



PROBIOTICS AND PREBIOTICS: HEALTH IMPACTS

Jaswinder Singh Randhawa,
Assistant Professor, Department of Food Science & Technology
DAV College Jalandhar, Punjab, India
Contact No. +91-98155-11855
E-mail: jassi9947@gmail.com

Gursharan Kaur Sandhu
Assistant Professor, Department of Food Science & Technology
Khalsa College Amritsar, Punjab, India
Contact No. +91-98150-75148
E-mail: doc_gursharan@yahoo.co.in

ABSTRACT

A probiotic is a nondigestible food ingredient that beneficially affects the host by selectively stimulating the growth or activity of one or a limited number of bacteria in the colon. Probiotics are widely used to prepare fermented dairy products such as yogurt or freeze dried cultures. The colon's fermentation capacity may be modified after probiotic intake and oral intake of certain lactic acid bacteria increase the number of lactobacilli or bifidobacteria in human faeces. Several health related effects associated with the intake of probiotics have been reported in human studies. In the future probiotics may be found in fermented vegetables and meats. Some evidence suggests the role of probiotics in reducing the risk of rotavirus-induced diarrhea and colon cancer. The only prebiotics for which sufficient data have been generated as their classification as functional food ingredients are the inulin type fructans. Inulin is a polydisperse carbohydrate material which is a nondigestible food ingredient that benefits the host by selectively stimulating the growth or activity of one or limited number of bacteria in the colon. Work with prebiotics has been limited. At

present, the claims about reduction of disease risk are only tentative and further research is needed. Among the claims are constipation relief, suppression of diarrhea, reduction of the risk of osteoporosis and cardiovascular disease. Combining probiotics and prebiotics is a synergistic effect and it could beneficially affect the host by improving survival and implantation of live microbial dietary supplements in the gastrointestinal flora. This combination improves the survival of the bacteria crossing the upper part of the gastrointestinal tract, thereby enhancing their effects in the large intestine. In addition, their effects might be additive or even synergistic.

KEY WORDS: Probiotic, prebiotic, inulin, symbiotic, rotavirus, fermented dairy products.

INTRODUCTION

The rapid technological advancement in the field of Food Science and Technology had lead to the introduction of a number of new food products in the world market having impact on human health. A number of new terms like functional

foods, foodiceuticals, nutraceuticals, therapeutic foods, pharma foods, designer foods, medifoods, probiotic foods, prebiotic foods, power foods and so on are well recognized in this field. The latest in this field and the most exiting power food in the world today is “synbiotic food” which is a mixture of probiotics and prebiotics that beneficially effects the host by improving the survival and implantation of live microbial dietary supplement in the gastrointestinal tract (Gibson and Roberfroid, 1995).

Probiotics are friendly or good bacteria described as “living drug” which are good for life. Probiotics are non-pathogenic organisms (yeast or bacteria especially lactic acid bacteria) in the food that can exert a positive influence on the host’s health (Marteau et al., 2001). Gibson and Roberfroid (1995) have described prebiotics as the non-digestible food components that beneficially affects the host by selectively stimulating the growth and activity of one or limited number of bacteria in the colon. Prebiotics are the food fuel of the beneficial bacteria. These are the soluble fibers that stimulate the growth and activity of a limited number of bacterial species in the gut known as prebiotic.

The combination of prebiotics and probiotics is called as synbiotics and this combination has a specific targeted health effect and it has caught attention among medical practitioners and food companies as the demand of these products is growing day by day. Among the most promising targets for synbiotic foods are the gastrointestinal functions, including those that control transit time, bowel habits and mucosa motility (Clydesdale, 1997).

ROLE OF PROBIOTICS AS FUNCTIONAL FOODS

The bacterial genera most often used as probiotics are lactobacilli and bifidobacteria. At present, probiotics are exclusively consumed as fermented dairy products such as yogurt or freeze dried cultures. But their future also lies in fermented vegetables and meats. Probiotics are naturally occurring beneficial bacteria that are present in the gastrointestinal tract of healthy humans and animals. They are known to

participate in a wide variety of positive health promoting activities in human physiology.

Food products containing probiotics, include fermented products like, curd, yogurts, yogurt drinks, fermented whey (buttermilk), etc.; and cultured products like unfermented milk with culture added, cultured soy products, cultured fruit pieces etc. (Ohr 2002).

Cultured Dairy Products play a beneficial role in providing benefits of enhanced palatability, nutritive value, easy digestion and assimilation and therapeutic properties. The enhanced preference of the consumers for the dairy products with high therapeutic value led to incorporation of probiotic cultures in various milk preparations (Sarkar 1999). Widely favoured frozen dairy products have nutritional significance but possess no therapeutic properties. The growing interest of consumers towards therapeutic products has led to incorporation of cultures in frozen dairy products (Hekmat & McMohan 1991). The names like probiotic ice cream and frozen yoghurt have been evolved to provide the dual benefit of a cultured item and a frozen dessert.

Important features of probiotics are

- Probiotics should be representative of of micro-organisms that are generally recognize as safe (GRAS) micro-organisms.
- Probiotic strains should not exhibit any pathogenic, toxic, allergic, mutagenic or allergic reaction.
- They should be capable of reviving and metabolizing in the gut environment.
- They should be easy to culture.
- They should be viable during processing and storage.
- They should be capable of producing beneficial effects on the consumers.

Mode of action

The probiotic micro-organisms play a functional role by modulation of the gut microflora (population and activities) i.e. by inhibiting the growth of pathogenic organisms (like *Salmonella*, *Escherichia coli*, *Staphylococcus*, *Listeria*, and the yeast *Candida* etc.) (Sanders and Huis in’t Veld 1999) through mechanisms such as production of inhibitory substances (like organic acids, bacteriocins, etc.) (Tamure 1983),

upregulation of intestinal mucin production, colonization resistance (Sanders and Huis in't Veld 1999), blocking of adhesion sites (like intestinal mucosa and epithelial cells), competition for nutrients, degradation of toxin receptors (Ohr 2002), deconjugation of bile salts (Tamure 1983), and stimulation of immunity (Chow 2002). Thus, therapeutic cultures used must be highly acid and bile tolerant (Pettersson et al. 1983), and should produce organic acids and other biologically active compounds (Anon 1995). In many cases, the lactic cultures present in the foods provide many functional (acid production, flavour enhancement, textural improvements in a fermented product) and nutritional (ease of digestibility, improved availability of some nutrients) advantages. Some products also carry a complement of intestinal lactic bacteria that are added solely for their stated positive influence on human health (Sanders 1994).

Probiotic and human health

Probiotic agents have been accepted as agents that can bring significant health benefits

- Improvement of gut function by normalizing microflora balances, reducing constipation and improving intestinal mobility.
- Treats diarrhea including infantile, traveller's and antibiotic induced diarrhea.
- Nutraceutical effects including contributing to the reduction of serum cholesterol, management of diabetes and prevention of osteoporosis.
- Enhance mineral and isoflavon absorption.
- Increase biomass of probiotics and bulking of stool.
- Help digest lactose, thereby reducing symptoms of lactose intolerance.

ROLE OF PREBIOTICS AS FUNCTIONAL FOODS

Prebiotics are the food fuel of the beneficial bacteria. These are the soluble fibers that stimulate the growth and activity of a limited number of bacterial species in the gut known as prebiotic. The commonly available prebiotics in the world food market includes fructo-oligosaccharide, inulin, galaeto-oligosaccharides, lactulose, isomaltooligosaccharides, malto-oligosaccharides, Xylo-oligosaccharides etc. (Niness, 1999 and Macfarlene et al., 2006).

Mode of action

Mono- and oligosaccharides that are not absorbed and/or not digested in the small intestine reach the large intestine where they become available for degradation by the colonic bacteria. The fact that these saccharides are non-digestible, but are fermentable, is related closely to special physiological functions of these compounds (Oku 1994). A fermentable oligosaccharide that is not digested and/or not absorbed, are utilized by the intestinal bacteria, with the production of a metabolizable energy. As a result, the composition of the intestinal microflora changes; i.e., the percentage of beneficial bacteria such as *Bifidobacterium* and *Lactobacillus* increases and the percentage of harmful microbes such as *Clostridium* decrease. Some special physiological functions are caused via the improvement of the intestinal microflora (Oku 1994).

Prebiotics and human health

- Prebiotics aid in normal gastrointestinal functions.
- Reduces digestive illness
- Boost Immunity
- Increase fibre content.
- Treatment of allergenic colitis.
- Increase stool frequency in constipated patient.
- Decreased serum triglycerides and blood cholesterol levels in hypercholesterolemic patients.
- Enhance mineral and isoflavon absorption.

Conclusion :

So, the probiotics and prebiotics, both have a number of beneficial health effects and for improving the effectiveness researchers have combined a specific prebiotic with a specific probiotic to form a unique symbiotic compound which creates an opportunity to provide targeted health benefits and a huge boost in immunity.

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