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Probiotics: The Nutritious Bio-Medicine

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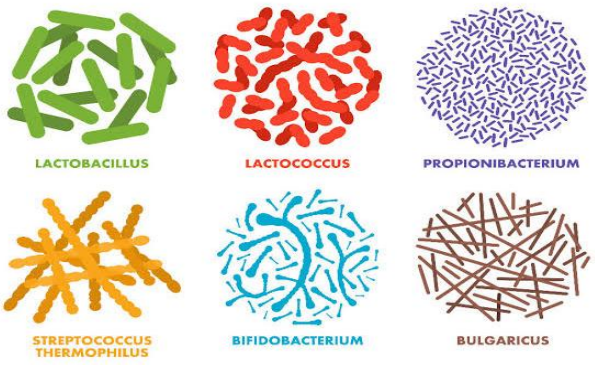
Introduction

Probiotics are live microbial feed supplements which beneficially affects the host animal by improving its intestinal microbial balance (Fuller, 1992). In 1900s, Louis Pasteur identified the microorganisms useful for fermentation. The first discovery in form of *Lactobacillus bulgaricus* in 1905 was done by Bulgarian physician Stamen Grigrov. Russian scientist E. Metchnikoff in 1907 associated the increased lifespan of Bulgarian rural people to regular consumption of yogurt.Jozef Brudzinski is known as the 'Father of probiotics' for his application of *Bacillus lactis aerogenes* suspension in treatment of acute diarrhoea in infants. The term "probiotic" (from Latin word "pro" and Greek word "βιοσ" that means "for life") was coined by German scientist Werner Kollath in 1953 to designate "active substances that are essential for a healthy development of life." Hence probiotics are food items containing microorganisms that maintain intestinal microflora balance, thus are beneficial for human and animal health.

Types of probiotics

Probiotics can be bacteria or yeast. Bacteria most commonly used as probiotics are *Lactobacillus* and *Bifidobacterium* species. *Bifidobacterium* genus is commonly used in foods and supplements. Bifidus factor (amino sugar) present in breast milk increases the growth of Bifidobacterium species. It decreases the growth of harmful bacteria *Escherichia coli* in intestine and increases immunity. *Lactobacillus* genus produces lactic acid and the lactose breaking enzyme lactase. Lactic acid serves as muscle fuel during exercise and enhances the calcium absorption in body. *Lactobacillus* bacteria are naturally present in mouth, small intestine and vagina. Six



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common species of *Bifidobacterium*and *Lactobacillus*are *B. animalis, B. breve, B. lactis, B. longum, L. acidophilus* and *L. reuteri*. *B. animalis*, an ingredient in Dannon yogurt's Activia product improves digestion and provides immunity against food borne illness. *B. breve* present in digestive tract and vagina fights infectious bacteria and yeast. It helps i by fermenting sugars and facilitates digestion of dietary fibres. *B. lactis* present in raw milk serves as a starter for buttermilk and different types of cheese. It's used as a component in Nestle's infant formula i.e. Good Start Natural Cultures. *B. longum* residing in human gut helps in carbohydrate digestion and in formation of antioxidant. *L. acidophilus* found in intestinal tract and vagina helps in synthesis of vitamin B_{12} and protects vaginal environment from infections through maintaining the correct pH, respectively. It is present in curd, yogurt and fermented soy products. *L. reuteri* present in mouth and intestine helps in digestion as well as protects the oral cavity against bacteria causing tooth decay. The most common yeast that acts as probiotics is *Saccharomyces boulardii*. It is isolated from lychee and mangosteen fruit peel and useful in treating rotaviral diarrhoea in children. Other bacterial species like *Lactococcus lactis* found in buttermilk and cheese boosts mucosal immunity against pathogens of respiratory tract. *Lactobacillus bulgaricus* present as intestinal microflora helps keep intestinal mucosa strong and safe and decreases the risk of chronic intestinal problems.*Streptococcus thermophilus* present in fermented dairy products is helpful in treatment of diarrhoea, constipation and colic pain. *Propionibacterium shermanii* used in preparation of Swiss cheese, pickle, silage helps in preservation of the products and aids in digestion process.

Food sources of probiotics

Probiotics food are mostly fermented products of milk. Foods that are rich in probiotics are yogurt, kefir, curd, sauekraut,tofu, temphe, miso, kimchi, kombucha, cottage cheese, pickles, buttermilk, natto, Gouda, mozzarella, cheddar and Swiss cheese.

Health benefits of probiotics

Yogurt, being the best source of probiotics contains lactic acid bacteria and bifidobacteria is beneficial for bone health, high blood pressure, antibiotics induced diarrhoea, depression, skin and cardiac health. Probiotics help in reducing the pain

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of irritable bowel syndrome. Kefir that is rich in probiotics improves digestive health and protects against harmful microbial infections. Patients suffering from lactose intolerance can well tolerate yogurt and kefir. Probiotics containing fermented soy products like temphe, tofu, miso, natto etc. facilitates the absorption of calcium, iron, zinc, magnesium due to lesser content of phytate. These products are rich in vitamin B_{12} or cyanocobalamine that is helpful in synthesis of blood and reducing the risk of megaloblastic anemia. Kimchi, a fermented n nutrient absorption cabbage dish contains *Lactobacillus kimchi* is beneficial as it is rich in vitamin K, riboflavin, iron and cyanocobalamine. Miso, a Japanese product fermented with *Aspergillus oryzae* being rich with various types of probiotic bacteria and yeast provides enough quantity of protein, isoflavones, antioxidants and sodiumas well as helps in reducing the risk of breast cancer. Buttermilk containing lactic acid bacteria and bifidobacteria species provides adequate amount of calcium, phosphorus, riboflavin and cyanocobalamine. Natto contains*Bacillus subtilis* as its probiotic agent and is rich in protein and menaquinone i.e. good for cardiovascular and bone health, also helpful in preventing osteoporosis in women.Temphe, an Indonesian soy product, fermented by *Rhizopus oligoporous*is a good source of fibre, protein, isoflavones and vitamin $B_{12.}$ microbial count in gastro-intestinal tract. Probiotics are helpful in preventing and treating diarrhoea. Bacterial strains e.g.*Lactobacillus rhamnosus, Lactobacillus casei* and the yeast *Saccharomyces boulardii* help in reducing the risk of antibiotic induced diarrhoea. Supplementation of *Bifidobacterium* and *Lactobacillus* strains for 1-2 months improve depression, anxiety, autism, memory and obsessive-compulsive disorder. Regular consumption of probiotic supplements for 8 weeks is helpful for reducing the level of inflammation marker C-reactive protein as well as the level of depression. Certain lactic acid bacteria strains decrease blood cholesterol level by breaking down bile in gut. Probiotics helps in reducing the severity of eczema and allergies up to certain extent in children.Some probiotics aid in the process of weight loss in overweight and obese people.