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A review: Antihyperglycemic plant medicines in management of diabetes

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ABSTRACT

Diabetes is a serious metabolic disorder prevailing among people with ageing and sedentary lifestyle associated with rapidly growing urbanization and industrialization. Medicinal plants prescribed in the-saurus of Ayurveda and used by folklore have been a source of relief in controlling different types of diabetes all over the world. At the present time, the use of these herbal drugs is growing at high pace because of its cost effectiveness and free from the side effects over pharmaceutical hypoglycemic agents. The current review presents the profiles of approximately 35 plants having anti-diabetic activity and potential to reduce the oxidative stress, reported in the literature from 2005 to 2015. This review has been presented in such a fascinating manner which includes the plant along with its family, part used, phyto-constituents responsible for particular action in a tabulated form. Present study might provide a momentum to find newer antidiabetic entities.

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1. Introduction

Diabetes is recognized as the wide-reaching chronic disorder affecting almost people of every age group. Along with cancer, cardiovascular and cerebrovascular diseases, diabetes is becoming the third killer of the health of mankind [1]. The occurrence of this disease was seen to be high in India, China and USA. It is classified under genetically disorder and dietary disorder [2].

Recent estimations suggested that up to the year 2030, approximately 438 million people (7.8%) of the adult population, is expected to have diabetes [3]. Diabetes mellitus is a group of metabolic disorder characterized by hyperglycemia resulting from defects in insulin secretion, insulin action or both [4]. Diabetes mellitus is caused by the abnormality of carbohydrate metabolism which is related to low blood insulin level or insensitivity of target organs to insulin [5]. Some effects of diabetes are found to be mediated through oxidative stress associated with increased Reactive oxygen species (ROS) production which adversely affects the antioxidative machinery of our body. Disturbance of antioxidative machinery in diabetes is due to alteration in antioxidative enzymes, impaired glutathione metabolism and decreased ascorbic acid levels [6] [7].

Herbal plants have been traditionally used for the treatment of diabetes throughout the world. Plant drugs are frequently considered to be less toxic and free from side effects than synthetic ones [8]. Besides chemotherapeutic agents, the present century is switching towards naturopathy especially in developing countries where resources are in scanty and the cost of conventional medicines is a burden to the population [9]. The phyto-constituents present in herbal plants have been reported to retain pancreatic beta cells regenerative capacity, insulin secretion and fight against the problem of insulin resistance [10]. Concurrently, phyto-constituents identified from traditional medicinal plants can be used for developing new types of therapeutics.

The purpose of present review is to enlighten about some medicinal plants with their valuable phyto-constituents along with their possible molecular mechanism in the management of diabetes.

2. Material and method

The information of plants having antidiabetic activity was collected from different articles published in various journals and books available. This review contains 33 plants of 25 families along with 9 major phyto-constituents with their possible mechanism of action against diabetes. These plants are selected on the basis of their traditional usage and also reported several times in the literature since 2005–2015. Table 1 contains list of plants having antidiabetic activity, parts used for extraction, taxonomical status, basic biological activities with their phyto-constituents, and solvent used for extraction; whereas phyto-constituents with their possible mechanism of action against diabetes has been described in Table 2. To understand the mechanism of action Fig. 1 is showing major phyto-constituents of plants and Fig. 2 showing mechanism of action to control glucose metabolism [11], have been provided in this review.

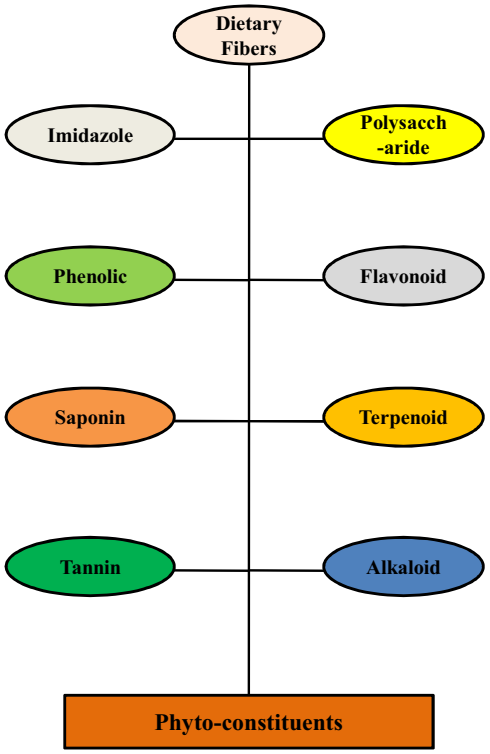

Fig. 1. Phyto-constituents present in herbal plants.

3. Mechanism of action of phyto-constituents against diabetes

Plants contain different types of phyto-constituents of different chemical classes (Fig. 1). Phyto-constituents show various biological activities like Hypoglycemic, Hypolipidemic, Anti-

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