Pharmacology and Mechanisms of Natural Medicine in Treatment of Type 2 Diabetes Mellitus

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Abstract

Diabetes mellitus (DM) is a chronic metabolic disorder that is affecting the worldwide population with high rates of morbidity and mortality. The most prevalent case of DM is type 2 diabetes mellitus (T2DM) which is characterized by insulin resistance and insulin secretion defect due to impaired β-cell functioning. Epidemiological studies implied that the number of diabetic cases has been doubled during the past two decades and has turned out to be a global epidemic accompanied by severe metabolic and endocrine complications over time. The rising emergence of T2DM in children, adolescents, and young adults signifies it to be one of the most dominant perturbing features of its kind. Proper diet control, moderate exercise, and hypoglycemic and lipid-lowering agents are some evident strategies that have been employed in the management of T2DM so far. However, a distinct possibility of severe diabetic complications still exists despite the therapeutic benefits achieved by these drugs. Various in vitro and in vivo models have suggested that phytochemicals exert several pharmacological effects on metabolic disorders such as in hyperglycemia, hypertension, and hyperlipidemia by modulating oxidative stress, inflammatory response, autophagy, and anti-apoptosis effects. Additionally, they have positive modulatory actions on molecular targets of T2DM like insulin signaling, IRS, glucose transporters, α-glucosidase, PPARγ, DPP-IV, PTP1B, NF-κB, etc. Regulation of these maladaptive pathophysiological mechanisms can improve insulin-resistant state, lower blood glucose levels, and protect against various macrovascular and microvascular complications. Thus, natural products have garnered significant interest as bioactive agents in the management of T2DM. This chapter aims to overview the activities and underlying mechanisms of natural medicine in the management of T2DM.

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