Review Article

ERA'S JOURNAL OF MEDICAL RESEARCH VOL.10 NO.2

DOI:10.24041/ejmr2023.47

ROLE OF PROBIOTICS IN HUMAN HEALTH-A REVIEW

Kaynat Fatima, Sanchita Srivastava, Ale Eba

Department of Biotechnology

Era's Lucknow Medical College and Hospital, Era University, Sarfarazganj, Lucknow, U.P., India-226003.

Received on : 12-06-2023
Accepted on : 23-08-2023

Address for correspondence

Ms. Kaynat Fatima
Department of Biotechnology
Era's Lucknow Medical College &
Hospital, Era University, Lucknow-226003.
Email: kaynatmicro@gmail.com
Contact no: +91-7525862096

ABSTRACT

Over the last 20 years, probiotic bacteria have gained popularity because of the increasing number of scientific evidence supporting their positive impacts on human health. Probiotic products are widely present in the market, and their potential applications are expanding everyday due to the fact that certain probiotics strain support the quality of the gut microbiota. They have therefore been used in a variety of therapeutics, and the research has been actively ongoing. This review article focuses on probiotics' use in the management of various illnesses their action mechanism and health advantages.

KEYWORDS: Probiotics, Microbiota, Bifidobacterium, Therapeutics.

INTRODUCTION

The term "probiotic," which means "for life" in the modern sense, refers to bacterial associations that are favourable to the health of both humans and animals (1). Metchnikoff (2) described probiotics in the early 1990s as a scientific way of changing the floral/microbial variety in human bodies and substituting beneficial microorganisms for toxic ones. But Henry Tissier's research-noting that stool samples from children with diarrhoea had a notably lower microbial content of a certain type of bacteria than did samples from children in good health—was what ultimately led to the breakthrough (3). His groundbreaking recommendations for helping patients with diarrhoea (infantile diarrhoea) regain a healthy gut flora by giving them live organisms (bifidobacteria) orally. Havenaar and Huisint Veld (4) suggested the Currently accepted definition of a probiotic as a mono- or mixed culture of bacteria that enhances the properties of the native flora and helps the host when fed to an animal or human host. In the 1980s, a few key probiotic features were introduced. These include: (a) strains to be advantageous; (b) safe for consumption non-allergic, and nonpathogenic; (c) readily available in large quantities as live cells; (d) appropriate for the gut's environment; and (e) stable and storable (5). Bacteria are the most common probiotics, particularly lactic acid. Molds and yeasts are also probiotics (6). Probiotics are a kind of miniature life form that, when taken in adequate sums, give medical advantages to the host. The first definition of probiotics was published in 2001 in the Journal of Food and Agriculture and was further refined in 2014 in Hill et al which can be perceived to imply that strains of probiotic should be (I) adequately described; (ii) ok for the expected use; (iii) upheld by no less than one sure human clinical preliminary directed by commonly acknowledged logical guidelines or according to proposals and arrangements of nearby/public specialists when appropriate, and (iv) alive in the item at an effective portion all through time span of usability (7). Models incorporate living microorganisms containing Lactobacillus, Bifidobacterium, and some others (8).

Nutritional Impacts of Probiotics

The most common foods that are fermented by Lactic Acid Bacteria (LAB) are fruits, vegetables and cereals. Lactic acid has an effect on flavor, and when fermented in rice bran, It is bioactive ingredients that is produces by bean sprouts and buckwheat that help with inflammation, weakened immunity, glycemic control and fatigue conditions (9).

Probiotics' Nutritional Effects on Inflammation People are very worried about their health right now. In contrast to cures, illness prevention is receiving more attention. About a century ago, probiotics and their health benefits first came to light. It was found that because they drank sour milk, which contains healthy bacteria, People lived longer than the other population in Bulgaria and Russia (10). Probiotics have a significant impact on the prevention and treatment of conditions such as allergies, hepatic dysfunction, intestinal disorders, and metabolic syndromes, which can result in diabetes, heart disease, and obesity (11). Since lactic corrosive microbes (LAB) straightforwardly convey cytokines to the

objective destinations inside the host, Escherichia coli and LAB are broadly used to treat incendiary gut sickness, colon malignant growth, and stoppage (12). Researchers found that carcinoma cells induce non-pathogen apoptosis significantly inhibits colon cancer (human gastric carcinoma HGC-27) and human colonic cancer cells (Caco-2, DLD-1, HT-29). This protective effect is particularly mediated by the actions of Lactobacillus rhamnosus, Bifidobacterium latis, and Escherichia coli K-12 strains (13).

Probiotics' Nutritional Effects on Inflammation People are very worried about their health right now. In contrast to cures, illness prevention is receiving more attention. About a century ago, probiotics and their health benefits first came to light. It was found that because they drank sour milk, which contains healthy bacteria, people in Bulgaria and Russia lived longer than people in other populations. (14). Probiotics are beneficial in both conditions such as allergies, liver problems, and metabolic syndromes, which can result in diabetes, heart disease, and obesity (15). Lactic acid bacteria (LAB) and Escherichia coli are widely used to treat constipation, colon cancer, and inflammatory bowel disease because they directly transport cytokines to the host. (16). Researchers found that non-pathogen apoptosis induction within carcinoma cells significantly inhibits colon cancer (HGC-27) and human colonic cancer cells (Cancer coli-Caco-2). This protective effect is particularly mediated by the actions of Lactobacillus rhamnosus, Bifidobacterium latis, and Escherichia coli K-12 strai (17). Healthful Effects of Probiotics in Dental Conveys LAB probiotics in cheddar appear to lessen the quantity of freak streptococci in spit and subsequently valuably affect dental conveys; Additionally, the LAB in cheese keeps dental plaque and enamel from becoming decalcified. (18). Nevertheless, the reduction in streptococci counts occurs regardless of the strain employed, and the outcome varies across research projects. As a result, there hasn't been a special report on dental carriers. (19). An individual's state of a healthy microbiota determines their health. When an acute infection occurs, pathogenic bacteria produce inflammation; in contrast, symbiotic bacteria control the immune system's reaction to such inflammations and shield the host from various illnesses. (20).

Mechanism of action of probiotics

Presence of Bacteria in probiotics affect the host in a various ways. The mucosal immune system, the intestinal luminal environment, and the function of the epithelium and mucosal barrier can all be influenced by various organisms. Probiotics have an impact on many different cell types, including monocytes/macrophages, and epithelial cells. The genera and species of probiotic bacteria differ greatly from one another. These variations might result from different probiotic mechanisms of action. Every strain needs to be tested separately or in products made for particular purposes. These strain-specific characteristics are taken into consideration in molecular research on these probiotics. Because of their particular capacities to communicate specific surface particles or to emit proteins and metabolites that interface straightforwardly with have cells, different probiotic strains have been connected to fluctuating impacts. Probiotics work best when they can both adhere to and colonize the colon, as well as thrive in the acidic and alkaline conditions of the gut. By giving enteric pathogens less access in terms of pH, redox potential, hydrogen sulfide creation, and antimicrobial mixtures/particles, or by various interrelated frameworks like mucous emission, chloride and water discharge, and epithelial cell restricting, the instruments for the better mucosal boundary are accomplished. Most pathogens are bactericidal when hydrogen peroxide and the lactoperoxidase-thiocyanate milk system are combined (21). Less than 1% of gut microbial communities are made up of Bacillus clausii, which promotes CD4 proliferation and produces bacteriocins to inhibit the growth of possible pathogens. Microbial communities also raise the nutritional impact of indigestible food residue and endogenously secreted mucus by producing a number of enzymes for fermentation (22). They also aid in the replenishment of lost energy in the form of small fatty acid molecule. Additionally, they are involved in the synthesis of vitamins (23) and the uptake of iron (24).

Potential uses of probiotics in creating nutritious food Consumer demand has increased as a result of awareness of health problems growing and growing body of evidence supporting the benefits of probiotics. Yogurt, frozen fermented dairy desserts, cheeses, ice cream (25), and fruit juices (26) are a few food items that have been proposed as probiotic delivery systems for consumers.. According to some research, 109 colony-forming units (CFU) of probiotic microorganisms per day are required to produce health benefits. Probiotics should contain at least 107 cells per g or mL of food, the amount that was also suggested in Japan, based on the everyday consumption of 100 g or mL of probiotics (24). The most widely used probiotics have been yoghurt and fermented milk. Numerous commercial yoghurt products have not been able to effectively supply the necessary number of viable probiotic bacterial cells, according to a few studies. (25). Cheeses offer several benefits to the GI tract when it comes to delivering viable probiotics, as opposed to fresh fermented products like yoghurt. Cheeses

typically have a high pH and a more solid form. This is because probiotic bacteria may be protected from the GI tract during transit by the cheese's matrix and high fat volume. Moreover, cheese is a better buffer than yoghurt (26). By and large, picking a viable probiotic strain and food type mix, utilizing food handling conditions that help probiotic endurance, ensuring the food network upholds probiotic development (assuming that maturation is vital), picking an item lattice, bundling, and ecological circumstances to guarantee sufficient probiotic endurance over the item's store network and during rack capacity, lastly ensuring the expansion of the probiotic doesn't adversely influence the item's taste and surface are the principal contemplations while integrating probiotics into food.

CONCLUSION

Probiotics have physiological effects that have been well-documented and have a clear mechanism. Be that as it may, more exploration is expected to decide the exact component by which they improve health and fend off various diseases. Research from well-researched clinical trials has suggested that probiotics may help with a variety of GI and other conditions. Even though we now understand some of the underlying molecular mechanisms the advantageous effects of probiotics, many autoimmune and inflammatory diseases still lack clinically demonstrated efficacy. Furthermore, a growing body of research has been conducted using the animal model; therefore, it is necessary to extrapolate these findings to humans. Presently, unique chemicals with potential health benefits are being delivered by genetically altered commensal lactic acid bacteria. However, the majority of research on recombinant bacteria is focused on vaccines. Genetically engineered bacteria, however, can be used to investigate novel approaches for delivering bioactive compounds to mucosal tissues. To find probiotics' effects on the body system and to disclose their limitations, safety, and efficacy, more reliable and repeatable clinical trials are needed. With all the approaches covered in this review, food manufacturers can easily incorporate probiotics into innovative functional foods that enhance human health (6).

REFERENCES

1. Bagchi T. Traditional food & modern lifestyle: impact of probiotics. Indian J Med Res. 2014; 140(3): 333e5.
2. Metchnikoff E, Mitchell PC, Essais optimistes. London: Heinemann; 1907.
3. Tissier H. Tritement des infections intestinales par la methode de translormation de la flore bacterienne de lintestin. C R Soc Biol. 1906; 60: 359e61.
4. Havenaar R, Huis in't Veld JHJ. Probiotics: a general view. In: Wood BJB, editor. The lactic acid bacteria in health and disease. London: Elsevier Applied Science; 1992.
5. Amara AA, Shibl A. Role of probiotics in health improvement, infection control and disease treatment and management. Saudi Pharm. J. 2013; 23: 107-114.
6. Suskovic J, Kos B, Beganovic J, et al. Antimicrobial activity-The most important property of probiotic and starter lactic acid bacteria. Food Technol. Biotechnol. 2010; 9862: 296-307.
7. Hill C, Guarner F, Reid G, et al. Expert consensus document: The International Scientific Association for Probiotics and Prebiotics consensus statement on the scope and appropriate use of the. Nat. Rev. Gastroenterol. Hepatol. 2014; 11: 506-514.
8. Mei G, Carey CM, Tosh S, et al. Utilization of different types of dietary fibres by potential probiotics. Can. J. Microbiol. 2011; 57: 857-865.
9. Kim KM, Yu KW, Kang DH, et al. Anti-stress and anti-fatigue effect of fermented rice bran. Phyther. Res. 2002; 16 : 700-702.
10. Sales-Campos H, Soares SC, Freire CJ. An introduction of the role of probiotics in human infections and autoimmune diseases. Crit. Rev. Microbiol. 2019; 45: 413-432.
11. Eslami M, Yousefi B, Kokhaei P, et al. Importance of probiotics in the prevention and treatment of colorectal cancer. J. Cell. Physiol. 2019; 234: 17127-17143.
12. Behnsen J, Deriu E, Sassone-Corsi M, et al. Probiotics: Properties, examples, and specific applications. Cold Spring Harb. Perspect. Med. 2013; 3: a010074.
13. Sli zewska. The role of probiotics in cancer prevention. Cancers. 2020; 13: 20.
14. Altonsy M.O., Andrews S.C., Tuohy K.M. Differential induction of apoptosis in human colonic carcinoma cells (Caco-2) by Atopobium, and commensal, probiotic and enteropathogenic bacteria: Mediation by the mitochondrial pathway. Int. J. Food Microbiol. 2010; 137: 190-203.
15. Twetman S, Keller M.K. Advances in dental research probiotics for caries prevention and control. Adv. Dent. Res. 2012; 24: 98-102.
16. Mahasneh S.A., Mahasneh A.M. Probiotics: A promising role in dental health. Dent. J. 2017; 5:26.

17. Louis P, Duncan SH. The role of the gut microbiota in nutrition and health. Nat. Rev. Gastroenterol. Hepatol. 2012; 9: 577-589.
18. Kailasapathy K & Chin J. Survival and therapeutic potential of probiotic organisms with reference to Lactobacillus acidophilus and Bifidobacterium spp. Immunol Cell Biol. 2000; 78: 80-88.
19. Roberfroid MB, Bornet F, Bouley C, et al. Colonic microflora: nutrition and health: summary and conclusions of an International Life Sciences Institute (Europe) workshop held in Barcelona, Spain. Nutr Rev.1995; 53: 127-130.
20. Conly JM, Stein K, Worobetz L et al. The contribution of vitamin K2 (metaquinones) produced by the intestinal microflora to human nutritional requirements for vitamin K. Am J Gastroenterol. 1994; 89: 915-923.
21. Younes H, Coudray C, Bellanger J, et al. Effects of two fermentable carbohydrates (inulin and resistant starch) and their combination on calcium and magnesium balance in rats. Br J Nutr. 2001; 86: 479-485.
22. Nagpal R, Kaur A. Synbiotic effect of various prebiotics on in-vitro activities of probiotic lactobacilli. Ecol Food Nutr. 2011; 50: 63-68.
23. Nagpal R, Kumar A, Kumar M. Fortification and fermentation of fruit juices by probiotic lactobacilli. Ann Microbiol. 2012; 62: 1573-1578.
24. Ross RP, Fitzgerald G, Collins K, et al. Cheese delivering biocultures probiotic cheese. Aust J Dairy Technol. 2002; 57: 71-78.
25. Dave R, Shah NP. Viability of probiotic bacteria in yoghurt made from commercial starter cultures. Int Dairy J. 1997; 7: 31-41.
26. Gardiner G, Ross RP, Collins JK, et al. Development of probiotic Cheddar cheese containing human-derived Lactobacillus paracasei strains. Appl Environ Microbiol. 1998; 64: 2192-2199.

Orcid ID:

Kaynat Fatima - https://orcid.org/0000-0002-0367-8752

Sanchita Srivastava - https://orcid.org/0000-0002-9325-5605

Ale Eba - https://orcid.org/0000-0002-9469-8619

How to cite this article:

Fatima K., Srivastava S., Eba A. Role of Probiotics in Human Health-a Review. Era J. Med. Res. 2023; 10(2): 111-114.