

## Probiotics: Nature's Food Supplement

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### Abstract

The nutritional profile and health implications of Probiotics as a functional food and preventive medicine requires great importance in developing country like India. The results of this review indicates signs of success of probiotic products in the prevention of pathogenic microorganisms in adults and children, control of lactose intolerance, developing the nutritional status of the population, allergy prevention and as a substitute for vaccine in developing countries.

**Keywords:** Probiotics; Lactose Intolerance; Functional Food.

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### Introduction

A stable composition of micro flora is an important factor responsible for a balanced ecosystem and good gut health. The composition and the activity of intestinal flora are influenced by dietary factors like prebiotics, probiotics and symbiotics.

Prebiotics are starches, running in size from less sugar alcohols and disaccharides, to oligosaccharides and substantial polysaccharides. They are dietary mixes which upgrade the development and action of metabolic microbes. They are non-absorbable food elements which influence the host by specifically stimulating the development of health promoting bacteria in the intestinal tract, thus enhancing the hosts intestinal equalization [1].

Probiotics are the live microorganisms advantageous for wellbeing. It is derived from the Greek, word meaning "for life" which advanced to apply to those microbes that add to intestinal equalization. Probiotic food is characterized as a preparation of or a product containing live microorganisms in adequate numbers, which adjust the microflora of the host by implantation or colonization in a compartment and by that exert beneficial health effects on the host. The probiotic

microorganisms ought to be nonpathogenic in nature; impervious to destruction by gastric acid and bile and ready to cling to intestinal epithelial tissue, colonize in the gastrointestinal tract, deliver antimicrobial substances, balance insusceptible reactions and impact human metabolic activities [2].

Quite often overlooked or disregarded is the way that gut and metabolic wellbeing depends to a great extent on way of life measures including eating practices and propensities, physical action, thinking capacity, social collaboration quality, and presentation to natural contaminations.

### Characteristics of a Good Probiotics [3].

The International Life Sciences Institute, European Food and Feed Cultures Association and FAO/WHO (2010) have launched the determination criteria for probiotics. one ought to think about wellbeing, practical and mechanical viewpoints as follows:

- Probiotics must from the human origin.
- It must be gram positive organism.
- Survival after passage through acid and bile.
- Adherence to the human intestinal cells.
- Able to grow in the gut.
- Should have defined dosage regimes and durations of use.
- Antagonism action against pathogenic and carcinogenic bacteria.
- It must show a specific health benefit measured by defined tests (in vitro, animal and/or human).

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- Must have defined dosage regimes and durations of use.
- Clinically proven documented beneficial health effects.

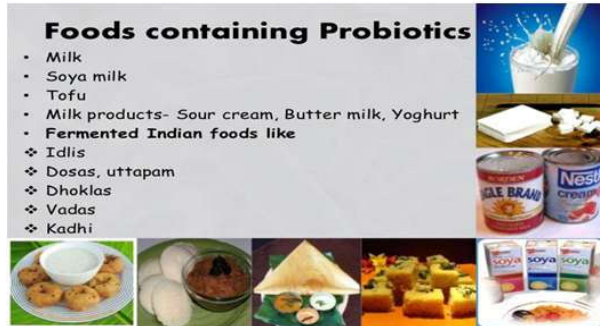


Fig. 1: Probiotic Foods

- *Bifidobacterium*: Bifidobacteria constitute a major part of the normal intestinal microflora in humans. Bifidobacterium have been found to grow better in human milk than in cow milk, which may be the reason for log count more growth of Bifidobacterium in the faeces of breastfed infants in comparison of bottle-fed infants. The faecal flora of formula-fed infants resembles more closely to that of adults. Fermented or unfermented dairy foods like milk, yoghurt, ice cream and cheese, are the most popular food vehicles that are used to deliver these cultures [4].
- *Lactobacillus*: These microorganisms utilize carbohydrates as the source of nutrition which helps in fermenting animals and plants products. Different functional effects of Lactobacillus on the host organisms comprises protection against infections, stimulation of immune system, reduction of incidence of diarrhea, reduction of allergy and others, have been demonstrated in vitro and in animal models [5].
- *Saccharomyces*: Saccharomyces genus includes two groups of species. Saccharomyces sensu is associated with the fermentation industry. Saccharomyces sensu lato, comprising species that are more distantly related to *S. cerevisiae*.

### Mechanism of Action of Probiotics [6]

Adherence and colonization of the gut: this is the initial phase in colonization and may help in modification of the host immune system. Studies have proved that probiotic microbes help to prevent the survival of pathogenic organisms, such as enteropathogenic escherichia coli and salmonella typhimurium.

*Competition for nutrients and production of antimicrobial substances:*

Probiotic strains further inhibit pathogenic organisms by competing for the limited substrates required for fermentation and by secreting antimicrobial products called bacteriocins.

*Stimulation of mucosal and systemic host immunity:*

Probiotics help to maintain a normal intestinal microflora. probiotics help to stimulate the immune system by detoxifying the colon contents thereby reduces serum cholesterol and promotes lactose tolerance to maintain intestinal health.

*Probiotics used in different disease conditions [7]:*

- Antibiotic-associated diarrhoea (AAD)
- Irritable bowel syndrome.
- Inflammatory bowel disease.
- Vaginal Infection.
- Celiac disease.
- Cancer.
- Gastrointestinal disease.

### Nutritional Effect of Probiotics:

Microorganisms in fermented foods or in the gut have shown to improve the quantity, bioavailability and digestibility of some dietary nutrients. Lactic acid produced during food fermentation by lactic acid bacteria leads to pH reduction, improvement of protein digestibility and calcium absorption. In addition, lactic acid bacteria was also shown to increase folic acid, niacin, and riboflavin levels in cultured dairy products with release of various enzymes and vitamins into the intestinal lumen [8].

At present, over 70 probiotic products are available all over the world commercially and include dairy products such as sour cream, ice cream, buttermilk, yogurt, milk powder and frozen desserts containing *Bifidobacteria* and *Lactobacilli*. Research has also shown potential to incorporate probiotics in non-dairy foods such as soy milk, soy cream cheese, chocolate and variety of juices such as tomato, orange, grape, carrot, beet and cabbage juice. Probiotics are also available in the form of capsules, tablets and powders. Overall the incorporation of probiotics in foods and their survival ability depends on the food matrix, composition, pH, storage facilities, thus making it a challenge for manufacturers [9].

### Probiotic Food Products [10]:

**Yogurt:** Yogurt helps to build muscles. It is prepared by adding two strains of bacteria, *Streptococcus thermophilus* and *Lactobacillus bulgaricus*, to pasteurized milk. The milk coagulates to a creamy product due to the lactic acid that is produced by the lactic acid producing bacteria.

**Sauerkraut:** Sauerkraut is prepared by fermenting cabbage. The lacto-fermented cabbage, contains natural compounds that fights cancer and reduces belly fat. Compared to yogurt unpasteurized sauerkraut contains more number of *Lactobacillus* bacteria to boost healthy flora in the intestinal tract.

**Kombucha:** Kombucha is a fermented drink with little effervescence. Fermented food based drink It made with black or green tea and a symbiotic culture of bacteria and yeast, known as a SCOBY.

**Kimchi:** Kimchi is an Asian matured vegetable dish, made with cabbage, radishes, and scallions. The particular red shading originates from a prepared glue of red pepper, salted shrimp, or kelp powder. The novel strains found in kimchi mends the gut, and enable to remain thin.

**Green Olives:** Olives are Salt-water brined in salt-water to undergo a natural fermentation, Acid produced by the lactic acid bacteria which are naturally present on the olives gives these little fruits their unmistakable flavor. Two strains of live cultures namely *Lactobacillus plantarum* and *Lactobacillus pentosus*, have been isolated in olives, and *L. plantarum* indicates incredible potential for getting flat stomach. A study published in the American Society for Clinical Nutrition. states that this of bacteria strain can balance the gut microbes and reduce bloating, particularly in people with irritable bowel syndrome.

**Natto (Japanese dish):** Natto is an important and healthiest food for women. It is made of fermented soybeans being a fermented food it contains highest dietary source of vitamin K2, a vitamin which is important for cardiovascular and bone wellbeing. Vitamin K2 also helps promote skin elasticity to prevent wrinkles. Natto is a good source of gut-healing probiotics that keeps inflammation at bay.

Yakult is a another fermented milk drink containing a specific strain of *Lactobacillus casei* Shirota (LcS) with probiotic properties It was isolated by Dr Minoru Shirota in 1930.

**Kefir:** Kefir is a smoothie-like fermented dairy beverage helps to counteract the effects of lactose from milk that causes stomach-irritation. Ohio State University researchers found that kefir fermented

drink can reduce bloating and gas produced by lactose consumption by 70 percent. The bacteria in kefir colonize the intestinal tract. It is almost lactose free that makes it suitable for those who are lactose intolerant.

**Pickled vegetables:** Pickles made from vinegar do not contain any live bacterium To get the real health benefits from eating fermented foods, the pickled vegetables must be fermented and not just pickled.

**Miso:** It is prepared by fermenting soybeans, salt and a fungus koji (*aspergillus oryzae*). it is a total protein, containing nine essential amino acids. Miso keeps the digestive system under normal working condition, strengthens the immune system, and lessens the danger of various malignant growths.

**Sourdough bread:** It is the fermentation process where wild yeast and friendly bacteria break down the gluten and sugar in the wheat flour into good proteins, vitamins, and minerals. The "sour" taste of the bread is due to the presence of wild yeast. The starch is predigested by the bacteria hence this bread is much easier to digest than commercial white bread that is over-processed.

**Beet Kvass (Russian drink):** Beets are a good source of potassium and dietary fiber. Beet Kvass uses beets as the starch base and whey to increase the lactose based fermentation process. The flavor improves as the beets are left to ferment for longer period. Beets when fermented improve the digestive process.

**Cottage cheeses:** Cultured cottage cheese is rich in good bacteria and a step forward to the active survival of *L. acidophilus* and *Bifidobacteria* in acidic products similar to those present in yogurt and cultured buttermilk. The closed matrix structure of cheese, low acidity and high fat content protects the probiotic strains during cheese manufacturing, storage and in the gastrointestinal tract.

**Tempeh:** Tempeh is a fermented\_soy product prepared from yeast culture that has a neutral flavor, with tender and meaty. Bite with a neutral flavor. A standard serving of tempeh gives 16 grams of protein and 8 percent of the day's recommended calcium. It is gut friendly fermented food. Cheese: Aged and soft cheese such as cheddar, Gouda, parmesan, and swiss cheese contain beneficial bacteria that improves gut health. They are prepared by adding lactic acid bacterial culture to milk, to form lactic acid that causes the milk to form curds and whey. The longer the cheese ages, the more beneficial is the bacteria for the gut.

**Doogh:** Doogh is one of the natural probiotic for human health along with

food-producing commercial poultry. Doogh is a mixture of yogurt, water, mint or pennyroyal, and salt. Diced cucumbers are also added to produce a less watery food for summer when the human body balances heat and stress. It is consumed in Iran, Afghanistan, Armenia, Iraq and Syria.

### Conclusion

Probiotic strains can be successfully incorporated and manufactured into highly acceptable food products while retaining their viability and functionality. Preclinical and clinical studies have shown evidence of health benefits of probiotics. The development of successful probiotic products depends on the selection of probiotic strains for human consumption, therapeutic effect of the strain and survival and viability of the strain during consumption and storage. No more effective probiotic than lifestyle modification can improve the human gut and metabolic health.

### Key Messages:

Probiotic are "friendly bacteria" mainly used in developing countries in the form of dietary supplements and foods due to their health benefits. Yogurt is the most natural and healthy probiotics preferred.

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