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Plant and mushroom extracts as potential intervening supplements in diabetes and diabetic complications

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Diabetes is a metabolic disorder characterized by impaired pancreatic insulin production and/or insufficient cell response to insulin and is characterized by chronic hyperglycemia which induces metabolic abnormalities in different cells and tissues. High intracellular glucose concentrations induce overproduction of reactive oxygen species and activate the formation of advanced glycation end-products, the polyol pathway, the hexosamine pathway and the protein kinase C pathway, influencing gene expression and activity of different regulatory proteins. These changes lead to diabetic end-organ complications affecting vascular system, kidneys, eyes, peripheral nerves, liver and gastrointestinal system. Diabetes represents one example of a disease that has been treated according to the traditional medicine world-wide and as such represents a good model for investigation of beneficial effect of different plant and mushroom extracts and isolated compounds in the management of diabetes and diabetes-related complications. Plants and mushrooms extracts are the source of metabolites such as polyphenols, polysaccharides, terpenes, alkaloids and antibiotics with pronounced biological activities including antioxidant, antitumor, anti-inflammatory, antidiabetic, antimutagenic, anti-hepatotoxic and immunostimulant properties. We provided an overview of the beneficial effects of the examined extracts obtained from flowering plant (*Centaurium erythraea*), sweet chestnut (*Castanea sativa*), edible mushroom (*Lactarius deterrimus*) and natural products containing β -glucans (from cereal grains) in the treatment of diabetes. Their antioxidant and antidiabetic properties *in vitro* and positive effects on different processes involved in the onset and progression of diabetes and its complications *in vivo* are presented and possible mechanisms that underlie these effects are suggested.

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