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Proceeding Article

Fruit and Vegetable Based Functional Beverages, Probiotic Dairy Beverages and Fortified Beverages with Bioactives: Anticarcinogenic Implications and Commercial Trends

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Abstract

In this proceeding paper, functional fruit and vegetable based beverages, functional dairy beverages and probiotic beverages have been approached. Possible healthy and anticarcinogenic influences of mentioned products have been summarised.

Keywords: Funtional Beverage, Dairy Beverage, Antioxidant, Anticarcinogenic

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Introduction

It is recommended drinking six to eight glasses of water per day owing to water makes up 60 percent of our total body weight but many people find staying adequately hydrated to be a challenging task.

Recently, there has been growing recognition of the key role of foods and beverages in disease prevention and treatment. Especially, the production and consumption of functional beverages has gained much importance as their providing a health benefit beyond the basic nutritional functions. Functional beverages include an ingredient that gives that food health-promoting properties over and above its usual nutritional value. Those may classified as fruit and vegetable based functional beverages, probiotic dairy beverages and fortified beverages with bioactives. With current trends, their functional properties, anticarcinogenic implications have been increased based on commercial demands.

Fortified Beverages with Bioactives

Beverages are beginning to incorporate a more expansive line of functional ingredients including nutraceuticals, zero-calorie sweeteners and flavors that not only taste good but also healthy for consumers. Nowadays there is such a wide array of functional agents on the consumer market. Functional ingredients contain nutrients including vitamins, minerals, amino acids, nutraceuticals, etc. and also various flavours, sweeteners, stabilizers, and colors.

Functional beverages can be manufactured directly from fresh fruit and vegetables included bioactive or can be formuled by bioactive enhancing and fortifying. Bioactive compounds potentially extractable from the aimed plant foods and plant by-products contain majorly phytochemicals, fibers, natural flavor constituents, sugars, polysaccharides, proteins and its derivatives and can be fortified to beverages and called fruit and vegetable functional drinks, if fortify by protein concentrate, whey protein isolate, milk protein concentrate, probiotic addition and other dairy ingredients, they are called as dairy functional beverages.

Micronutrients are essential compounds for the proper function of the body; especiallly iron is part of various enzymes and molecular complexes involved in metabolic body processes, the primary functions of which include the transportation of oxygen by hemoglobin, degradation and storage of neurotransmitters, and the erythropoietic function and immune response of cells. Antioxidants are exogenous compounds which contribute to the stabilization of reactive oxygen species or free radicals in the human body.

Antioxidants play an essential role for decreasing the risk of degenerative diseases containing cardiovascular problems and neurological illnesses. Depending upon the consumer trends, healthy potential foods are preferred like native small fruits crops including majorly citrus (orange, mandarin, lemon, lime) fruits, strawberry, cranberry, raspberry, blackberry type of grape based berry fruits, cherry and parsley, spinach, celery in fortified/functional fruit or vegetable beverages for the domestic market. For final product; the moisture, pH, acidity, color, content of soluble solids, iron and vitamin C contents, phenolic antioxidants contents are considered for preparing the beverage development. and for preparing the smoothies (Tokusoglu, 2019, 2019a, 2018).

Functional Dairy Beverages

Dairy functional drinks can be manufactured for human heath. Bioactives in dairy beverages have many functions as antimicrobial, antithrombotic, antihypertensive, opioid, immunomodulatory, antioxidant related to gastrointestinal system, cardiovascular system, nervous and immune systems.

Bioactive constituents as anticarcinogenic peptides, which are associated with chemopreventive properties, reduction of tumor proliferation as well as apoptosis. Cytotoxic milk peptide lactoferrin (whey proteins) showed positive efficiency against cancer cells. Breast cancer treatment based on the lactoferrin utilization resulted the inhibition of cancer cells through suppressing signaling of nasopharyngeal carcinoma cells. Peptides derived from beta-casein (isoleucine-proline and valine-proline-proline) have been acted the hypertesive ability and characterized as potentially effective against cardiovascular diseases. Dietary casein and whey-based milk peptides and protein hydrolysates showed a vital role in maintaining immune system by the IgG antibodies production inducing the proliferation of spleen lymphocytes through mitogen inhibition, depending upon the availability of sialic acid (Tokusoglu, 2019, 2019a, 2018).

Whey is plentiful by-product of the dairy industry that corresponds to the liquid fraction remaining after milk clotting and casein removal throughout cheese manufacturing process. By-product whey represents about 85–90% of milk volume and retains approximately 55% of milk nutrients. Whey includes lactose and non-casein proteins of milk, and its elevated content of organic matter is associated with a high biochemical oxygen demand and potential for decomposition.

It is considered that whey is the most important pollutant of the dairy industry, gives high organic loading. The using of whey in natura is limited owing to its perishable characteristics and elevated dilution of its components. It is stated that several technologies have been used to benefit from whey material. Concentration of whey may be realized by heating and drying (evaporation, spray-drying, freeze-drying) or by reversed osmosis, whereas demineralization can be performed by ion exchange resins or electrodialysis. Also, it has been used membrane separation technologies for obtaining protein ingredients from whey. Bioactive peptides are

inactive while encrypted in the sequence of original protein; diverse protein hydrolysates can be released by proteolytic microorganisms and/or enzymatic catalysis by digestive enzymes and /or the actions of plant or microbial proteases (Tokusoglu, 2018).

Antioxidative and Antidiabetic Activity of Bioactive Peptides in Nutraceutical Dairy

Whey proteins can be hydrolzed by either digestive ezymes, plan tor microbial proteasas and then occur bioactive peptides; it is reported that bioactive peptides derived from whey proteins have several physiological effects for health including immune, cardiovascular, nervous and gastrointestinal systems.

Antimicrobial, immunomodulatory, cytomodulatory effects, antihypertensive, antioxidant, antithrombotic, hypocholesterolemic, effects, opioid agonist, opioid antagonists, mineral binding, anti-appetizing, antiulcerative effects of bioactive peptides have been stated (Tokusoglu, 2019, 2018).

It is expressed that whey protein based peptides (α-LA, β-LG) are likely responsible for the antioxidant activity of enzyme-hydrolyzed whey concentrate and skim milk. It is also stated that whey protein isolate is hydrolyzed by different proteases including trypsin, pepsin, Alcalase, Promatex, Flavourzyme, or protease N and the hydrolysate occurred by Alcalase 2.4L has the highest antioxidant activities.

It was stated that that the antioxidant peptide WYSL showed the highest DPPH radical scavenging activity and superoxide radical scavenging activity-SRSA, with IC50 values of 273.63 μM and 558.42 μM, respectively (Tokusoglu, 2019, 2018).

It is reported that antioxidant peptides generally consist of 5–11 amino acids, containing hydrophobic amino acids, proline, histidine, tyrosine and/or tryptophan. Antioxidant peptides contain aminoacid groups including histidine (HIS), phenylalanine (PHE), proline (PRO), tryptophane (TRP), tyrosine (TYR).

It is stated that the antioxidant peptides can be incorporated into food matrices and crude extracts may contain several different peptides which can act synergistically to exert antioxidative action, can be more economically feasible to be used in food products (Tokusoglu, 2019, 2018).

With due consideration, whey has the great potential as a source of bioactive peptides, as an ingredient several added-value food formulations and an effective knowledge on the production and characteristics of these peptides would be very convenient (Tokusoglu, 2019, 2018).

Type 2 diabetes is a metabolic disorder characterized by impaired insülin secretion by β!cells and insulin resistance in tissues; this sitation is related with the progress of several complications including hypertension and cardiovascular disease. Oral administration of whey proteins and their hydrolysates have been positively affected blood glucose control and insulinotropic responses in humans.

It is reported that whey protein hydrolysates enriched in free amino acids (AAs) and hydrophilic peptides could have been responsible for the rised insulinotropic response of BRIN-BD11 cells. In vivo, it is seen the effects of whey proteins and whey protein hydrolysates on glycemia through the releasing or the presence of bioactive peptides and amino acids from whey proteins which could stimulate the gut hormone secretion, and also act as dipeptidyl peptidase IV (DPP IV) inhibitors

The potential utilization of whey protein hydrolysates and peptides can be performed as natural complementary approaches; these could be implemented through dietary intervention and food-drug therapies for type 2 diabete management by inhibiting DPP IV activity and thence increasing the half-life of incretin hormones (Tokusoglu, 2019, 2018; Grumezescu and Holban, 2019).

Probiotic Dairy Beverage

Probiotics and fermented milk products have attracted the attention of consumers and scientific persons including health care, pharmacy, food and nutrition sector. Recently, reports have shown that dietary probiotics containing kefir have a great potential for cancer prevention and treatment (Tokusoglu, 2019a).

Kefir is fermented milk with Caucasian and Tibet origin, made from the incubation of kefir grains with raw milk or water. It is stated that kefir grains are a mixture of yeast and bacteria, living in a symbiotic association.

Antibacterial, antifungal, antiallergic and anti-inflammatory influences are some of the health benefits of kefir grains. Besides, polysaccharides and peptides are some bioactive compounds of kefir and have great potential for inhibition of proliferation and induction of apoptosis in selected tumor cells. Many studies confirmed that kefir acts on different cancers including colorectal cancer, malignant T lymphocytes, breast cancer and lung carcinoma (Tokusoglu, 2019a).

At present, beverages are the most active functional food category due to their convenience and possibility to meet consumer demands for container contents, size, shape, and appearance, as well as ease of distribution and storage for refrigerated and shelf-stable products. The design and development strategies of functional beverages requires multistage processing which takes into account various of the parameters including organoleptic acceptance, physical and microbial stability, chemical and functional properties, cost and distributing strategies. From the nutrition perspective of view, functional and nutraceutical beverages has been increased great attention for healthy and safe bioactive constituent utilization.

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