

# Pharmacogenetic Account of Anti-Diabetic Herbs

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**Abstract:** Diabetes mellitus is commonly found type of a disease characterised by hyperglycemia, change in the metabolism of lipids, proteins and carbohydrate. It is non communicable disease but still affects millions of people in the world. To treat diabetes mostly traditional or the ayurvedic medicines are referred, as it has lesser side effects as compared to the modern or the allopathic medicines.

**Keywords:** Diabetes, Allopathic medicines, Herbal formulations, Insulin, Traditional medicinal plant.

## Introduction -

In India, the diabetes is found to be a major health problem, especially in urban areas. To reduce ill effects of diabetes and its complications, there are various approaches, but mostly herbal formulations are preferred due to its lesser side effects [1]. Mostly there are two types of diabetes which are Diabetes mellitus and Diabetes insipidus. Diabetes mellitus is caused due to increase in glucose levels which is due to absolute or relative insulin deficiency. From different parts of the world, many plants are investigated for antidiabetic effect [2]. Due to high level of phenolic compounds, flavonoids, terpenoids, alkaloids and glycosides, many plants which are believed to treat diabetes, have been proven in research studies to possess antidiabetic properties [3]. These include *Allium sativum*, *Pterocarpus marsupium*, *Aloe barbadensis*, *Azadirachta indica*, *Eugenia jambolana*, *Mangifera indica*, *Trigonella foenumgracum*, *Ferula assafoetida*, *Momordica charantia*, *Cinnamomum verum* [2][4].

## Materials and methods-

According to WHO, "Diabetes mellitus is a chronic disease caused by the inherited and /or acquired deficiency in production of insulin by the pancreas, or by the ineffectiveness of the insulin produced, which results in increased blood glucose level that can cause damage of many of the body's systems, in particular blood vessels and nerves [5]. The Diabetes requires early diagnosis, treatment and unhealthy lifestyle. It is a disease that affects health of many people in the 21<sup>st</sup> century and is known as the fifth leading cause to death [6]. Diabetes mellitus is disease of disordered metabolism occurs due to heredity and environment results in abnormal increasement in blood glucose level (Hyperglycemia). Ebers papyrus consist of earliest known documentation of plant used in treatment of diabetes of about 1550 BC [9].The allopathic medicines do not restore normal glucose homeostasis and also it has more side effects as compared to ayurvedic medicines [10].Benefits of medicinal plants with hypoglycaemic effects in management of diabetes mellitus confirmed by many studies [11].Nowadays, antidiabetic agents such as sulfonylureas , biguanides, thiazolidinediones and alpha glucosidase inhibitors are widely used in treatment of the diabetes mellitus (hyperglycemia)[13].

There are three types of Diabetes -

1.Type 1 (Insulin Dependent Diabetes Mellitus) – It occurs due to failure of pancreas to produce insulin, so it is treated with exogenous insulin injection every to control blood glucose level.

2. Type 2 (Non-Insulin Dependent Diabetes Mellitus) – It results as a result of fails to use insulin properly. Therefore, it is treated with oral hypoglycemic agents like sulphonyl urea and biguanides.

3.Type 3 (Gestational Diabetes) - It is a form of diabetes in which blood glucose level increases in the pregnancy and became normal after baby is born.[14] [16].

The natural herbs used in treatment of diabetes focus on lowering blood sugar level and reduces the damaging effect of the diabetes [24]. Generally, diabetes mellitus is caused due to less physical exercise or unhealthy lifestyle like less exercise and changed workstyle as well as food habit also causes hyperglycemia [26].

## Indian medicinal plants used to treat diabetes-

Table No. 01

Sr. no	Plant	Part used	Biological species	Family	Result	Reference
1.	Asafoetida	Gum	<i>Ferula assafoetida</i>	Apiaceae	It reduces the quantity of free radicles in the cell and stimulate synthesis of insulin in type 2 diabetes	2 and 4
2.	Fenugreek	Seeds	<i>Trigonella foenumgracum</i>	Fabaceae	Powder of fenugreek reduces darqndkhvn sense in patients of type 2 diabetes	21 and 22
3.	Cinnamon	Whole plant	<i>Cinnamomum verum</i>	Lauraceae	It reduces risk associated with diabetes and cardiovascular diseases.	21

4.	Aloe	Gel and latex	<i>Aloe barbadensis</i>	Liliaceae	It shows hypoglycemic effects in alloxanized diabetic rats.	2 and 18
5.	Bitter gourd	Whole plant	<i>Momordica charatia</i>	Cucurbitaceae	It shows antihyperglycemic effect in normal and streptozotocin diabetic rats.	20
6.	Jamun	Seeds	<i>Syzygium cumini</i> and <i>Eugenia jambolana</i>	Myrtaceae	The extract of jamun pulp inhibit insulinase activity in the liver and kidney.	4 and 18
7.	Mango	Leaves	<i>Mangifera indica</i>	Anacardiaceae	Aq. extract of m. indica have antihyperglycemic property which causes reduction in intestinal glucose absorption	2 and 20
8.	Vinca	Root or leaves	<i>Catharanthus roseus</i>	Apocynaceae	Methanol extract of leaves taken orally for 15 days increases plasma insulin level.	12
9.	Neem	Leaves	<i>Azadirachta indica</i>	Meliaceae	Antihyperglycemic effect is shown by the hydroalcoholic extract of this plant.	4
10.	Garlic	Bulb/ Seed	<i>Allium sativum</i>	Amaryllidaceae	In type 2 diabetes, garlic have antihyperglycemic and antihyperlipidemic effect.	19
11.	Pterocarpus	Stem	<i>Pterocarpus marsupium</i>	Fabaceae	Due to presence of tannates in the extract, it shows hypoglycemic property.	4
12.	Custard apple	Bark	<i>Annona squamosa</i>	Annonaceae	Plant bark decoction taken orally on empty stomch once a day useful to cure diabetes	12
13.	Papaya	Fruit	<i>Carica papaya</i>	Caricaceae	Papaya scores 60 on glycemic index (GI), so it doesn't raise blood sugar too quickly.	12
14.	Babhul	Seeds	<i>Acacia arabica</i>	Fabaceae	The plant extract acts as antidiabetic agent by acting as secretagogue to release insulin.	23
15.	Onion	Bulb	<i>Allium cepa</i>	Amaryllidaceae	Different ether soluble or insoluble fractions of onion powder shows antihyperglycemic activity.	23
16.	Turmeric	Rhizomes	<i>Curcuma longa</i>	Zingiberaceae	Research has shown that curcumin (chemical constituent) may be 400 times than metformin (common diabetes drug) in improving insulin sensitivity.	25

#### Discussion-

The word diabetes was coined by the Greek physician Aeretæus in first century A.D. and Willis observed that urine of diabetic person as wonderfully sweet as if imbued with honey or sugar, whereas presence of sugar in the urine of diabetic person was demonstrated by Dobson in 1755 [27]. There are various reasons for development of diabetes and its complications, one of the etiological factors is the damage induces by free radicle and hence anti-diabetic drug or agent with antioxidant properties are more advantageous [28]. There are different complications should face due to diabetes some of them are cardiovascular disease, nerve damage, eye damage, foot damage, altered skin condition, hearing impairment, Alzheimer's disease and depression, whereas risk factors for type 2 diabetes include weight, lack of physical exercise, family history, age, high blood pressure abnormal level of cholesterol and triglycerides [29].

#### Conclusion-

The plants used in treatment of diabetes are mostly belonging to the family Liliaceae, Fabaceae, zingiberaceae and Lauraceae, and mostly found in India. All of these plants have anti diabetic properties and/or can helpful to reduce diabetes complications.

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