

# Diabetes Mellitus and Some Anti-Diabetic Indian Medicinal Herbs - A Review

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**Abstract:** *Diabetes mellitus is defined as a syndrome which refers to a disease that alters the blood glucose level of human body. Basically it is a disorder of metabolism where the metabolism rates of fat and protein have been altered also with the alteration of blood sugar level. Among the many more types of diabetes the most challenging and life threaten is diabetes mellitus (DM), creating lots of health complications in human body like: retinopathy, diabetic neuropathy, chronic kidney disease (CKD), inflammation, oxidative stress and many more. Diabetes mellitus is not fully curable but to control the situation lots of allopathic molecules like: sulfonylureas, thiazolidinediones etc. are available in market in different formulations like tablet, insulin etc. But those can arise lots of adverse effects in human body. So it is very much necessary to emphasis on the different traditional medicines those are extracted from different body parts of different medicinal herbs found in all over the world including in India also fighting against diabetes mellitus. The adverse effects of those medicines are almost nil. For this reason the demand of herbal medicines increasing globally day after day for the treatment of different diseases including diabetes also. Lots of medicinal herbs have been used for the treatment of diabetes mellitus traditionally but the scientific studies are pending for many of those herbs to prove the same. So the further study has required for those herbs to convert their traditional efficacy against diabetes mellitus into scientific data. In this review we are highlighted some of those Indian medicinal herbs which have already proven their efficacy against diabetes mellitus through scientific studies and some common features of diabetes mellitus.*

**Keywords:** Diabetes mellitus, Indian medicinal herbs, allopathic medicine, traditional medicine, adverse effect.

## 1. Introduction

Diabetes mellitus is a common disease in which blood glucose level gets high. It is also called as hyperglycaemia. Diabetes occurs due to not producing enough insulin secreted from  $\beta$ -cells of the pancreas or not getting proper response from the body cells to the insulin produced. Insulin hormone helps the glucose to get into the cells that produces energy. There are mainly two types of diabetes, one is diabetes mellitus and another one is diabetes insipidus. In case of diabetes mellitus blood glucose level gets high and extra glucose passed through urine but in case of diabetes insipidus blood glucose level remains normal. Normal blood glucose level in our body is less than 140 mg/dl and kidney produces diluted urine.

In 1889 Joseph von Mering and Oskar Minkowski discovered diabetes mellitus by removing pancreas from dogs and the disease was developed in their body. In India 12.1% adults are affected by diabetes mellitus. In 2016 during a survey International Diabetes Federation (IDF) states that diabetes mellitus is a disorder that affects 415 million people in the world. If untreated diabetes mellitus can cause –

- Damage in blood vessels
- Stroke
- Heart attack& other heart disease
- Nerve damage
- High blood pressure
- Kidney damage
- Eye damage, even blindness may occur

Though some allopathic drugs that are used for treatment of diabetes mellitus are –Metformin, Glipizide, Glimperide, Pioglitazone etc. but actually there is still no permanent treatment to cure for diabetes mellitus. So it is better to use traditional remedies which we get from different medicinal herbs, can control high blood sugar levels with almost nil adverse effects. India is the botanical garden of the world for aromatic and medicinal plants, which are used as raw materials for preparing perfume products and formulating medicine. Diabetes mellitus can be treated by herbal medicines. Herbalism is the study of the use of medicinal herbs which is used to treat disease. Some Indians herbs used for diabetes mellitus are Giloy, Vijaysar, Gurmar, Sadabahar etc.

### Signs & Symptoms of Diabetes Mellitus:

The symptoms of diabetes mellitus may vary depending upon how much blood glucose level in our body is increased. There are various signs and symptoms of diabetes mellitus. Those are-

- Cloudy colour of urine due to the presence in urine
- Extreme hunger
- Skin infection & vaginal infection
- Blurred vision
- Weight loss
- Increased thirst
- Polyuria
- Polydipsia
- Polyphagia
- Slow healing of wounds
- High amount of glucose excretion through urine, because excess amount of glucose builds up in our blood, hence the kidneys are forced to absorb and filter the excess amount of glucose and as a result kidney will damage.

## 2. Diagnosis

The diagnosis of diabetes mellitus is based on random blood glucose level, oral glucose tolerance testing, measurement of A1c level and fasting blood glucose level.

### • A1C Level Test:

A1c is the measurement of glucose-haemoglobin percentage of red blood cell. It is also called as HbA1c. The normal A1c level is less than 5.7%, the level between 5.7% and 6.4 % indicates pre diabetes. If the level is more than 6.5% it indicates diabetes mellitus.

### • Oral Glucose Tolerance Test:

It is also known as glucose tolerance test. It is the measurement of how the body respond to glucose. After meal, the glucose tolerance test is used to identify the irregularities in the body's glucose handling.

### • Random Blood Glucose Level:

Random blood glucose level test is basically used to measure the glucose amount in our blood circulation at the time when we are tested. We can take the test at any time and can eat or drink before the test. If the blood glucose level is 200 mg/dl or higher, it indicates diabetes mellitus.

### • Fasting Blood Glucose Test:

We should not eat or drink overnight before the test. If the level is 99 mg/dl or less then the blood sugar level is normal. 100- 125 mg/dl means the patient have pre diabetes and 126 mg/dl or higher level indicates diabetes mellitus.

### • Postprandial Blood Glucose Test:

The blood sample will take after two hours of a heavy meal. It is also known as PP sugar. Less than 140 mg/dl is normal. 140-199 mg/dl means the patient have pre diabetes and 200 mg/dl or higher level indicates diabetes mellitus.

### Pathophysiology of Diabetes Mellitus

Diabetes mellitus is chronic heterogeneous metabolic disorder, which is characterized by formation of excess amount of glucose in our blood, is called hyperglycaemia and destruction of  $\beta$  cells of Islets of Langerhans of pancreas which secretes insulin.

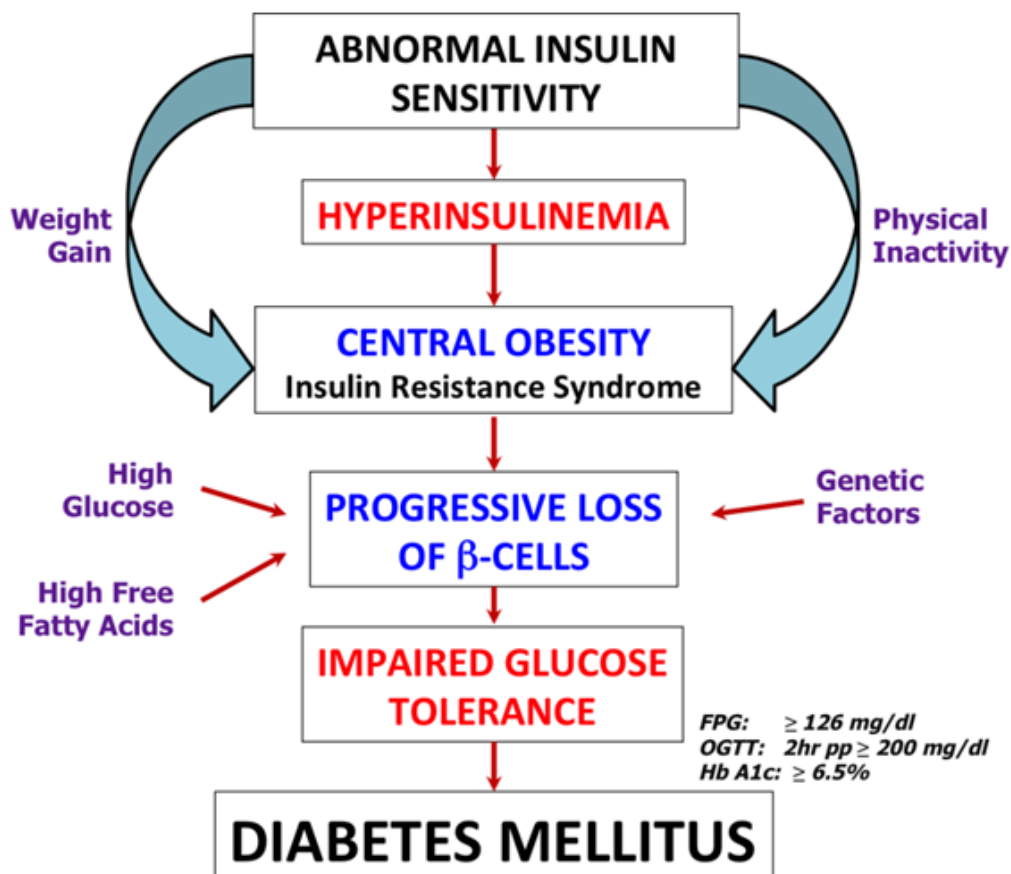


Figure 1

### Anti-Diabetic Drugs

Diabetes mellitus disease can be suppressed by regulating the blood glucose level with different types of medicines or diet plans or yoga therapy. Type 1 diabetes mellitus can be treated by insulin treatment and type 2 diabetes mellitus can be treated by using oral hypoglycaemic drugs like: thiazolidinediones, peptide analogs, sulphonylureas etc.

### Herbal Remedy

Diabetes mellitus treatment by using anti-diabetic drugs without any adverse effects is the largest question to pharmacists, medical practitioners, doctors. According to

national ethno-botanical, we know that total 800 medicinal plants were used for the treatment of diabetes mellitus, but clinically proved that 450 medicinal plants shows anti-diabetic properties, but only 109 medicinal plants have perfect action for diabetes mellitus. Synthetic drugs which have anti-diabetic properties and used for treatment of diabetes mellitus, they show some adverse effects such as vomiting, migraine, malignant anaemia, sickness etc. So we can't use synthetic drugs every time. According to clinical trial, herbal drugs are better choice than synthetic drugs because of very less adverse effects and side effects.

### Some of Indian medicinal herbs & therapeutic use for diabetes mellitus

Sl. No.	Plant Species	Synonyms	Family	Part Used	Active Constituents
1	<i>Aegle marmelos</i>	Bael	Rutaceae	Leaves extracts	Aeglemarmelosine
2	<i>Allium cepa</i>	Onion	Liliaceae	Dried powder	Dipropyl disulphide oxide
3	<i>Allium sativa</i>	Garlic	Liliaceae	Petroleum ether extract of bulbs	Allypropyl disulphide oxide, Allicin
4	<i>Aloe barbadensis</i>	Ghikanwar	Asphodelaceae	Leaf pulp extract	B-sitosterol, Campesterol
5	<i>Andrographis paniculata</i>	Kalmegh	Acanthaceae	Ethanol extract of plant	Kalmeghin
6	<i>Annona squamosa</i>	Sharifa	Annonaceae	Leaf extract	Liriodenin, moupinamide
7	<i>Azadirachta indica</i>	Neem	Meliaceae	Leaf extracts	Azadirachtinimbin
8	<i>Brassica juncea</i>	Mustard	Brassicaceae	Aqueous extract	Sulforaphane
9	<i>Cajanus cajan</i>	Arhar	Fabaceae	Seed	2'-2' methyl cajanone, isoflavones, cajanin, cahanones
10	<i>Carica papaya</i>	Papaya	Caricaceae	Aqueous seed extract	Papain, chymopapain
11	<i>Carum carvi</i>	Caraway	Apiaceae	Aqueous extract of seed	Furfurocarvone
12	<i>Catharanthus roseus</i>	Vinca	Apocynaceae	Hot water decoction of leaves	Catharanthine, vincristine, vinblastine
13	<i>Cassia auriculata</i>	Tanners cassia	Fabaceae	Aqueous extract of seed	Limonene, terpinol
14	<i>Coccinia indica</i>	Baby watermelon	Cucurbitaceae	Ethanol extract of whole plant	Glutamic acid, Asparagine
15	<i>Coriandrum sativum</i>	Coriander	Apiaceae	Seed extract	p-cymene linalool
16	<i>Cinnamomum cassia</i>	Cinnamon	Lauraceae	Bark	Cinnamaldehyde eugenol
17	<i>Cinnamomum tamala</i>	Tejpat	Lauraceae	Leaf extract	Linalool, $\beta$ -caryophyllene
18	<i>Curcuma longa</i>	Turmeric	Zingiberaceae	Powdered form	$\alpha$ -phellantrene, tripinolene
19	<i>Eugenia jambolana</i>	Jamun	Myrtaceae	Pulp of fruit	Oleanolic acid, ellagic acid
20	<i>Ficus bengalensis</i>	Bargad	Moraceae	Alcoholic extract of stem bark	Leucodelphinidin

### 3. Conclusion

Diabetes mellitus is increasing day after day globally and turning into a major worldwide challenge which affects millions of people in the world. So it must be monitored constantly with appropriate medicines to keep control the blood glucose level of human body. This disorder if not treated properly within time, it can cause severe damage to the affected individuals. During the treatment it is also necessary to keep in mind those drugs we will use for the treatment must be produced less adverse effects in human body. So it is the only way to increase the use of traditional drugs for the treatment of diabetes mellitus extracted from different medicinal herbs which having almost no adverse effects. From this review article, it may be useful to the scientist, healthcare professionals and scholars to develop alternative medicine from medicinal herbs for the treatment of diabetes mellitus without any adverse effects.

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