

Probiotic Potential of Curd and Its Health Benefits

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ABSTRACT

Nutraceutical is a wide term that describes/portrays any product derived from sustenance sources with other health benefits besides the essential dietary value found in foods. Probiotics are the live microorganisms which are beneficial to the host. These have shown a significant potential therapeutic action for a variety of diseases, but the mechanism responsible for this is not fully known. Though the mechanism is not fully understood, there are certain steps which are believed to be involved in this. The possibility is that there could be increased adhesion to intestinal mucosa, or enhancement of an epithelial barrier. Competitive exclusion of pathogenic microorganisms can also be thought about. These may also lead to the production of antimicrobial substances and strengthen the immune system. A daily bowl of fresh curd helps in fighting a wide range of diseases. It is used to treat various illnesses and diseases like liver diseases, insomnia, cancer, and diabetes. Apart from this, curd is also reputed in the field of cosmetics where it is frequently used for its benefits to hair and skin. It has antibacterial, antioxidant, and antiinflammatory properties. Curd is known with various names in different states of India. Curd makes a favourite probiotic liked equally by the young as well as elderly people because of easy availability, good taste and ample of health benefits.

KEYWORDS: Nutraceutical, Probiotic, Curd, Cancer, Diabetes, Insomnia, Liver disease, Antiinflammmtory, Antioxidant, Antimicrobial

INTRODUCTION

Nutraceuticals are a broad class of food or part of food that help to maintain normal physiological functions in human beings. These are considered as non specific biological therapies used to develop general well being and prosperity. The market is growing at a fast pace due to population burden and health demands. The word “Nutraceutical” has been derived from two words – “nutrient” that means a nourishing food component and “pharmaceutical” that means a medicinal agent. “Stephen DeFelice, founder and chairman of the Foundation for Innovation in Medicine, an American organization located in Cranford, New Jersey has got the credit for coining this term in 1989 [1].” The items that could pave the path include probiotics, prebiotics, antioxidants, and omega- 3 fatty acids [2].

These have been classified into two broad categories as traditional nutraceuticals and non-traditional nutraceuticals. Traditional nutraceuticals are the natural foods without any changes. These are further divided into categories like chemical components, probiotic microorganisms, and nutraceutical enzymes. Chemical components may include nutrients (for example, minerals, amino acids, and unsaturated fats) [3], herbs (for example, concentrates and extracts of botanical products) [4], or dietary supplements (for example, chondroitin sulphate, steroid hormone precursors). Probiotic microorganisms are living organisms that provide health benefits [5]. Nutraceutical enzymes are those enzymes which are derived or obtained from animal, plant, or microbial resources. Enzymes are essential for a variety of reactions being carried out inside the body [3].

On the other hand, non traditional nutraceuticals are those which are artificial in nature. These are prepared with biotechnological techniques. These have been subdivided as fortified nutraceuticals (obtained from agriculture breeding, added nutrients/ ingredient e.g. orange juice with fortified added vitamins) or recombinant nutraceuticals which are energy providing foods like alcohol, bread [6].

Nutrients are the substances that give sustenance fundamental support to life. Most commonly used nutrients are fat- soluble vitamins, water- soluble vitamins and antioxidants. Antioxidants can help in cerebrovascular diseases such as atherosclerosis and in inhibiting the growth of cancer cells. Vitamin C, E, and beta carotene have shown potential effect and can be

successfully used to decrease low density lipoprotein oxidation and thereby help in atherosclerosis. Vitamin supplements can play an important role in stimulating the production of macrophage and T cells thereby increasing the response of vaccines [7].

Since ancient times, herbs have been utilized for the treatment of various ailments and these are in practice till date. Almost every part of plants like flowers, leaves, roots, seeds, berries, and bark have been commercialized for therapeutic purposes [8].

A dietary enhancement is proposed to give supplements that may some way or another not be expended in sufficient sum. Enhancements as normally comprehended comprise of nutrients, minerals, fiber, unsaturated fats, or amino acids, among various substances [9].

Probiotics are frequently referred to as "great" or "supportive" microscopic organisms as they help keep the gastrointestinal tract in tip top condition. These are specifically beneficial for the stomach. Our body is fully loaded with microorganisms, both great and awful [10].

A good number of bacteria are classified as probiotics. *Lactobacillus* (*Lactobacillus acidophilus*) is the most common probiotic. It is found in the curd, yoghurt and other fermented foods. Bifidobacteria (*Bifidobacterium bifidum*) is found in some dairy products like kefir, foods like fermented vegetables like kimchi, and in fermented soyabean product tempeh. *Saccharomyces boulardii* is a yeast also known as Baker's yeast [11]. Curd is a food product obtained by coagulating milk with a method known as curdling. Curdling means to discrete or cause to isolate into curds and knots. The coagulation can be caused by including rennet or any consumable acidic substance, for example, lemon juice or vinegar and afterwards enabling it to coagulate. Rennet is a complex set of catalysts created in the stomach of ruminant warm-blooded animals. Milk that has been left to acid i.e. raw milk alone or milk with value added carboxylic acid bacteria or with included lactic corrosive micro-organisms will likewise naturally create/turn out curds. In India, curd is utilized to allude to the handmade/ crafted yogurt known as Dahi, while Paneer and Chhena are utilised as coagulated milk products [12].

There are some differences between yoghurt and curd. The probiotic bacteria found in the curd is *Lactobacillus acidophilus* and the bacteria found in the yogurt are the *Lactobacillus bulgaricus* and *Streptococcus thermophilus*.

Yoghurt is produced utilizing comparable strategies to curd, however, the fermentation of the milk is different. Different strains of lactic corrosive microscopic organisms may likewise be included. The preparation becomes normalised and homogenous. This guarantees the quality and right amount of organisms in the yoghurt [13]. Curd is the general sustenance and normal nourishment of India. Curd is the milk that coagulates when the milk sours or is treated with lactic corrosive microorganisms. The curd has different names in the country. This can be consumed plain or along with salt/pepper/sugar/natural products. Its origin is connected to India where it is gobbled up throughout the year. The word dahi looks as if it has been taken from Sanskrit word dadhi [14].

Yogurt makes a super food because of high measures of probiotic microscopic organisms which add to additional supplementary nutrition.

Prebiotics are those non-digestible foods which help in the growth and metabolism by feeding the good bacteria that are already living inside the large intestine. It is not affected by temperature, time, or acidity. Some of the most common examples of the prebiotics are banana, onion, skin of apple, kiwi, berries, beans, and many more. They are helpful in preventing some diseases such as inflammatory and irritable bowel disease, colon polyps and certain types of cancer. They help by nourishing the bacteria living inside the intestine [15].

Table 1: Differences between probiotics and prebiotics

PROBIOTICS	PREBIOTICS
Living microorganisms	Non digestible food
Die due to temp, acidity, time ,etc	Not affected by the time, acidity, temp, etc
Nourishes the bacteria that live inside the gut	Fight the harmful bacteria present in the gut

Enhancement of the epithelial barrier

The intestinal barrier keeps the epithelial integrity and defends the organism from the surrounding environment. It comprises of an epithelial junction adhesion complex, mucous layer, antimicrobial peptides, and secretory IgA [16]. Once this junction gets destroyed, the bacteria and food antigens may get in touch with the sub mucosa and can bring about inflammatory

response, leading to intestinal disorders [17, 18]. Therefore intake of non pathogenic bacteria can help in improving the intestinal barrier. Probiotic bacteria have been widely studied for their contribution but the mechanism by which they enhance the functioning of the intestinal barrier is not fully perceived [19].

Increased adhesion to intestinal mucosa

Precondition for colonization is called as the adhesion to intestinal mucosa. This is essential for contact between probiotic strain and the host [20, 21, and 22]. This is also vital for modulation of the immune system, [22, 23] and antagonism against pathogens [24]. Adhesion is counted as one of the major selection criteria for new probiotic strains [20, 25, 26, and 27] and has been associated with certain advantages to the immune system [28].

Competitive exclusion of pathogenic Microorganisms

Greenberg in 1969 used the term competitive exclusion. In competitive exclusion, single species of bacteria competes for receptor sites in the intestinal tract. The mechanisms elaborated by one species of bacteria to decrease the development of other species are diverse. These mechanisms include abolition of available bacterial receptor sites, making of an unfriendly micro ecology, production of specific metabolites, secretion of antimicrobial substances, and competitive exhaustion of essential nutrients [29].

Secretion of antimicrobial substances

Organic acids like acetic acid and lactic acid have sturdy inhibitory impact against gram negative bacteria. These are major antimicrobial compounds responsible for the inhibitory activity of probiotics against pathogens [30, 31 and 32]. The undissociated form of organic acid enters the bacterial cell and dissociates within the cytoplasm. The lowering of the intracellular pH or increase of the ionized form of organic acid can cause the death of the pathogens [33, 34].

Probiotics and the immune system

The adaptive immune response relies on the B and T lymphocytes, which are particular for specific antigens and the innate immune system reacts with common pathogens. Probiotic

bacteria can show an immunomodulatory effect as they have got the ability to interact with dendritic and epithelial cells [35].

How curd works

Zymolysis is used to convert milk into curd or yogurt. Milk is composed of globular proteins, casein. The curd is created with a reaction between the lactic corrosive microorganisms and casein. Throughout the zymolysis, the microbes utilize compounds to deliver vitality i.e. adenosine triphosphate (ATP) from lactose. Milk proteins get denatured. Due to this denaturation, the tertiary and quaternary structures of proteins get crashed and the globular proteins get transformed into stringy proteins which give a thick appearance to the milk [36].

Table 2: Synonyms of curd [37]

Hindi and Punjabi	Dahi
Telugu	Perugu
Assamese and Bengali	Doi
Malayalam	Thayiru
Tamil	Thayir
Kannada	Mosaru
Oriya	Dohi
Sindhi marathi	Dhah or dhaunro dahi

Health Benefits of curd

Lactobacillus rhamnosus taken in the form of curd has shown some potential outcome for the safe capacity of the general population living with HIV. Curd has shown the capability to enhance immune function capacity and postpone the progression of disease. HIV patients regularly experience the ill effects of modified gastrointestinal capacity, fast decrease of CD4, lymphocytes (linked with improved intestinal penetrability), changed gut profiles, decay of lactobacilli and bifidobacteria, looseness of the bowels and a higher grouping of pathogenic species [38].

Curd is a safe, cost effective and natural approach to create a barricade against microbial infection. Scientific studies have shown that curd contains selenium, vitamin B, C, E, folic acid, and whey proteins which are valuable in the management of HIV [39].

Gastrointestinal tract malignancy, gastric cancer, colorectal cancer, oesophageal growth, *H.pylori* infections are third most prominent tumours worldwide. These are ranked at number four as the most common reason of death due to cancer [40]. Taking a correct composition of proteins, starches, fats vitamins, minerals (through curd), and help in battling cancer growth. Numerous animal studies have proven that the consumption of yogurt/curd containing probiotics hinder tumour development and its multiplication. The intake of supplements like curd brought about lower concentration of bile acids in stools of colon disease patients [41].

Curd in the treatment of insomnia

Sleep deprivation (insomnia) can be treated with the dietary enhancements like curd/yogurt before sleep time. These contain a few supplements with sleep booster effects. Tryptophan is an essential amino acid of the body that produces serotonin and melatonin. These neurotransmitters are associated with rest and relaxation. Curd has abundant tryptophan which encourages the synthesis of serotonin and melatonin [42].

Magnesium in the curd improves the melatonin from the pineal gland, averts nervousness and promotes sleep. Vitamin B12, i.e cobalamin averts perplexity (confusion), dementia and weariness/tiredness. Vitamin B5, i.e pantothenic acid reduces stress and anxiety. Folic acid elevates haemoglobin synthesis and boost alertness [42].

Antioxidant mechanisms of probiotic could be allocated to reactive oxygen species, metal ions chelation, enzyme inhibition and inhibition of ascorbate autoxidation[43].

In treatment of liver disease

Bacteria present in the curd have the ability to balance smaller scale vegetation (flora) overpopulation. Probiotics intake can relieve alcoholic liver disease. Probiotic treatment regulates the bio ecological system in the intestinal tract by keeping a check on the development of more pathogens[44].

Curd and its cosmetic benefits

Curd is well respected as a cure for every possible stomach ailment. Throughout the world, it is used as a component of the cuisines. But other than this, it can also do wonders in the hair and skin.

Benefits to the skin

It improves the brightness of the skin and assembles its elasticity by hydrating the skin. It reduces wrinkles and fine lines. Lactic acid present in the curd works well as a defoliator and makes the skin look younger and brighter. Curd can also be applied to the acne affected areas. It reduces puffiness below eyes and also reduces persistent dark circles. Applying curd to sunburnt area cools it down because of its antiinflammatory properties. It fades blemishes and pigmentation [45].

Benefits to hair

It conditions hair because of its moisturising properties. It leaves the hair conditioned and makes them manageable. It reduces hair fall due to the presence of variety of vitamins in it. It nourishes the hair follicles. Since curd is a natural antifungal, it helps in removing all signs of dandruff [45].

CONCLUSION

Foods that enhance health, prevent and cure diseases, boost the immune system are known as the nutraceuticals. They are categorised into many classes ranging from natural diets, herbal products to genetically modified foods. The live microbial food supplements which show potential health benefits are known as the probiotics. Dairy products contain many probiotic organisms such as *Lactobacillus*, *Bifidobacterium* species. In this article, an effort has been made to summarize about various health benefits that the curd has and how probiotics work in the human ecosystem. Curd is a semisolid food which is obtained from fermented milk. It is easy to prepare, eat, digest and also has ample health benefits. It contains a lot of healthy ingredients like protein, carbohydrates, fats, minerals, and vitamins. It was also seen that adequate oral intake of fresh curd everyday helps to fight and prevent numerous diseases like allergy, diabetes, insomnia, liver diseases, HIV, cancer, inflammatory bowel disease and many more. It has also

shown various defence factors like protecting the immune system and regulating it in many ways. It also helps to promote the secretion of hormones and helps the kidney in detoxification. It has properties like antioxidant, antimicrobial, antiinflammatory which is the sole reason for its uses in the cosmetic field as well. Curd is known with various names in different states of India. Curd makes a favourite probiotic liked equally by the young as well as elderly people because of easy availability, good taste and ample of health benefits. Probiotics have various therapeutic and preventive potential uses in various gastrointestinal disorders. But the mechanism for these therapeutic and preventive potentials of the probiotic is not known fully. Curd is a semisolid food which is obtained from fermented milk. It is easy to prepare, eat, and digest. It contains a lot of healthy ingredients like protein, carbohydrates, fats, minerals, and vitamins. It is also a good source of calcium as it is obtained from milk. Curd is also a good food for the treatment and prevention of various diseases like insomnia, diabetes, liver diseases, and cancer. As curd contains a lot of good bacteria, it helps in digestion. It also helps in beating the summer heat and enhances stamina and vitality. It is mainly used for gastrointestinal applications, but its use can also be extended in the field of cosmetics for skin and hair. It is used in the cosmetic field for skin and hair because of its antiinflammatory, antioxidant, antimicrobial properties. It keeps the skin youthful, pigment free, and fresh. It is a good hair conditioner as it keeps the hair soft, healthy and dandruff free.

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