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Opinion Article

Phytochemicals as Dietary Supplements for Blood Sugar Control

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Opinion

Diabetes mellitus (DM) is a chronic metabolic disease characterized by high blood glucose levels and has been an increasing world health problem. It is one of three non-communicable diseases (NCD) worldwide, and the 3rd leading cause of death in humans. Type 2 diabetes is induced by insulin deficiency owing to damaged pancreatic beta cells and insulin resistance. The current therapeutic approaches include repairing damaged beta cells, increasing the sensibility to insulin, retarding carbohydrate digestion, etc., and the relevant medicines such as diformin and acarbose have been developed [1]. However, they usually have single efficacy and some side effects. Notably, most DM may result from unhealthy lifestyles and dietary habits. Therefore, routine prevention rather than therapy has been proposed to be more important. In this way, abundant natural phytochemicals are good candidates for preventing and treating NCD including DM because of their various bioactivities, low costs, and lesser side effects.

There are many kinds of phytochemicals associated with hypoglycemic activity, present in plants, including fruits, vegetables, fungi, herbs and so on. Such phytochemicals may include flavonoids & phenolics, polysaccharides, terpenoids, alkaloids, etc [2]. Diabetic patients may control or regulate their blood glucose levels through daily consuming the aforementioned plants directly or their extracts as dietary supplements. The plants or their parts (fruits, roots, leaves, stem barks, flowers or their combinations, essential oils) can be orally administrated in different forms such as concoctions of different plant mixtures, infusions as teas or as component mixtures in porridges and soups. However, enriched extracts and their products can be more efficient and convenient to intake orally than direct consumption of plant materials. Under this circumstance, phytochemicals have been isolated and characterized from fruits such as citrus and apples, vegetables such as broccoli and onion, spices such as turmeric, beverages such as green tea and red wine, as well as many other sources. Extraction from the plant is an empirical exercise in which different solvents are utilized under a variety of conditions such as time and temperature of extraction, and the success or failure of the extraction process depends on the most appropriate assay [2]. An appropriate assay is required to first screen for the presence of the source material by determining contents of targeted phytochemicals, to extract, purify and subsequently identify the compounds therein, and finally verify their hypoglycemic activities through different mechanisms such as the inhibition of α-amylase, α-glucosidase, insulin-sensitizing effect, direct action on protein tyrosine phosphatase 1B, peroxisome proliferator-activated receptors, GLUT4 expression, insulin receptor substrate-1 and glycogen synthase kinase-3β as well as dipeptidyl peptidase-4 enzyme [3]. However, when processed into dietary supplements, crude extracts are usually enough processed into solids such as powders, tablets, jelly-sweets, or concentrated oral liquids. To improve acceptability by diabetes high-risk groups, the formula of products usually contain different additives, including flavoring agents, excipients, etc., but no sugars to mask bad tastes, such as bitterness and astringency as well as improve stability or absorption of bioactives.

The prevalence of type 2 diabetes has assumed epidemic dimensions in Western industrialized societies and some quickly developing countries. It is mainly the environmental, dietary and lifestyle behavioral factors that are the control keys in the progress of this disease. Several epidemiological studies have linked over nutrition and lack of physical activity with type 2 diabetes. Indeed, the excessive consumption of energy dense foods as source of carbohydrates and fats along with ineffective medical management has negative impact on controlling blood glucose levels and on insulin response [4]. Dietary guidelines have always been

important for people with diabetes mellitus. A well-balanced diet that provides the essential macro- and micro-nutrients is always an impaired need for a patient with diabetes. Thus regular supplement of compounds and their source materials which have been approved efficient in lowering blood glucose levels or hypoglycemic activity either in vitro or in vivo is indispensable for diabetic patients and diabetes high-risk groups who are in overweight, sedentary, staying up late and fast-paced. This routine practice plus reduced dose of medicine can efficiently control blood sugar level in DM patients and be adopted to self-manage blood sugar for high-risk or healthy groups without taking medicines.

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