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ANTI-DIABETIC PROPERTIES OF ASIAN EVERYDAY FOOD

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ABSTRACT: Diabetes mellitus is indicated by abnormal glycemic control. Blurred vision, retinopathy, dry skin, nerve damage, and kidney damage are among the common complications associated with diabetes mellitus. Diet, exercise, medications, and insulin therapy are considered better therapeutic options for diabetes mellitus. Herbal medicines have been a highly valued source of medicine throughout human history. They are widely used today, indicating that herbs are growing parts of modern high-tech medicines and some of the herbal plants and active chemical constituents have a role in the management of Diabetes mellitus. In Asia, many herbs are used in everyday food, which has antidiabetic effects directly or is effective to improve secondary complications like nephropathy, nephropathy, cardiomyopathy, *etc*. *Allium cepa* (onion), *Allium sativum* (garlic), *Zingiber officinale* (ginger), *Coriandrum sativum* (coriander) and *Nigella sativa* (Kalonji) are the common herbs used in Asian everyday food, have been reported to alleviate diabetic conditions. The present review summarizes the benefits of these common herbs in diabetes mellitus.

Keywords: Diabetes, Herbs, Onion, Garlic, Coriander, Ginger

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INTRODUCTION: Diabetes mellitus is caused by a deficiency of insulin hormone, imperfect insulin act, or both, usually a combination of hyperglycemia and the heterogeneous disorders (retinopathy, cardiomyopathy, neuropathy, nephropathy, *etc.*) with high blood glucose level [1]. Diabetes mellitus and its management have been recognized since the Middle Ages [2]. The World Health Organization (WHO) declared that around 80% world's population rely on herbal therapies due to lack of side effects [3]. Many plants produce useful compounds for the production of fungicides, insecticides and industrial raw materials.

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In 1980, (WHO) the World Health Organization recommended researchers to find out the therapeutic ability of multiple herbs [4]. It has been estimated that up to one-third of patients with diabetes mellitus use some form of complementary and alternative medicine.

To time, approximately 400 ancient plants have been used to treat diabetes, among which only a few have been found to have medicinal importance for reducing blood glucose in non-insulin dependent diabetic patients [5]. Hypoglycemic activity of different plants' products had been used in traditional medicines all over in the world [6]. Asian food contains some of the herbs which are rich in compounds active for therapy of diabetes. Onion, ginger, garlic, coriander, and black seeds are used almost daily in the Asian diet and have been reported to prevent or alleviate diabetes. Still, high rate of diabetes in this region necessitates the studies on estimation of concentration and activity

of important neutraceuticals of these plants after cooking, which may destroy or decrease their activity. The present review focuses on the advantages of the important daily food form plants or their extracts in diabetes mellitus without cooking.

Onion: Scientific Name: *Allium cepa:* *Allium cepa*, a spice plant, is commonly known as onion and belongs to the family Liliaceae. Since ancient times, it has been used traditionally for the treatment of different diseases Akash *et al*., [7] In agriculture onion is very commonly cultivated in many countries globally. Onion has multi-dimensional effects on diabetes from lowering of blood glucose, lipids, oxidative stress, and chances of thrombosis [8, 9].

FIG. 1: *ALLIUM CEPA*

Allium cepa contains sulfur compounds like S-methyl cysteine and flavonoids (quercetin) which are mainly responsible for the hypoglycemic, hypolipidemic, and anti-oxidative stress activities. Extracts of onion normalize the activities of liver hexokinase, glucose 6-phosphatase, and HMG coenzyme-A reductase [7]. Different components of onion-like Cycloalliin, S-methyl-L-cysteine, S-propyl-L-cysteine sulfoxide, dimethyl trisulfide, and S-methyl-L-cysteine sulfoxide inhibit the formation of oil drop in cells [10].

Quercetin has an antiapoptotic effect for liver cells so effective for diabetic hepatopathy [11]. Onion has also been shown antithrombotic effect by inhibiting collagen- or arachidonic acid (AA) induced platelet aggregation and collagen-induced AA release response [12].

Garlic: Scientific Name: *Allium sativum:* Garlic (*Allium Sativum*) has been used for various ailments in herbal medicine. Garlic has controversial researches for therapy of diabetes because of inconsistent data from animal models and improper scientific data from humans.

FIG. 2: *ALLIUM SATIVUM*

Garlic prevents diabetes progression through its antioxidative, anti-inflammatory, and antiglycative properties [13]. Garlic extracts have been seriously considered as medicine in recent years as it can reduce serum lipids, blood pressure, and plasma viscosity [14]. Extracts of garlic were found to have antidiabetic activities as they decrease the level of glucose, serum triglycerides, uric acid, urea, creatinine, complete cholesterol, AST and ALT [15, 16].

Ginger: Scientific name: *Zingiber officinale*: Ginger (*Zingiber officinale*) is considered an effective therapy against diabetes mellitus as it prevents secondary complications. It improves insulin sensitivity, lipid profile, and reduces CRP and PGE_2 [17, 18, 19].

FIG. 3: *ZINGIBER OFFICINALE*

Ginger inhibits multiple transcriptional pathways, lipid peroxidation, carbohydrate-metabolizing enzymes, and HMG-CoA reductase and activates antioxidant enzyme activity and low-density lipoprotein (LDL) receptors.

So, it not only improves insulin sensitivity or synthesis but also protects β-cells of pancreatic islets, reduces fat accumulation, decreases oxidative stress, and increases glucose uptake by the tissues. It also acts as an antioxidant hence improves nephropathy and diabetic cataract [20]. Ginger has also been reported to reverse diabetic proteinuria in diabetic rats [21]. Oral supplementation of ginger improves glycemic indices, TAC, and PON-1 activity [22] reduces FBS (fasting blood sugar) and HbA1c and improves QUICKI (quantitative insulin sensitivity check index) [23].

Coriander: Scientific Name: *Coriandrum sativum*: *Coriandrum sativum* (CS) is a daily used food ingredient in Asia, and it is claimed that CS can be used for many ailments. All parts are used for flavoring or treatment of various disorders. It is rich in lipids (petroselinic acid), essential oil (high in linalool), and many bioactive. It has anti-microbial, anti-oxidant, anti-diabetic, anxiolytic, anti-epileptic, anti-depressant, anti-mutagenic, anti-inflammatory, anti-dyslipidemic, anti-hypertensive, neuro-protective and diuretic properties [24].

FIG. 4: *CORIANDRUM SATIVUM*

CS extract has many bioactive compounds like phenolics, flavonoids, steroids, and tannins. It lowers blood glucose, total serum cholesterol, triglycerides, and low-density lipoprotein inhibit lipid peroxidation and scavenges 2, 2-diphenyl-2-picrylhydrazyl free radical. It also increases the activity of antioxidant enzymes such as catalase, superoxide dismutase, and glutathione [25].

Aqueous extract of CS inhibits gastrointestinal α-glucosidase hence has antidiabetic properties [26]. It decreases atherosclerosis, increases cardio-protective indices, and several components of diabetes as metabolic syndrome [27].

Black Seeds: Scientific Name: *Nigella sativa*: *Nigella sativa* (NS) and its major constituent thymoquinone (TQ) have anti-inflammatory, cardiovascular, analgesic, anti-neoplastic, anti-cancer, and chemopreventive properties [28]. Oxidative stress is reported to increase the pathogenesis of diabetes mellitus.

FIG. 5: *NIGELLA SATIVA*

NS can decrease lipid peroxidation, serum nitric oxide, and also increased antioxidant enzyme activity in stressed diabetic environment [29, 30]. TQ or NS oil improves neuropathy and oxidative stress in diabetes by a reduction in Glutathione S-transferases (GST), Glutathione (GSH) and catalase [30]. In pregnancy, it inhibits the rate of embryo malformations in diabetic mice. Cyclooxygenase-2 (COX-2) increases inflammatory conditions of diabetes mellitus. NS treatment suppresses COX-2 enzyme, lipid peroxidation MDA levels, and increased the level of SOD anti-oxidant enzyme in the pancreatic tissue of diabetic rats [31].

CONCLUSION: From the above data, it may be concluded that Asian everyday herbs are beneficial against diabetes and its complications. Further studies are required to evaluate the improvement of the efficacy of these herbs.

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