

## Therapeutic Uses of Curd: A Review

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**Abstract:** Curd is a natural and healing food which prevents from numerous enteric diseases. It contains lactic acid bacteria and a perfect balance of proteins, carbohydrates, fats, vitamins, minerals and water. Curd boosts the immune system and enhances stamina. It strengthens natural immunity by stimulation of mucosal and systemic host immunity. Further it activates macrophages, enhances the level of immunoglobulins, natural killer cell activities and cytokines in the host body. A good number of studies have been published on the effects of curd on human health. The benefits of curd in maintaining health, treatment of disease and management have been investigated in animal models and human subjects. Some studies have proved that curd is effective in the treatment of AIDS, cancer, diabetes, insomnia and hepatic diseases. Although clinical research has progressed, more clinical evidences are needed to establish the efficacy and limitations of curd in the treatment of various diseases. It is important to resolve whether curd is superior to the existing therapies.

**Keywords:** Curd, probiotics, diseases, immunity, lactic acid bacteria

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### I. Introduction

Curd is regarded as a complete and natural food. It is a product of the milk which is white in colour and resulted due to bacterial action. Daily consumption of fresh curd helps in preventing some diseases by virtue of the nutrients and probiotic bacteria it contains. It is a functional food, which boosts natural as well as acquired immunity and improves stamina. Being the richest source of probiotics, curd offers beneficial and healthy microflora to our alimentary canal.

The term probiotics was first used by Lilly and Stillwell (1965) to describe the substances secreted by one microorganism that stimulates the growth of another. Parker (1974) proposes that probiotics are 'organisms and substances which contribute to intestinal microbial balance'. Probiotics are defined as live microorganisms which when administered in adequate amount confer health benefits to the host (Anonymous, 2002). Probiotics are also defined as live microbial feed supplements that improve the intestinal microbial balance of the host (Fuller, 1989). The most important clinical significance of probiotic therapy is prevention and treatment of gastrointestinal infections and diseases (Parvez et al., 2006). Elie Metchnikoff, a Russian scientist working at the Pasteur institute in Paris is credited with giving attention to the health benefits of fermented milk. In 1994, the World Health Organization (WHO) regards that probiotics stimulate the immune defence system when prescribed antibiotics are rendered useless by antibiotic resistance (Kailasapathy and Chin, 2000; Levy, 2000). The use of probiotics in antibiotic resistance is termed as microbial interference therapy (Zhou et al., 2005, Botes et al., 2008).

Curd is prepared either from cow or buffalo's milk of the family Bovidae. The curd prepared from buffalo's milk is denser (16-19 %) than cow's milk (12%) due to higher total solids. The microorganisms involved in the formation of curd are *Streptococcus cremoris*, *Streptococcus lactis*, *Streptococcus thermophilus*, *Lactobacillus bulgaricus*, *Lactobacillus acidophilus*, *Lactobacillus helveticus* and *Lactobacillus cremoris* (Madhu et al., 2013). Curd is formed by the process of lactic acid fermentation. So a small amount of fermented curd is used as a starting material. Addition of 0.2% citrate is recommended for rendering pleasant aroma to dahi. Firm and uniform consistency, sweet aroma, palatable taste and smooth texture are the features of a good quality curd. The type of milk used and the manufacturing conditions determine the composition of the curd.

Curd forms the richest source of probiotics known so far. Probiotics contain living microorganisms such as lactic acid bacteria which provide health benefits to the host. Curd promotes the health of the host by boosting the immune system. It strengthens natural immunity by stimulation of mucosal and systemic host immunity, which is manifested through activated macrophages, increased levels of immunoglobulins, higher levels of natural killer (NK) cell activities and cytokines in the host body (Ashraf and Shah, 2011). Curd bacteria can trigger a cascade of immunological defence mechanism by binding to recognition receptors, such as Toll-like receptors (TLRs) expressed on the surface of epithelial cells. These may also stimulate the production of immune cells such as CD<sub>4</sub><sup>+</sup> T- cells in HIV patients. CD<sub>4</sub><sup>+</sup> T-cells mediate and control the balance of pro-

inflammatory and anti-inflammatory cytokines and chemokines. So curd can be used for the treatment of allergy, urinogenital infections, HIV, cancer, infection of *Helicobacter pylori*, liver disease, inflammatory bowel disease (IBD), irritable bowel syndrome (IBS) and pancreatitis (Shadnough and Shaker, 2013). Depending on the immune system of the host, different probiotic strains generate diverse immune responses. Non-specific mechanisms of action of probiotics include adherence and colonization of the gut, suppression of growth or epithelial binding or invasion by pathogenic bacteria, improvement of intestinal barrier function and production of antimicrobial substances.

The present review focuses on (i) the mechanism by which curd acts in our body and boosts our immune system. (ii) management and treatment of diseases by curd.

Role of curd in the treatment of diseases

### **1 acquired immuno deficiency syndrome (AIDS)**

Curd significantly reduces the infectivity of Human Immunodeficiency virus (HIV). *Lactobacillus rhamnosus* GR-1 present in curd has shown significant improvement in the immune function of persons suffering from AIDS. HIV infected persons suffer from rapid decline of CD<sub>4</sub> lymphocytes (associated with enhanced intestinal permeability), altered gastrointestinal functions, altered gut microbiota profiles, enhanced concentration of pathogens such as *Candida albicans* and *Pseudomonas aeruginosa* and reduced concentration of *Lactobacilli* and *Bifidobacteria* (Irvine et al., 2010). Vitamin B, C, E, folic acid, selenium and whey protein available in curd are extremely beneficial in the management of HIV (Irvine et al., 2010; Hummelen et al., 2010). Thus, curd provides a safe, cost effective and natural approach that creates a barrier against microbial infections.

### **2 cancer**

The third most frequent cancers occurring worldwide, i.e., more than one million cases per year are the gastro intestinal tract cancer, gastric cancer, oesophageal cancer and colorectal cancer. Good nutrition before, during and after the treatment of cancer, helps in quick recovery of the patients. Ingestion of curd which contains the right combination of proteins, carbohydrates, fats, vitamins and minerals helps in fighting cancer. Curd containing probiotic bacteria inhibits tumour formation and proliferation. A study has demonstrated that a 6-week administration of *Lactobacillus acidophilus* fermented curd resulted in lower concentrations of soluble bile acids in faeces of colon cancer patients which was responsible for cytotoxic effect on colon epithelium (Correa and Piazuolo, 2012). A study has revealed that lactic acid bacteria inhibits the growth and viability of the cancer cell line HT-29. It has been established that milk fermented with *B. infantis*, *B. bifidum*, *B. animalis*, *L. acidophilus* and *L. paracasei* inhibits the growth of the MCF7 breast cancer cell line (Correa and Piazuolo, 2012). Thus, curd containing probiotic bacteria and different nutrients, plays a significant role in preventing as well as arresting tumours.

### **3 Diabetes and improving lipid profile**

Type 2 diabetes mellitus is associated with an enhanced production of free radicals and impaired antioxidant defence system. Probiotics empower our anti-oxidant defence system by scavenging reactive oxygen species, chelation of metal ions, enzyme inhibition and ascorbate autoxidation inhibition. *Lactobacillus acidophilus* and *Lactobacillus casei* attenuate oxidative stress and hence antidiabetic effect which has been confirmed by animal studies (Farvin et al., 2010). Glucose metabolism can be regulated and diabetes mellitus can be treated by modification of the gut microflora by probiotics. In type 2 diabetics, dyslipidaemia is the leading cause of cardiovascular diseases (Franz et al., 2010). In a study, it was found that consumption of curd results in 4.5% decrease in total cholesterol (TC) and 7.5% decrease in LDL-C compared with the control group (Farvin et al., 2010). *Lactobacillus acidophilus* has been most widely studied among all probiotic strains for cholesterol reducing effect. Deconjugation of bile acids by bile salt hydrolase, assimilation of cholesterol binding to cell walls of probiotics and production of short chain fatty acids (SCFA) inhibiting hepatic cholesterol synthesis are the possible mechanisms by which a probiotic candidate acts. The serum cholesterol level in hypercholesterolemic patients gets reduced by 2.9% with the ingestion of 200 g/day of fermented milk containing *L. acidophilus* L1 (Mahu et al., 2013).

### **4 insomnia**

Insomnia refers to the inability to sleep during bed time. The symptoms include waking up during the night, feeling restless in the morning, fatigue, irritability, anxiety, depression, difficulty in concentrating, headache and digestive problems. Insomnia can be treated at home by eating curd or yogurt before bedtime. Tryptophan is a primary amino acid of our body to produce serotonin and melatonin which are involved in inducing sleep and relaxation. Studies have proved that preparations containing melatonin, magnesium and zinc taken daily for 8 weeks, an hour before bed time improve the quality of sleep (Katri et al., 2012). Curd contains

tryptophan, calcium, magnesium, vitamin B<sub>12</sub>, B<sub>5</sub> and folic acid which are beneficial for the treatment of insomnia. Tryptophan helps in the synthesis of serotonin and melatonin which induces sleep. Calcium reduces wakefulness and restlessness. Magnesium stimulates melatonin secretion from the pineal gland, prevents nervousness and induces sleep. Vitamin B<sub>12</sub> prevents confusion, dementia and fatigue. Vitamin B<sub>5</sub> relieves from stress and anxiety. Folic acid facilitates haemoglobin production and improves concentration.

### 5 liver diseases

Severe Alcoholic Liver Disease (ALD) and Alcoholic Steatohepatitis (ASH) are noticed in approximately 30% of heavy drinkers (Imani et al., 2013). Numerous in vivo studies on animals and human beings suggest the presence of endotoxin producing bacteria in the bowel tracts. Administration of probiotics relieves from ALD symptoms by modulating gut and immune systems. Non- alcoholic Fatty Liver Disease (NAFLD) is caused due to overgrowth of gut microflora, excess formation of bacterial lipopolysaccharides and inflammation inducing substances. Metronidazole and polymixin B are the drugs used to reduce the overpopulation of pathogens in the NAFLD patients (Imani et al., 2013). However, curd, a rich source of probiotics is recommended which creates a microbial balance. Hepatic encephalopathy (HE) is a chronic liver disease, occurring in 50-70% of patients with cirrhosis (Imani et al., 2013). The gut flora produce ammonia which disrupts the central nervous system producing neuropsychiatric syndrome. Probiotics reduce the p<sup>H</sup>, bacterial urease activity and absorption of ammonia. Thus hepatic encephalopathy can be treated by the intake of probiotics. Bifidobacteria and Lactobacillus improve endotoxemia and liver necrosis in the patients with hepatitis B and C virus. More clinical research is essential to establish the benefits of curd in treatment of liver diseases.

## II. Conclusion

Curd is a therapeutic natural animal product prepared from fermented milk. It promotes health of the host by boosting the immune system. Curd contains a perfect balance of various essential substances for our body and health. It is also a rich niche for probiotics. Curd is very popular among all the sections of the society due to its easy preparation, digestibility, delicious taste and ample of health benefits more specifically by south Indians. It is very effective in the prevention, management and treatment of AIDS, cancer, diabetes, insomnia and liver diseases. Thus, it can be regarded as the most popular probiotic food which helps in the treatment of various diseases. Although, promising potential health benefits of curd are being observed, extensive clinical research and evidence are essential to establish the efficacy and limitations of curd in disease management. It is important to resolve whether it is superior to existing therapies. Curd is a complete food blessed with the goodness of probiotics.

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