ISSN: 2644-2981

Global Journal of Nutrition & Food Science

DOI: 10.33552/GJNFS.2020.03.000556

Iris Publishers

Mini Review

Turmeric

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Received Date: July 27, 2020

Published Date: September 30, 2020

Abbreviations: HDL: High Density Lipoprotein, SOD: Superoxide Dismutase, CAT: Catalase, GPx: Glutathione Peroxidase, LDL: Low Density Lipoprotein, MetS: Metabolic Syndrome, IL-6: Interleukin 6

Introduction

"Turmeric" or "Indian saffron", a member of the Curcuma longa L Zingiberaceae family, is a large-leaved, long-lasting herbaceous plant with yellow flowers. Turmeric's homeland is South Asia; It is widely located in the tropical areas of China, Indonesia, India, Thailand and Africa. Curcumin is a yellow pigmented substance of Curcuma longa. It is generally used as a coloring agent in foods, it is odorless, heat-resistant and contains tetra-hydrocumin, an antioxidant compound. Curcuminoids (curcumin, demetoxicurcumin, bisdemetoxicurcumin) are the main ingredients of turmeric. Curcumin has been reported to have many other pharmacological properties, including anti-inflammatory, antioxidant and antiapoptotic effects [1,2].

Effect on Insulin Resistance

There is clinical evidence that supplementation with curcuminoids improves glucose homeostasis parameters and insulin resistance, and positively alters serum adipokine levels, such as adiponectin and resistin [3]. Curcumin has recently been reported to inhibit the development of diabetes, reduce insulin resistance in vivo, and improve β-cell function. The potential of curcumin therapy against various diabetic complications such as nephropathy, retinopathy and neurochemical changes in the brain stem caused by diabetes has been reported [2]. According to the study conducted with curcumin in individuals with type 2 diabetes, it was determined that lipoprotein A decreased and HDL cholesterol increased after 12 weeks of treatment, and it was determined that it can be used in the treatment of dyslipidemia in individuals with type 2 diabetes [4].

Effect on Obesity

Curcumin has been shown to be an anti-adipogenic dietary bioactive component that is most effective in the early stage of adipocyte differentiation [5]. Ejaz, et al. [6] in a study found that curcumin reduced body weight, inhibited angiogenesis, in adipose tissue, differentiated preadipocytes, reduced hepatic cells and adipocyte fat accumulation. Another study has shown that curcumin inhibits the increase in body weight and total fat mass as a result of a high-fat diet [7]. It has been shown that the animal model of Calebin A, one of the bioactive components of turmeric, inhibits adipogenesis and hepatic steatosis in both in vitro and high-fat diet induced obesity [8].

Antioxidant Effect

With its phenolic structure and β diketone derivative, curcumin has been shown to have protective effects against oxidative stress and its harmful consequences. Curcumin, the antioxidant property

of which is almost the same compared to vitamin C and vitamin E; helps to reduce lipid peroxidation by protecting antioxidant enzymes such as SOD, CAT, GPx. In addition, curcumin has been found to be effective in lipid peroxidation as good as α-tocopherol in liposomes [1]. Tripathy, et al. [9] have shown that curcumin protects rats from middle cerebral artery occlusion. In a study carried out by Rattah, et al. [10] rats were given a high fat diet and turmeric extract was given to one of the groups turmeric extract have prevented atherosclerosis, reduced LDL cholesterol. In a meta-analysis study, it has been shown that curcuminoids have an important effect in reducing serum SOD and CAT activities, GSH concentrations and serum lipid peroxides [11]. In another study supporting this result, it was clearly demonstrated that curcumin supplementation improves systemic antioxidant capacity, lipid peroxidation and inflammation biomarkers in individuals with metabolic syndrome (MetS). Similarly, in a previous study in obese individuals with high risk of MetS, it was found that supplementation of curcuminoids with piperine reduced the rate of proxidant/antioxidant levels. Another study in patients with tumors found that an eight-week supplementation with a lecithinised curcuminoid preparation (180 mg / day) have improved serum SOD activities, as well as other antioxidant indices, including serum CAT activities and reduced concentrations of glutathione and thiobarbituric acid reactive species [3].

Anti-Inflammatory Effect

As a result of the inhibition of cycloxygenase and lipoxygenase enzymes in the colonic mucosa with the addition of curcumin to the diet, arachidonic acid metabolism was inhibited and anti-inflammatory activity was observed. Studies have shown that turmeric delays the occurrence of inflammatory chemicals such as leukotriene, prostaglandin, tumor necrosis factor and interleukin and reduces their negative effects [1]. In one study, the combined anti-inflammatory effect of powdered turmeric and linden was reported to be as effective as cortisone in carrageenan induced edema [12]. Chuengsmarn et al. [13] have observed that curcumin reduces inflammatory markers, improves glucose metabolism, and in addition reduces weight and waist circumference. The results of a significant reduction of IL-6 with curcumin supplement support the idea that this nutraceutical agent may play a role in suppressing pro-inflammatory pathways associated with different diseases [14]. Curcumin can be used as an immunotherapeutic agent in the treatment of tumor and infectious diseases [15].

Anti-Cancer Effect

Extracts of turmeric plant have been shown to prevent the growth and spread of cancerous cells. In a study, the use of turmeric extracts have been found to have a certain inhibitory effect on prostate cancer cells with high metastases [16]. It has been stated that curcumin causes apoptosis in cancerous cells without damaging healthy cells and prevents tumor growth in animal models and prolongs life in cancerous animals. It has been reported that curcumin has antitumor effect in many cancer types such as mouth, esophagus, stomach, liver, breast, duedenum, colon, prostate cancers. In studies in vivo and in vitro, curcumin has been shown to inhibit carcinogenesis in three stages; it blocks the initiation of the tumor by blocking the metabolic activation of carcinogenic compounds or by stimulating its detoxification. It is also stated that it inhibits the development and progression of the tumor by increasing apoptosis, inhibiting the progression of the cell cycle, enabling control of transcription factors, suppressing the inflammatory response, inhibiting angiogenesis and metastasis, which are important for the nutrition of the tumor [1]. It shows that Calebin A, a component found in turmeric, has a strong anticancer activity against leukemic, myeloid and other cancer cells [17].

As a result, regarding to its anti-inflammatory, antioxidant and anticancer activities, turmeric is a food that has several health benefits. Therefore, it should be included in our daily diet to benefit from its positive effects on health including preventing from diseases and even treatment.

Acknowledgement

None.

Conflict of Interest

Author declare no conflict of interest.

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