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# **Review Article**

# **Functional Aspects of Dairy Foods in Human Health: An Overview**

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## ABSTRACT

Role of food as an agent for improving health has proposed a new class of food, called functional food, with positive effects on host health and /or well-being beyond their nutritional value. In the early 1980's, the Japanese were the first to recognize dairy components as having significant contributions to "physiologically functional foods." They have been associated with health benefits containing bioactive peptides, probiotic bacteria, antioxidants, vitamins, specific proteins, oligosaccharides, organic acids, highly absorbable calcium, conjugated linoleic acid and other biologically active components with an array of bioactivities: modulating digestive and gastrointestinal functions, haemodynamics, controlling probiotic microbial growth and immunoregulation. Consumers increasing interest for maintaining or improving their health by eating these specific food products has led to the development of many new functional dairy products. These dairy products contain many functional ingredients that decrease the absorption of cholesterol, can significantly reduce blood pressure, play role in the regulation of satiety, food intake and obesity-related metabolic disorders and may exert antimicrobial effects. This paper reviews and discusses some of the latest findings regarding the role of milk and dairy products as functional foods.

**KEYWORDS :** Functional foods, Milk, Dairy products, Immunomodulation, Antioxidant

## **1. INTRODUCTION**

Role of food as an agent for improving health has proposed a novel division of food, called functional food, with positive effects on host health and /or well-being beyond their nutritional value [1]. In the early 1980's, the Japanese were the first to recognize dairy components as having significant contributions to "physiologically functional foods" [2, 3]. They have been associated with health benefits containing bioactive peptides, probiotic bacteria, antioxidants, vitamins, specific proteins, oligosaccharides, organic acids, highly absorbable calcium, conjugated linoleic acid and other biologically active components with an array of

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bioactivities: modulating digestive and gastrointestinal functions, haemodynamics, controlling probiotic microbial growth and immunoregulation.

Milk is a complex mixture of specific bioactive proteins, lipids and saccharides and contains numerous biologically active substances such as immunoglobulin, enzymes, antimicrobial peptides, oligosaccharides, hormones, cytokines and growth factors [4]. Fresh milk contains a mixture of antimicrobial agents that exhibit bacteriostatic and even bactericidal activities [1, 5]. Mammalian milk contains more than 60 different enzymes including digestive enzymes (proteinases, lipases, amylases and phosphatases) and enzymes with antioxidant and antimicrobial characteristics (like lysozyme, catalase, superoxide dismutase, lactoperoxidase, myeloperoxidase, xanthine oxidoreductase, ribonuclease, etc.) that are important in terms of milk stability and in terms of protection of mammals against pathogenic agents [6].

Milk proteins include caseins, β- $\alpha$ -lactalbumin, lactoglobulin, immunoglobulins, lactoferrin and serum albumin that exert their biological activities either directly, or after degradations to different peptides that, through their action, affect not just the immune system, but cardiovascular and nervous systems [6]. Milk proteins are currently the main source of a range of biologically active peptides such as casomorph immunopeptides, lactoferrin, phosphopeptides. lactoferricin and Fermented milks are also a rich source

whey  $\alpha$ -lactalbumin, of as 3lactoglobulin, lactoferrin, lactoperoxidase. immunoglobulins growth factors. These proteins have demonstrated a number of biological effect anti-carcinogenic activities to different effects on the digestive function (McIntosh-lactoglobulin acts as an effective emulgator and immunomodulator) [7]. Hydrolysis of  $\alpha$ lactalbumin produces peptide Oly-Leu-Phe with immunomodulatory effects which stimulates phagocytosis through specific receptors as well as respiratory burst of neutrophiles [8]. Lactoferrin, a multifunctional glycoprotein, is present in milk in smaller concentration and has many physiological roles which include regulation of iron homeostasis, host defense range of microbial infections, anti-inflammatory activity and cancer protection [9]. Kitts and Weiler (2003) defines bioactive peptides as specific protein fragment that insert a positive impact on body functions or conditions and may ultimately influence health are considered the most important source of bioactive peptides that are beneficial risk of obesity and development of type two diabetes. Bioactive peptides, generated during milk ferment starter cultures, have been found in a number of dairy products, such as yoghurt and sour milk.

# 2. BIOACTIVE FUNCTIONS ASSOCIATED WITH DAIRY PRODUCTS

Food has long been associated with human health. Every individual requires, roughly, the right combination of foodstuffs at the right time and in the

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right amounts in order to maintain their health. Dairy products could potentially be used for improved health or wellbeing in a range of areas, including antimicrobial function, cardiovascular gastro-intestines. growth, system. metabolism, defense against free radical oxidation enhance and to psychological functions.

## **2.1 Anti-microbial functions**

- Control of gut microflora [10]
- Anti-viral [11]
- Binding of *E. coli* and cholera enterotoxins [11]

## **2.2 Cardiovascular Functions** [12]

- Anti-inflammatory
- Anti-hypertensive
- Anti-thrombic
- Cholesterol reduction

## 2.3 Others

- Anti-cancer [12]
- Immunomodulation [12]
- Anti-oxidative [12]
- Opioid effects [13]
- Retard osteoporosis [14]

# 3. DAIRY PRODUCTS WITH BIOACTIVE FUNCTIONS ON HUMAN HEALTH

Almost all milk components contribute potential health benefits including proteins, peptides, lipids, minor Volume 1 Issue 1 2012 www carbohydrates, minerals, and vitamins. Relationship between bioactive function and milk components are shown in the Figure. Some dairy product which people consume regularly in their daily life is: Yogurt and other fermented dairy foods, Milk, Colostrum, Cheese, Whey Protein Concentrates / Isolates, Milk Protein Concentrates etc.

Milk as a nutritional food has become the topic of research and discussion related to weight management. In fact, consumption of dairy products has been linked to several health benefits that are the direct antitheses of diseases and complications that arise from overweight and obesity. For example, individuals that consume low-fat dairy products are more likely to have lower weight [15], lower blood pressure [16] and decreased risk of stroke, colon cancer and osteoporosis [17]. Protein components in milk provide high branched chain amino acid content which help to maintain lean muscle tissue. Several components found in skim milk may have a protective effect against the onset of disease that occurs as a result of obesity. Many of the components found in skim milk can be isolated and used in specific applications for individuals that do not consume dairy or may be lactose intolerant Another study [18]. concluded that lipid peroxidation induced by lead can be counteracted by ingestion of Capparis, Artemisia and whey proteins [19]. of probiotics Mixtures and prebiotics, which favourably modify the

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gut flora and its metabolism by increasing the survival of healthpromoting bacteria, are described as synbiotics. The major applications for probiotics are in dairy foods while prebiotics are added to dairy products, table spreads, baked goods and breads, breakfast cereals and bars, salad dressings, meat products and some confectionery items.

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al. (2008) showed that probiotic labneh containing garlic and onion oil demonstrated a protective effect and reduced the total worm couple, male and female as well as, ova in liver and intestine in mice infected with S. mansoni [19]. Also, probiotic labneh containing garlic or onion oil increased the dead oogram in mice infected with S. mansoni. It can be concluded that probiotic labneh containing garlic and onion oil may be play a great role as a protective food against infectious diseases such as Schistosomiasis. Also, another study investigated the biological effects of aqueous herbal extracts (aqueous extracts of fenugreek, greater burdock, goat's rue, colocynth, chicory and lupine) mixed with stirred yoghurt filtrate against alloxan-induced oxidative stress and diabetes in rats and concluded that mixture of medicinal plant extracts and stirred yoghurt filtrate may play a role in protection against alloxaninduced oxidative stress and diabetes in rats [20]. Probiotic yoghurt displays an immunmoprophylactic effect by stimulating plasma immunoglobulin response, which improved the liver and spleen weight to be nearest to the control. In addition, the activities of aspartate transaminase (AST), lactate dehydrogenase (LDH) and g-glutamyl transferase (gGT) were significantly increased in the infected group compared to the control [21].

The biological evaluation of a symbiotic fermented milk synergistic with some active ingredients of herbal and honey on the sexual activity, semen characteristics and testosterone levels in Ardhi and Damascus goat's bucks have been studied [22]. Results showed that giving goat bucks a mixture of a synbiotic functional syrup enhanced the activity resulting metabolic in improvements in their reproductive performance. The antibacterial effect of labneh containing aqueous extracts of oregano, marjoram, sage and licorice against *E. coli* and *B.* subtilis were demonstrated an inhibitory effect against organisms Probiotic both [23]. fermented milk containing honey, garlic, ginseng, cod liver oil and chicory was enhanced the role of protection against lead acetate contamination in rats by increasing the activity of the antioxidant enzymes that requires the antioxidant glutathione as substrate, thus protecting the liver against the oxidative damage [20]. Supplementing or administering specific ingredients in hydrolysate form with beneficial probiotic bacteria to ruminant animals were a promising area of study [22].

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Figure 1 Relationship between bioactive function and milk component

### 4. CONCLUDING REMARKS

There are a wide range of dairy products and developments that provide examples for the changing relationship between food and health because of the increasing attention to the health-diet interaction. The idea that food habits have direct influence on one's health is certainly not new, but the attention paid to this relation is increasing. Ongoing research yields new insights regarding the relation between dairy food habits and the increase or decrease of the incidence of varies aliments, such as certain types of cancer and different forms of cardiovascular diseases. In conclusion:

- Almost all components of milk have a physiological function beyond nutrition,
- Milk components are multifunctional and
- Dairy foods possess a natural "cluster" of nutrients that protect health and enhance the immune system.

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