinical practice. These have been used for the prevention and treatment of a wide range of diseases from acute gastroenteritis to intestinal neoplasia. The strongest evidence for the use of probiotics is in the management of diarrheal diseases. The colonisation of the gut by probiotic bacteria prevents the growth of harmful bacteria by competitive exclusion and by the production of organic acids and antimicrobial compounds.

Keywords: *Probiotics, microorganisms, Diarrhea, Fermentation.*

I. INTRODUCTION

Probiotics are live microbial food supplements beneficially affecting the host by improving the microbial balance. Several researchers have reported about beneficial role played by use of probiotics in Humans. Most widely studied benefits of probiotics are to promote a healthy digestive tract and a healthy immune system. These are commonly known as friendly, good, or healthy bacteria. Probiotics are considered as “good” bacteria that help to keep our digestive system healthy by controlling growth of harmful bacteria. They decrease the number of bacteria in our gut that can cause infections or inflammation and restore the body's bacterial balance.

Although people often think of bacteria and other microorganisms as harmful germs, many microorganisms help our bodies function properly. Large numbers of microorganisms live on and in our bodies. Microorganisms, especially bacteria that are normally present in our intestines help to digest food, destroy disease-causing microorganisms, and produce vitamins. Many of the microorganisms in probiotic products are the same as or similar to microorganisms that naturally live in our bodies. Probiotic foods are foods that contain live and active bacterial cultures. Probiotic foods also have benefit to the process of fermentation. Probiotics are widely used to prepare fermented dairy products such as yogurt or freeze-dried cultures. During fermentation, carbohydrates in the food are broken down into acids by various kinds of probiotic bacteria and/or yeast.

Products sold as probiotics include foods (such as yogurt), dietary supplements, and products that aren't used orally, such as skin creams. Yogurt is perhaps the most common probiotic-carrying food. Cheese, fermented and

unfermented milks, juices, smoothies, cereal, nutrition bars, and infant/toddler formula all are food vehicles for probiotic delivery. Probiotics are also sold as dietary supplements, medical foods, and drugs, in addition to being sold as foods. These products are composed of concentrated, dried microbes which are packaged into capsules, tablets, or sachets. Large numbers of microbes can be easily delivered in this form and are quite stable even at room temperature if manufactured and stored properly.

The term probiotic is a relatively new word meaning 'for life' and it is currently used to name bacteria associated with beneficial effects for humans and animals. The terminology of probiotics was first coined by Elie Metchnikoff, a Russian Nobel Prize winner in the early 20th century. He was the first scientist to propose the therapeutic use of probiotics for the prevention or treatment of several health issues. Probiotics in the form of *Streptococcus thermophilus* and *Lactobacillus bulgaricus* in fermented milk have been ingested by humans for thousand of years.

Various scientists defined probiotics in various ways. According to the currently adopted definition by FAO/WHO, Probiotics are "Live microorganisms which confer a health benefit on the host when administered in adequate amounts." In 1989 Fuller also suggested that probiotics beneficially affect the host by improving its intestinal microbial balance.

II. SAFETY ASPECTS OF PROBIOTICS

Different strains of bacteria used as probiotics should be safe to use in applications. The ideal probiotic should possess some characteristics which suggest that it would be desirable as a health supplement. It should be non-pathogenic, non-toxic and beneficial to host in some way. Probiotic to be used should be of high viability and stable on storage and in the field, during the entire shelf life of the product. It should be able to survive in or colonise the gut and amenable to cultivation on an industrial scale. The ideal probiotic should remain viable at the level of the intestine and should adhere to the intestinal epithelium to confer a significant health benefit. Probiotics must also be resistant to gastric acid digestion and to bile salts to reach the intestinal tract. According to Saarela et al. (2000), safety aspects of probiotic bacteria include the following requirements: strains for human use are preferred to be of human origin, they are isolated from healthy human gastrointestinal tract, they have to be non-pathogenic, they have no history of relationship with diseases like infective endocarditis or gastrointestinal tract disorders, they should not carry transmissible antibiotic resistance genes.

III. PROPERTIES OF PROBIOTICS

In order to act as a probiotic, a strain must survive the conditions of the stomach. Ziemer and Gibson (1998) considered that probiotics must possess certain properties like:

- they must survive passage through the upper regions of the gastrointestinal tract and persist in the colon;
- there must be no adverse response to the bacteria, their components or metabolic end products;
- they should be antagonistic to mutagenic or pathogenic organisms in the gut and must be genetically stable;



- for successful introduction of the probiotic concept into the food market; chosen micro-organisms must be amenable to industrial processes and remain viable in the final food product.

IV. SOURCES OF PROBIOTICS

Most probiotics are strains of *Lactobacillus* or *Bifidobacterium* species. Some are derived from the intestinal microbiota of healthy humans and others are nonhuman strains used in the fermentation of dairy products. Species from other bacterial genera such as *Streptococcus*, *Bacillus* and *Enterococcus* have also been used as probiotics. Nonbacterial microorganisms such as yeasts from the genus *Saccharomyces* have also been used as probiotics for many years.

Genera and species of microbes used as probiotics

1. **Lactobacillus:** Some of the lactobacilli found in foods and supplements are *Lactobacillus acidophilus*, *Lactobacillus bulgaricus*, *Lactobacillus rhamnosus*, *Lactobacillus plantarium*, *Lactobacillus reuteri*, *Lactobacillus salivarius*, *Lactobacillus casei*, *Lactobacillus johnsonii*, and *Lactobacillus gasseri*.
2. **Bifidobacteria:** *Bifidobacterium lactis*, *Bifidobacterium longum*, *Bifidobacterium breve*, *Bifidobacterium infantis*, *Bifidobacterium thermophilum*, and *Bifidobacterium pseudolongum*.
3. *Saccharomyces cerevisiae*
4. *Streptococcus thermophilus*
5. *Enterococcus faecium*
6. *Escherichia coli*
7. *Bacillus coagulans*

V. EFFECTS OF PROBIOTICS

Antimicrobial effects of Probiotics: Probiotics help to modify the microflora to suppress pathogens. To suppress pathogens, probiotics compete with pathogens to prevent their adhesion to the intestine, compete for nutrients necessary for pathogen survival, exert antitoxin effect and secrete antibacterial substances. Probiotic bacteria produce a variety of substances that are inhibitory to both gram-positive and gram-negative bacteria. These include organic acids, hydrogen peroxide and bacteriocins. These compounds help to reduce the number of viable pathogenic organisms.

Effects of Probiotics on the Intestinal Epithelium: It includes promotion of tight contact between epithelial cells forming a functional barrier, reducing the secretory and inflammatory chances of bacterial infection, enhancing the production of defensive molecules such as mucins.

Immune effects of Probiotics: Probiotics are used to deliver anti-inflammatory molecules to the intestine. These health-related effects are described below:

1. **Managing lactose intolerance:** Lactose is the main sugar found in milk which is composed of two molecules: glucose and galactose. To split lactose into glucose and galactose, an enzyme Lactase is produced by infants,

children, and some adults. However, some humans don't have the ability to produce this enzyme. If these people consume *dairy products with lactose*, they can develop gastrointestinal symptoms such as abdominal bloating, pain, flatulence, and diarrhea.. Some bacteria such as *Streptococcus thermophilus* and *Lactobacillus delbrueckii* subsp. *Bulgaricus* can also produce lactase, and are used as starter cultures in yoghurt. So if people consume dairy products such as yoghurt can improve their lactose digestion and symptoms. A number of studies have demonstrated better lactose digestion, as well as a decrease in gastrointestinal symptoms, in people with this condition who consume yogurt with live cultures.

2. Diarrhea control: Diarrhea is a common side effect of taking antibiotics. It occurs because antibiotics can negatively affect the balance of bacteria in the gut . Researchers found that taking probiotics reduced antibiotic-associated diarrhea by 42%. The best effect of probiotic is shortened duration of rotavirus diarrhea using *Lactobacillus* GG. Other strains can also be used such as *Lactobacillus acidophilus*, *Bifidobacterium lactis* and *Lactobacillus reuteri* on shortening the diarrhea.

3. Prevention of cancer: Probiotics having anti tumor action work through following mechanisms:

- (a) Carcinogen/procarcinogen are suppressed by binding, blocking or removal
- (b) Probiotics suppress the growth of bacteria with enzyme activities that convert the procarcinogens into carcinogens
- (c) They alter colonic transit time to remove fecal mutagens more efficiently
- (d) They change the intestinal pH thus alter microflora activity and bile solubility
- (e) And stimulate the immune system.

4. Cholesterol reduction: Bile salt hydrolysis enzymes deconjugate the bile salts resulting in increased cholesterol breakdown.

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