

A Review: Probiotics and potential of probiotic products

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ABSTRACT: The probiotic potential of *Lactobacillus* spp. from dairy sources was investigated in vitro. Antibiotics, immunosuppressive medication, and irradiation are some of the treatments available. Despite its high fat and sugar content, chocolate eating contributes to good human nutrition by providing antioxidants. today probiotics are a very popular subject of research among scientists and pharmaceutical companies. the spore obtain pharmaceuticals are not good taste, so generally, children avoid eating them, hence making probiotic chocolate. It's better to eat chocolate than medicine. Probiotics juice it can be hypothesized that using these antibiotics against pathogens would not distrust the natural microbiota of the gastrointestinal tract which mainly consists of lactic acid bacteria.

KEYWORDS: probiotics, therapeutic value, products, yogurt, chocolate, Juice.

I. INTRODUCTION

Lilly and Stillwell coined the word probiotics in 1965, defining it as "living microorganisms in sufficient amounts impart a health benefit on the host for identifying chemicals secreted by one organism that stimulates another." [1] The term "probiotics" is derived from the Greek word "life." [2] FAO and WHO The term probiotics were taken from the Greek word probiotics, which means "agents that operate as bio therapeutic agents". [3] Beneficial probiotic strains have an influence on the host, allowing it to live, as well as proteolytic enzyme and bile salt. [4] In light of research undertaken mostly in the last ten years, many functions are being attributed to the gut microbiota including: (i) maintaining an epithelial barrier (ii) inhibition of pathogen to intestinal surfaces (iii) modulation and maturation of immune system (iv) degradation nondigestive carbon sources (v) production of different metabolite.

The intestinal microbiota of a germ-free animal has been obtained. [5,6] In a probiotics product microorganisms contain and depend on

their composition (i) yeast and bacterial products (ii) mono and multiple strain products (iii) probiotics and symbiotic products. [7] Currently, function food is receiving a lot of attention. People are enthusiastic about taking probiotics. [8] Probiotics are now being offered commercially all over the world, primarily in the form of fermented foods and dairy products. the Lipolytic characteristics of probiotics are significant in the decomposition of protein and fat in dairy products, as are two features in dairy product taste and flavor. [9]

II. THERAPEUTIC VAULE

Control of intestinal infections:

Antimicrobial capabilities are seen in probiotic bacteria such as bifidobacteria and lactobacilli. [10] the mechanism for the inhibition of pathogen to lactobacilli and bifidobacteria:

- Antimicrobial substance: organic acid, hydrogen peroxide, bacteriocins, deconjugated bile acids.

- Play the role of a competitor.
- Stimulate of immune system. [11,39,40]

Lactic acid and antibacterial substances are produced by starter microorganisms in fermented milks. These antimicrobial compounds are created to prevent pathogenic and putrefying bacteria from multiplying. The bactericidal or bacteriostatic action of lowering pH caused by lactic acid produced by starter bacteria during fermentation and in the gut. H₂O₂ is produced by a variety of lactic acid bacteria species as an antibacterial agent. Lactic acid, on the other hand, is thought to be the only antibacterial agent of any significance. The low pH created by the fermentation of lactic acid generates an unfavorable environment for the growth of spoilage microorganisms. [63]

Reducing lactose intolerance

Due to a lack of β -D-galactosidase, some persons are unable to digest lactose. Some probiotics generate β -D-galactosidase, an enzyme that

hydrolyzes lactose and improves dairy product tolerance.^[12] After drinking fresh, unfermented milk or milk products, lactose malabsorbers frequently experience "gastric distress." Lactose malabsorption is a condition in which lactose, milk's main carbohydrate, is not completely digested into its monosaccharides, glucose, and galactose components. Lactose malabsorption is caused by a deficiency of the lactase or -D-galactosidase enzyme, which breaks down lactose into its constituent monosaccharides. Lactase insufficiency is an issue that affects people all around the world. Lactose malabsorption has a different prevalence based on the ethnic origin of the population. Lactase activity is higher in infants than in adults. Lactose malabsorption is prevalent in China, Thailand, Japan, Africa, and Australian aborigines, but less so in Caucasians. When patients have diarrhea, they develop a temporary shortage of galactosidase. Unabsorbed lactose reaches the colon, where it is digested into volatile fatty acids, lactic acid, CO₂, H₂, and CH₄ by colonic flora. Lactose that has not been hydrolyzed pulls water and electrolytes from the duodenum and jejunum. Bloating, flatulence, abdominal pain, and diarrhea are all symptoms of lactase deficiency.^[64,65,66]

Reduction serum cholesterol level

Fermented milk lowers blood cholesterol levels substantially. Because free bile is eliminated from the body, bile acid production from cholesterol can lower total cholesterol levels in the body.^[13,14] Dietary saturated fat or cholesterol intake and serum cholesterol levels have a strong relationship. Serum cholesterol levels, particularly LDL cholesterol, have been associated to an increased risk of cardiovascular disease, one of the leading causes of mortality in developed countries. Fermented milks' cholesterol-lowering qualities were discovered among the Masai tribes of East Africa as early as the 1960s. Cholesterol is a necessary component of cell membranes for the production of hormones and bile acids. It is produced by the liver and is derived from ingested meals. Controlling blood cholesterol levels is a complicated process. It has been observed that the metabolism of starter cultures in fermented milks produces hydroxymethyl-glutarate, which inhibits hydroxymethylglutaryl-CoA reductase, an enzyme essential for cholesterol synthesis in the body. Cholesterol synthesis may be hampered as a result of this. Hypocholesterolemia factors such as calcium, orotic acid, lactose, and casein have been proposed.^[67]

Anti-carcinogenic activity

Probiotic's antitumor activity is based on the suppression of carcinogens or Proto carcinogens, as well as the proliferation of bacteria that convert proto carcinogens to carcinogens.^[14] The model supports the anti-carcinogenic effect of probiotics.^[15] In Western countries, cancer is one of the leading causes of mortality. Environmental variables, particularly nutrition, are thought to cause cancer, according to epidemiological studies. Colorectal cancer is caused by a number of sources, including microorganisms and metabolic products such as genotoxic chemicals (nitrosamine, heterocyclic amines, phenolic compounds, and ammonia). Except for lactic acid bacteria and -glucuronidase, many bacterial enzymes, such as β-glucuronidase, produce these carcinogenic compounds. Lactobacilli and bifidobacteria are examples of probiotics. Lactic acid bacteria and fermented foods have been linked. Anticarcinogenic action is a possibility.^{[68,69,70,71].}

III. FUNCTIONALITY OF PROBIOTICS

Lactobacillus bulgaricus, *Lactobacillus plantarum*, and *Streptococcus thermophilus* all showed anti-inflammatory activity.^[41,42] Furthermore, a meta-analysis of probiotic bacteria uses in cancer patients receiving chemotherapy and radiation therapy found promising effects in terms of preventing radiation-induced diarrhea^[43,44]. Many investigations are centered on the Probiotic supplementation may have a favorable effect on autistic spectrum disorder,^[45] Skin disorder care^[46], cardio metabolic diseases, and chronic renal disease^[47].

IV. SELECTION AND IDENTIFICATION OF PROBIOTIC STRAIN

A multi-step method is required for isolating, assessing, and characterizing novel probiotic candidates. In terms of phenotypic and genotypic natures, both dairy and non-dairy species show more similarities than differences. One of the most common probiotics is *Lactococcus lactis*. Dairy product fermentation. *Lc. lactis*, on the other hand, is not limited to dairy products; They've also been discovered on plant surfaces and in other sources.^[60,61] Furthermore, new probiotics should be chosen according to the strain's properties. As a result, new approaches for selecting and characterizing probiotic microorganisms are required. Molecular approaches are particularly important in this area^[62].

V. PROBIOTIC IN FOOD PRODUCTS

In response to the rising need for a more nutritious diet, functional foods, particularly those containing bioactive compounds or probiotics, have been produced. When adequate amounts of probiotics are ingested, they provide health benefits to the person who consumes them.^[9]

Probiotic yogurt

Lactic acid bacteria transform lactose substrate into lactic acid in the manufacturing of yogurt. Lactose is converted to glucose and galactose via the glycolytic and D-tagatose 6-phosphate pathways as a free sugar-galactosidase.^[19] In addition, the Leloir pathway enzyme metabolites^[20].

1. homogenized whole or low-fat milk
2. addition of skim milk powder
3. heat treatment [80 °C-90 °C held for 30-60 min]
4. cooled to 45-45 °C
5. culture added (2%) at 40-45 °C
6. incubation at 43 °C
7. fermentation stopped by cooling to 4 °C
8. addition of fruit and sugar
9. packaging
10. storage 4 °C

Production of yogurt [11]

Nutritional profile

Yogurt is a good source of protein, calcium, phosphorus, riboflavin, thiamin, vitamin B12, and significant supplies of folate, niacin, magnesium, and zinc due to its nutritional similarities to milk.^[21]

Chocolate

Chocolate is a delectable, usually, brown, confection created from roasted and ground Theobroma cocoa seeds and commonly flavored with vanilla. It's available as a liquid, paste, or block, and it's also used to flavor other dishes. The flavor of chocolate is distinct. Polyphenols, which give it flavor and texture, are biologically active compounds. which are high in antioxidants and have a beneficial effect on human health.^[22,23]

Cocoa contains a significant amount of flavonoids, notably flavanols, also known as flavan-3-ols, and is in cocoa components rich source of polyphenolic chemicals. Furthermore, catechins, epicatechins, and proanthocyanidins are abundant^[24] In health, many vital minerals, including magnesium, copper, potassium, and iron, are abundant in cocoa powder. Most of these minerals, as discussed, may have an impact on vascular and function. Increasing the nutritional value of cocoa.^[25] Recent cocoa intervention studies on the ability of theobromine to boost

serum HDL cholesterol have been done due to theobromine's high bioavailability and various biological actions.^[26] They discovered that covering probiotics in chocolate is an effective way to shield them from environmental stress while also ensuring adequate delivery. The lyophilization technique is used to freeze-dry bacteria in powder form so that they can be easily added to the chocolate mixture. In some cases, the viability of Lactobacillus species is not impacted by the lyophilization procedure.^[27]

probiotics juice

In today's nutrition sciences and associated professions, the concept of using foods to promote a sense of well-being, improve health, and reduce illness risk has become the new frontier.^[28] Juice is a liquid that is often taken as a beverage and can be extracted from plants (fruits and vegetables), drinks flavoured with (plants), or other biological food sources. Fruit juice is described as an unfermented but fermentable liquid or juice meant for direct consumption that is extracted mechanically from the edible portion of a sound that has been properly matured., and fresh fruit and preserved exclusively by chemical and physical means (WHO) by the Food and Agriculture Organization (FAO) and the World Health Organization's Codex Alimentarius.^[29,30]

A wide range of foods has been fermented or fortified with probiotics in order to be assessed as possible carriers of these helpful microbes and effectively marketed. Lactobacillus and Bifidobacteria species are the most widely utilized probiotic microorganisms in these foods, but additional strains such as Saccharomyces cerevisiae (boulardii), Enterococcus, Bacillus, and Escherichia coli are also used.^[28,31,32]

Trace elements are important micronutrients that perform a wide range of metabolic roles in all living organisms; some of them are required components of numerous enzymes.^[33,34] Natural fruit juices are recognized to be a good source of potassium (K), as well as iron, calcium, and magnesium in moderate amounts.^[35,36] The inclusion of bioactive components (phytochemicals) such as phenolic and flavonoids in orange juice, in addition to vitamins and pro-vitamins, is critical nutritionally in the prevention of chronic diseases such as cancer, cardiovascular disease, and diabetes.^[37] Gallic acid, chlorogenic acid, and ferulic acid, for example, have been demonstrated to have antioxidative, antimutagenic, and anticarcinogenic properties, as well as preventive effects against heart disease and cataracts.^[38]

VI. SURVIVAL ASSESSMENT AND VIABILITY

When it comes to probiotic survival, there are two factors to consider. The first is if the selective strains can survive in the gastrointestinal tract and then continue to be viable throughout the food preparation process.^[48] It's also crucial to verify that probiotic food items have the necessary minimum amount of probiotics (10^6 – 10^7 CFU/mL product.^[49] Because the quantity of live and active probiotic cells per gram or millilitre of probiotic food items at the moment of consumption influences their health effects, this level of probiotics should be maintained throughout the product's shelf life.^[50] Oxygen content, heating temperature, acidity, water activity, osmotic stress, moisture content, and packing material are all elements that affect probiotics' long-term viability in a product.^[51] outlines the most important parameters that affect probiotic survival during manufacturing and ingestion.^[52]

VII. PROGRESS AND ENHANCE VIABILITY

It appears to be the most effective way of germ protection currently available. However, probiotic microencapsulation is a time-consuming procedure. Encasing probiotics in polymers such starch, alginate, and carrageenan, coatings of them in emulsions, or prebiotics with dry impacting and enteric coatings on the surface of food make up the majority of these techniques.^[53] the Drying of probiotics is one of the encapsulation procedures that has been explored and used extensively. Spray-drying,^[54,55,56] freeze-drying^[57,58], and vacuum-drying^[59] are all options.

VIII. CONCLUSION

The recent trend of enriching new foods with live *Lactobacillus* cells is an innovative and promising technique to using LAB in food manufacturing. A growing body of scientific research suggests that cocoa components with antioxidant and anti-inflammatory properties contribute to endogenous photoprotection and are important for skin health maintenance. The current work involved the isolation, characterization, and identification of *Lactobacilli* spp., as well as the incorporation of dried probiotic powder for the creation of probiotic chocolate and the investigation of the probiotic chocolate's pharmacological effects. When it comes to safeguarding a functional component, encapsulation is a great option. To encapsulate the

functional components, there are a variety of ways that can be used. The highest level of encapsulation efficiency has been achieved. The transition of laboratory-scale encapsulating technology to an industrial scale is one of the most critical concerns that will need to be addressed in future research.

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