



# A REVIEW OF HERBS USED TO REGULATE BLOOD SUGAR LEVEL

1Gaikwad Panchaphula Rangnath, 2Ashwini S Pundkar

1Student , 2Assistant Prof.

1Babasaheb Ambedkar marathvada University ,

2Babasaheb Ambedkar Marathvada University

## ABSTRACT

Different benefits of various herbal medicines in decreasing blood sugar have been reported in different clinical trials so far. Considering the growing tendency toward these combinations and the booming market, inappropriate advice is growing accordingly. Hence, it is necessary to evaluate the effects and possible complications of such combinations on health status and blood glucose control.

Diabetes is a serious metabolic disorder and plenty of medical plants are used in traditional medicines to treat diabetes. These plants have no side effects and many existing medicines are derived from the plants. The purpose of this systematic review is to study diabetes and to summarize the available treatments for this disease, focusing especially on herbal medicine.

The molecular genetics of diabetes received extensive attention in recent years by many prominent investigators and research groups in the biomedical field. A large array of mutations and single nucleotide polymorphisms in genes that play a role in the various steps and pathways involved in glucose metabolism and the development, control and function of pancreatic cells at various levels are reviewed.

Keywords: Diabetes, Classification of diabetes, Type 1 diabetes, Type 2 diabetes, diet

## INTRODUCTION :

Diabetes mellitus:

Diabetes mellitus (DM) also known as simply diabetes, is a group of metabolic diseases in which there are high blood sugar levels over a prolonged period. This high blood sugar produces the symptoms of frequent urination, increased thirst, and increased hunger. Untreated, diabetes can cause many complications. Acute complications include diabetic ketoacidosis and nonketotic hyperosmolar coma. Serious long-term complications include heart disease, stroke, kidney failure, foot ulcers and damage to the eyes. (1)

Diabetes mellitus is a group of metabolic diseases characterized by chronic hyperglycemia resulting from defects in insulin secretion, insulin action, or both. Metabolic abnormalities in carbohydrates, lipids, and proteins result from the importance of insulin as an anabolic hormone. Low levels of insulin to achieve adequate response and/or insulin resistance of target tissues, mainly skeletal muscles, adipose tissue, and to a lesser extent, liver, at the level of insulin receptors, signal transduction system, and/or effector enzymes or genes are responsible for these metabolic abnormalities. The severity of symptoms is due to the type and duration of diabetes. Some of the diabetes patients are asymptomatic especially those with type 2 diabetes during the early years of the disease, others with marked hyperglycemia and especially in children with absolute insulin deficiency may suffer from polyuria, polydipsia, polyphagia, weight loss, and blurred vision. Uncontrolled diabetes may lead to stupor, coma and if not treated death, due to ketoacidosis or rare from nonketotic hyperosmolar syndrome 18

There are two types of Diabetes :

### Type 1 Diabetes

Type 1 diabetes, which used to be called juvenile diabetes, Develops most often in young people; however, type 1 Diabetes can also develop in adults. In type 1 diabetes, your Body no longer makes insulin or enough insulin because The body's immune system, which normally protects you From infection by getting rid of bacteria, viruses, and other Harmful substances, has attacked and destroyed the cells That make insulin.

Treatment for type 1 diabetes includes

- taking shots, also called injections, of insulin.
- sometimes taking medicines by mouth.
- making healthy food choices.
- being physically active.
- controlling your blood pressure levels. Blood pressure is the force of blood flow inside your blood vessels.

Type 2 Diabetes

Type 2 diabetes, which used to be called adult-onset Diabetes, can affect people at any age, even children. However, type 2 diabetes develops most often in middle-aged and older people. People who are overweight and inactive are also more likely to develop type 2 diabetes.

Type 2 diabetes usually begins with insulin resistance—a condition that occurs when fat, muscle, and liver cells do not use insulin to carry glucose into the body's cells to use for energy. As a result, the body needs more insulin to help glucose enter cells. At first, the pancreas keeps up with the added demand by making more insulin. Over time, the pancreas doesn't make enough insulin when blood sugar levels increase, such as after meals. If your pancreas can no longer make enough insulin, you will need to treat your type 2 diabetes.

Treatment for type 2 diabetes includes

- using diabetes medicines
- making healthy food choices
- being physically active
- controlling your blood pressure levels
- controlling your cholesterol levels (3)

## Diet for type 1 diabetes

### 1 Choose healthful protein foods

Including protein in every meal can help balance blood sugar. People should choose healthful protein foods and vary their choices. Examples of these foods include:

Lean meat and poultry

Fish

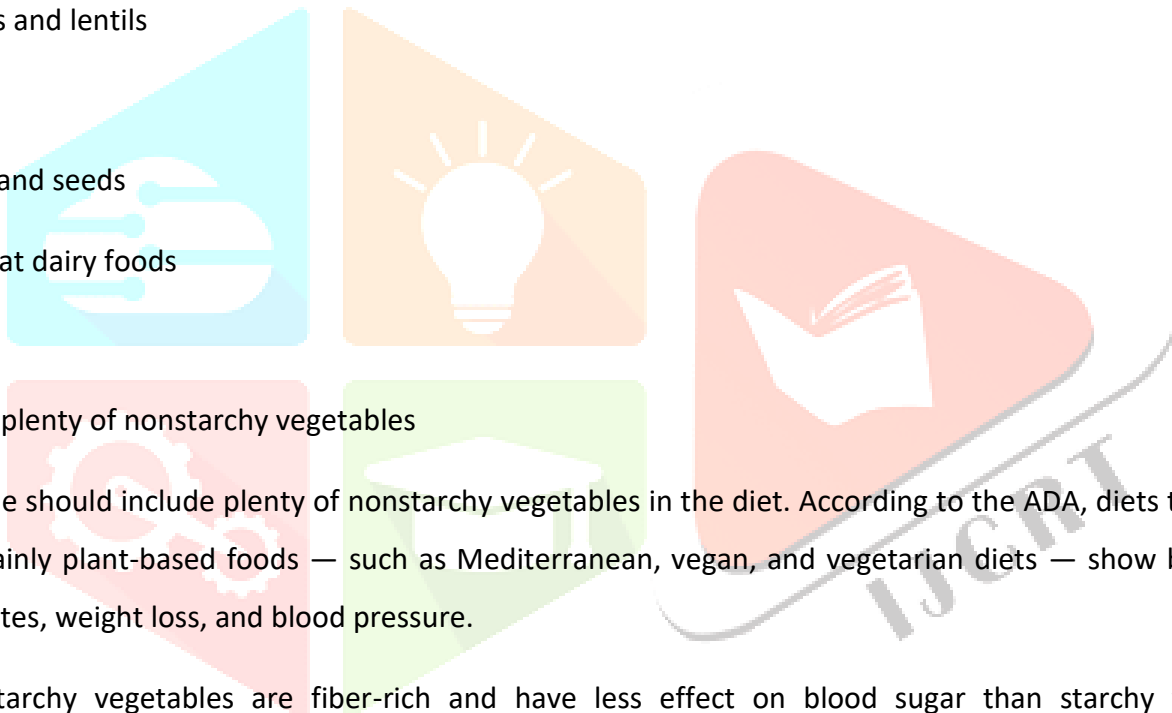
Eggs

Beans and lentils

Tofu

Nuts and seeds

Low fat dairy foods



### 2 Eat plenty of nonstarchy vegetables

People should include plenty of nonstarchy vegetables in the diet. According to the ADA, diets that consist of mainly plant-based foods — such as Mediterranean, vegan, and vegetarian diets — show benefits for diabetes, weight loss, and blood pressure.

Nonstarchy vegetables are fiber-rich and have less effect on blood sugar than starchy vegetables. Nonstarchy vegetables include:

Greens, such as lettuce, kale, cabbage, pak choi, spinach, rocket, and watercress

Bell peppers

Zucchini and eggplant

Green beans

Mushrooms

Broccoli and cauliflower

### 3 Include nuts, seeds, beans, and legumes

Nuts, seeds, beans, and legumes are good sources of fiber, which can slow down the release of sugar into the blood. They are also a source of protein. Examples of these foods include:

Nuts: walnuts, Brazil nuts, almonds, and hazelnuts

Seeds: chia, hemp, pumpkin, and sunflower seeds

Beans and legumes: black beans, kidney beans, pintos, lentils, and garbanzo beans

## Diet Type 2 diabetes

### Carbohydrates:

Although there is no consensus on the percentage of carbohydrates that people with diabetes should eat, it has been shown that the amount and the type of carbohydrates are the main determinants for glycaemic control. Counting carbohydrates has proven to be very important in all patients. It allows a better adjustment of the postprandial blood glucose for those who take insulin. 12

### Fiber:

Dietary fiber intake, especially the fiber that provide the natural resources, has shown that improve the control of cardiovascular risk factors, and improved the glycaemic control, turning into a lower risk of cardiovascular mortality in people with diabetes 13

### Sucrose and fructose:

Contrary to what one might think sucrose intakes of 10%-35% of total energy do not have a negative effect on glycaemic or lipid responses when sucrose is substituted for isocaloric amounts of fructos . Consume free fructose (naturally occurring from foods such as fruit) did not get worsen the glycaemic control more than other forms of sugar, although it should avoid further intake of 12% of daily calories 14

### Non caloric sweeteners:

Opposite of natural simple sugars there are sweeteners with lower calorific value. Most are artificial. They do not have caloric contribution, except aspartame (containing 4 kcal/g), and do not increase blood glucose. These sweeteners can be used by diabetic patients. If they are employed to replace glucose, bring the benefit of reducing the kilocalories in the diet 15

### Proteins:

It is interesting to make a differentiation between diabetic patients with and without kidney disease. In people without kidney disease, protein intake usually recommended is between 15%-20%; however, reviewing scientific studies no firm conclusion could be reached with respect to this issue. In the literature we can find different randomized clinical trials faced on this issue results. On the one hand there are studies that demonstrate that if 28%-40% of the energy of the diet is taken as proteins there is an improvement of the HbA1c, triglycerides, total cholesterol and/or LDL cholesterol 16

### Fat

Epidemiological studies have related fats with the risk of developing obesity and cardiovascular risk[38]. As in the rest of immediate principles there is no optimal fat proportion and, as a general rule, the recommendations for the general population (between 20%-35%) are applied for diabetic patient, paying special attention if the patient is overweight, then the percentage should be at the lower limits. Despite these recommendations, diabetic patients often take more fat than the recommended 17

### Herbs for type 1 Diabetes

- 1) Cinnamon



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Synonyms – amber,bay,beige.,bister,brick.

family.- Lauraceae family.

Biological source -) is an evergreen tropical tree, belonging to the Lauraceae family, and its dried inner bark is used as a spice or medicine.

Chemical Constituents -Cinnamon consists of a variety of resinous compounds, including cinnamaldehyde, cinnamate, cinnamic acid, and numerous essential oils

Mechanism of action

Cinnamon may help support blood sugar management by increasing insulin sensitivity, decreasing blood sugar levels after eating, and reducing the risk of diabetes-related complications.(8)

Herbs type 2 diabetes

## 1.Broccoli



Synonyms :- cabbage, kale, collards, coleslaw.

Family :- Brassicaceae.

Biological source :- Broccoli (*Brassica oleracea* var. *italica*) is an edible green plant in the cabbage family (family Brassicaceae).

Chemical constituents :- fiber, calcium, folic acid, magnesium, vitamin c, vitamin k.

Mechanism of action :- broccoli sprouts are concentrated sources of glucosinolate like glucoraphanin and they have been shown to help and promote insulin sensitivity and reduce blood sugar level in people with type 2 diabetes when supplement as a powder or extract.(4)

## 2) Onion



Synonyms :- bulb onion or common onion piazza, basal.

Family :- amaryllidaceous.

Biological source :- An onion (*Allium cepa* L., from Latin *cepa* meaning “onion”), also known as the bulb onion or common onion, is a vegetable that is the most widely cultivated species of the genus *Allium*.

Chemical constituents :- sculpture carbohydrates, proteins, amino acids, polyphenol, quercetin, kaemferol, vitamin B, vitamin C , saponin, B-amyrin, sterols, phenolic acid and minerals.

Mechanism of action :- onion induced reduction of blood glucose level because of quercetin flavonoid.(5)



### 3) Garlic



Synonyms :- lasun, allium sativum.

Family :- amaryllidaceae.

Biological source :- Garlic is the ripe bulb of *Allium sativum* Linn., belonging to family Liliaceae.

Chemical constituents :- allicin , allin, sulfide, diallyl sulfide, diallyl sulfide, ajoene.

Mechanism of action :- garlic was mainly increased insulin secretion as well as releas from pancreatic beta cell. (6)

## 4) Kale



Synonyms:- cabbage, cole, collard.

Family:- brassicaceae

Biological source :- kale edible plant derived from the cabbage of the mustard family (Brassicaceae).

Chemical constituents:- flavonoids, phytochemicals, lutein, zeaxanthin, quercetin, vitamin c, B- carotene

Mechanism of action:- flavonoid antioxidant found in kale including quercetin and kaemeferol have potent blood sugar lowering and insulin sensitizing effect. (9)

## 5) Turmeric



Synonyms :- haladi, curcuma, indian saffron.

Family:- zingiberaceae

Biological source :- Turmeric is the dried rhizome of *Curcuma longa* Linn. (syn. *C. domestica* Valetton), belonging to family Zingiberaceae.

Chemical constituents:- Curcumin, volatile oil.

Mechanism of action:- Mechanism of action:- turmeric contains curcumin which helps improve the function of beta cells which research shows help produce the hormone insulin (7)

## Both Type ½ diabetes

### 1) Spinach



Synonyms :- spinach plat , green, bice, blue green, Kelly.

Family :- amaranthaceae.(10)

Biological source :- Spinach (*Spinacia oleracea*) is a leafy green flowering plant native to central and western Asia. It is of the order Caryophyllales, family Amaranthaceae.

Chemical constituents :- calcium, vitamin A, vitamin c, fiber, iron, folic acid.

Mechanism of action :- spinach contain reach source of fiber which does not increase blood sugar level (.11)

## 2) Okra



Synonyms :- ladies finger

Family :- Malvaceae

Biological source :- Lady's-Finger, is an edible plant belonging to the Hibiscus family.

Chemical constituents:- phenolic compound, carotenoid, folic acid, thiamin, riboflavin, niacin, vitamin C, oxalic acid, amino acid, fiber antioxidant.

Mechanism of action :- it stimulates glycogen synthesis in liver and delays intestinal absorption of glucose. Okra products decrease blood glucose and lipid profile through soluble fibers

## Conclusion

Plants are natural antioxidants and effective herbal medicines, in part due to their anti-diabetic compounds, such as flavonoids, tannins, phenolics, and alkaloids that improve the performance of pancreatic tissue by increasing insulin secretion or decreasing the intestinal absorption of glucose. More researches are needed in order to separate the active components of plants and molecular interactions of their compounds for analysis of their curative properties.

This study assessed patients' and herbalists' perspectives and practices regarding the use of medicinal plants and traditional medicines in the management of diabetes. The majority of participants used medicinal plants and traditional medicines in the management of their diabetes, either alone or in combination with conventional medicines.

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