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SYNBIOTICS AS A FUNCTIONAL FOOD: A REVIEW

N. Keerthi[1], P. Jayasree*[1], J. Praveen[1], M. Sreeja[1], J. Yeshashwini[1], J. V. C. Sharma[1]

[1*]Joginpally B R Pharmacy College, Moinabad, Telangana-500075, India.

ABSTRACT

The primary function of nutrition is to provide adequate nutrients to fulfill the requirements of a healthy diet, while giving the customer a sense of satisfaction and well-being. The hypothesis that diet also controls and modulates various body functions and thus contributes to the state of good health needed to reduce the risk of some diseases is supported by the most recent knowledge in bioscience. Synbiotics have potential functional effects on mineral bioavailability, but also, more systemically speaking, on lipid metabolism. Potential health benefits may concern reduction of the risk of intestinal infectious and coronary diseases.

KEYWORDS

Anti-hypertensive action, Antioxidant effects, Probiotics, Prebiotics and Synbiotics.

Author for Correspondence:

Jayasree P,

Joginpally B R Pharmacy College,

Moinabad, Telangana-500075, India.

Email: jayasripuli829@gmail.com

INTRODUCTION

A 'functional food' is a 'food containing one or a combination of components (in sufficient concentration) influencing body functions in order to have beneficial cellular or physiological effects' (Roberfroid, 2002)[1]. A synbiotic is characterized as a mixture of a prebiotic and a probiotic that benefits the host by improving the survival and implantation of live microbial dietary supplements in the gut, selectively stimulating growth and/or triggering the metabolism of a specific or small number of health-promoting bacteria (Gibson and Roberfroid, 1995)[2]. A synbiotic is a mixture of probiotics and prebiotics principles (Mousavi *et al*, 2015)[3]. By enhancing survival and implantation of the selected microbial supplements, this mix will favor the host. Foods are the primary medium for pro-, pre- and synbiotics

due to the nutritional benefits associated with microflora management approaches. In reality, the use of synbiotics as functional food components is a novel and growing field and few animal and human studies have been performed to investigate their effects on risk factors for coronary heart disease (Roberfroid, 2002)[1]. Synbiotics provide several health benefits to its consumer, such as better control of the glycemic index, blood triglycerides (TG) reduction, prevention of cancer, improvement of mineral absorption, among others. A worthwhile field of improved functional food compounds is the production of synbiotics.

The effect of synbiotics is directed toward two distinct intestinal target characteristics, both small and large intestinal tracts. In addition, prebiotic oligosaccharides activate probiotic bacteria in the colon, prebiotic carbohydrates are used for their growth by a probiotic strain, and replication in the gut is selectively assisted (Deng *et al*, 2015)[4]. Since its unique substrate is readily available for fermentation, this mixture could increase the survival of probiotic species, determining a healthier composition of the host.

Synbiotics development

In improving colonic health, synbiotic products are fully secure and reliable. Anyone who has digestive problems or wants to optimize their digestive health will probably find that synbiotic products that are properly made are a safe and healthy choice.

First generation prebiotics

They are either extracted from plants or produced from cheap sources that are readily available, usually through enzymatic hydrolysis or synthesis reactions. Enzyme hydrolysis of polysaccharide is another approach. In order to hydrolyze chicory inulin to oligosaccharides with low monosaccharide content, fungal inulinase is used. The hydrolysis of their parent polysaccharides produces both fructo-oligosaccharides and xylo-oligosaccharides. Fructo-oligosaccharides can also be produced from sucrose by synthesis. Consequently, inulin-generated FOS has reduced activity. Prebiotics such as galacto-oligosaccharides, lactosucrose, isomalto-oligosaccharides (IMO) and some fructo-oligosaccharides are manufactured from cheap sugars such as sucrose and lactose or from starch by enzymatic glycosyl transfer reactions (Ljungh *et al*, 2002)[5].

Second generation prebiotics

Polysaccharide hydrolysis for prebiotics is a commercial processing approach. A more regulated partial hydrolysis was carried out in order to achieve control over the distribution of products by molecular weight. First of all, targeted prebiotics for probiotics can be produced by screening a wide range of oligosaccharide for their prebiotic attributes which will provide information about their selectivity towards particular species. The most significant aspect is structural diversity and cost-effective processing technology for complex oligosaccharides. The second mechanism is enzymes expressed as probiotics that can act as synthetic catalysts. These enzymes form a mixture of oligosaccharides, which in turn can be metabolized more readily by the generating organism, resulting in greater selectivity as new β-galacto-oligosaccharide mixtures have been synthesized from lactose using β-galactosidases from a variety of prebiotics. (Kruszewska *et al*, 2002)[6].

Applications of synbiotics

In their host defensive function against invasion of the intestinal tract by non-indigenous microorganisms, the scientific basis for the production of synbiotics is. Have many health benefits. Some of these applications are:

Serum cholesterol

Serum cholesterol levels can be reduced by probiotic bacteria. The bile acids that are secreted into the small intestine may be broken down by certain bacteria present in the gut. This prevents bile salt re-absorption, which in turn contributes to a decrease in liver cholesterol. Supposing that the gut was more colonized with Lactobacillus acidophilus, serum cholesterol levels might presumably be reduced so there would be more inhibition of bile salt reabsorption, less liver cholesterol and thus less serum cholesterol (Pereira and Gibson, 2002)[7].

Anti-hypertensive action

Hypertensive patients can benefit from the consumption of fermented dairy foods, such as fermented milk, along with other foods that may reduce blood pressure. But, on a long-term basis, probiotics alone do not substantially reduce BP. (Liong, 2007)[8].

Antioxidant effects

Cancer, heart disease and other serious illnesses may result from cellular damage caused by free radical induction. Such as *Lactobacillus delbrueckii ssp*. bacteria. Some contained in yoghurt by bulgaricus and Streptococcus thermophilus can successfully trap reactive forms of oxygen (Songisepp *et al*, 2004)[9].

Anti-mutagenic effect

Mutageni city implies the ability to cause genetic mutation in certain compounds, which may prove to be dangerous. Probiotics are capable of exerting a powerful anti-mutagenic effect. Lactobacilli strains in milk, for instance, may minimize the incidence of mutagenicity by binding the gastric juice to harmful chemicals and carcinogens. (Hosno *et al*, 1997)[10].

Immune system

Immunoglobulin A is developed by the immune system as an antibody that prevents harmful microbes from binding and entering the wall of the gut. By helping to create more IgA-producing plasma cells, yogurt and probiotics such as *Lactobacillus casei* are capable of increasing IgA levels. For example, individuals with daily probiotic milk intake for up to six weeks had immune cells with better phagocytic capacity. (Schley, 2002)[11].

Advances in synbiotic foods

Synbiotics have encountered increasing scientific interest in attractive and imaging names in the form of so-called functional foods and/or nutraceuticals that reveal their important consequences for human health.

Several studies have shown evidence supporting the positive impact of synbiotics on preterm and term infant and adult intestinal microflora, on immuno-nutritional parameters and on prevention of eczema, particularly atopic eczema. (Bartosch *et al*, 2005)[12].

It has also been documented that synbiotics given to newborn infants improve resistance to respiratory infections in the first 2 years of life, decrease the incidence and severity of respiratory diseases in the cold season, decrease the incidence of septic complications in patients with extreme systemic inflammatory response syndrome, and are safe (Kukkonen *et al*, 2008)[13].

Some other experimental and clinical studies support the fact that synbiotic-enriched early enteral nutrition can restore the balance of microbial communities in critically ill patients with positive effects on intestinal permeability and bacterial translocation in a beneficial way. It can decrease systemic inflammation, strengthen the immune state of the intestinal mucosa, and help minimize systemic inflammation and prevent infection. (Manzanares and Hardy, 2008)[14].

The beneficial effect of synbiotics was also observed in several trauma patients and in patients with high-risk operations (Rayes *et al*, 2009)[15].

CONCLUSION

In order to recognize and characterize the functional effects of foods and feeds, major advances have been made in information. High-quality health is strongly linked to a healthy lifestyle, especially to dietary recommendations that align with good quality dietary behaviour, the suggestions set out and the latest nutrition science. Improving the functions of the body and improving well-being and wellness through a specific diet and that the likelihood of developing diet-related diseases by means of acceptable food choices are definitely priorities for the parties concerned. It is therefore important to adequately substantiate the scientific evidence for functional foods before the potential health benefits are widely transmitted to consumers. This will ensure that the reported benefits of functional foods are credible.

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CONFLICT OF INTEREST

We declare that we have no conflict of interest.

BIBLIOGRAPHY

1. Roberfroid M B. Functional foods: concepts and application to inulin and oligofructose. British, *Journal of Nutrition,* 87(2), 2002, 139-143.
2. Gibson G R, Roberfroid M B. Dietary modulation of the human colonic microbiota - introducing the concept of prebiotics, *Journal of Nutrition,* 125(6), 1995, 1401-1412.
3. Elham Mousavi, Ali Esmaeili, Soodabeh Shahid Saless. The effect of positive thinking on quality of life and resiliency of cancer patients, Razavi *International Journal of Medicine,* 3(3), 2015, 24-28.
4. Deng Y F, Di Liao X, Wang Y, Liang J B, Tufarelli V. Prebiotics mitigate in vitro sulfur-containing odour generation in caecal content of pigs, *Italian Journal of Animal Science,* 14(1), 2015, 132-137.
5. Ljungh A, Lan J, Yanagisawa N. Isolation, selection and characteristics of Lactobacillus paracasei subsp. paracasei F19, *Microbial Ecology in Health and Disease,* 14(1), 2002, 4-6.
6. Kruszewska D, Lan J, Lorca G, Yanagisawa N, Marklinder I, Ljungh A. Selection of lactic acid bacteria as probiotic strains by *in vitro* tests, *Microecol. Ther,* 29, 2002, 37- 49.
7. Pereira D I A and Gibson G R. Effects of Consumption of Probiotics and Prebiotics on Serum Lipid Levels in Human, *Critical Reviews in Biochemistry and Molecular Biology,* 37(4), 2002, 259-281.
8. Liong M T. Probiotics: A critical review of their potential role as antihypertensive, immune modulators, hypo-cholesterolemics and peri-menopausal treatments, *Nutrition Reviews,* 65(7), 2007, 1-13.
9. Songisepp E, Kulisaar T, Hutt P, Elias P, Brilene T, Zilmer M, Mikelsaar M. A new probiotic cheese with anti-oxidative and antimicrobial, *Journal of Dairy Sciences,* 87(7), 2004, 2017-2023.
10. Hosno A, Kitazawa H, Yamaguchi, T. Anti-mutagenic and antitumor activities of lactic acid bacteria, In: Fuller, R. (ed.) Probiotics 2: Applications and Practical Aspects, *Chapman and Hall, London,* 1st Edition, 1997, 89-132.
11. Schley P D and Field C J. The immune-enhancing effects of dietary fiber and prebiotics, *British Journal of Nutrition,* 87(2), 2002, 221-230.
12. Bartosch S, Woodmansey E J, Paterson J C M, Murdo M E T and Macfarlane G T. Microbiological effects of consuming a synbiotic containing Bifidobacterium bifidum, Bifidobacterium lactis, and oligofructose in elderly persons, determined by real-time polymerase chain reaction and counting of viable bacteria, *Clinical Infectious Diseases,* 40(1), 2005, 28-37.
13. Kukkonen K, Savilahti E, Haahtela T, Juntunen-Backman K, Korpela R, Poussa T, Tuure T, Kuitunen M. Long-term safety and impact on infection rates of postnatal probiotic and prebiotic (synbiotic) treatment: Randomized, double-blind, placebo controlled trial, *Pediatrics,* 122(1), 2008, 8-12.
14. Manzanares W and Hardy G. The role of prebiotics and synbiotics in critically ill patients, *Current Opinion in Clinical Nutrition and Metabolic Care,* 11(6), 2008, 782-789.
15. Rayes N, Seehofer D and Neuhaus P. Prebiotics, probiotics, synbiotics in surgery-are they only trendy, truly effective or even dangerous Langenbeck's, *Archives of Surgery,* 394(3), 2009, 547-555.

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