Review Article

# A Review on Anti-diabetic Activity of Medicinal Spices

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**ABSTRACT**

Diabetes mellitus is a common metabolic disorder in which the human body does not produce insulin hormone, this leads to the increase in blood glucose levels. Diabetes infects more than 387 million individuals globally, posing a significant threat to both personal well-being and global economies. Normally, medicinal plants are highly used for the treatment of diabetes mellitus but some spices also have the efficiency to treat diabetes. Still, spices which we are using as ingredients plays important role in foods also have the ability to treat diabetes. This article describes the anti-diabetic activity of those medicinal spices.

**Keywords:** Diabetes Mellitus, Medicinal spices, Anti-diabetic activity, Invitro study, *In vivo* study.

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## INTRODUCTION

Diabetes Mellitus (DM) is a most common metabolic disorder which affects human throughout the world by raising their blood sugar level. It is mostly characterized by hyperglycemia, in which the human body does not produce insulin, a hormone that transforms the food particles into energy. DM is categorized into three major types: Type-1, Type-2 & Gestational. Type 1 diabetes mellitus is a most common type of DM, an auto-immune disorder, occurs when your body attacks its pancreatic cells with Ab's. Type 2 diabetes mellitus is correlated with obesity, which happens when the pancreas fails to function normally. Gestational diabetes is a class of diabetes only happens in pregnant persons.[1]

Type 1 diabetes is well known as Insulin-dependent diabetes. It is distinguished by deficiency of insulin which is required for daily administration. It occurs due to the cellular mediated autoimmune demolition of β-cells of the pancreas. Type 2 diabetes is also well known as non-insulin-dependent diabetes, caused by the unproductive use of insulin hormone by the body. Another type of DM is called Gestational Diabetes which is arising out of glucose tolerance, during pregnancy. It is a short-term condition but it carries the long time risk of DM.

Normally, Medicinal plants are widely used for the approach of diabetes. Still, spices which we are using as ingredients plays important role in foods also have the ability to treat diabetes. There are numerous spices including cinnamon, cumin, garlic, curry leaves, ginger, turmeric, onion, coriander etc.,

From the detailed survey and the knowledge of spices, we can up to discover new drugs that are therapeutically effective and has many advantages because they are easily available and used daily in foods.

## REVIEW

This paperwork was done by going through different articles from different journals from science direct, google scholar and Pubmed etc., This review article shows detailed information about the spices which have anti-diabetic property.

### *Coriander sativum*

Common name: Dhania
Family: Umbelliferae

**Figure 1:** Coriander seeds

It is a small-sized tree growing all over India, Italy, China, and Bangladesh. 40 mg/kg concentration of aqueous extract of coriander seeds shown dormant anti-hyperglycemic activity in streptozotocin-diabetic rats by reduced their blood sugar level and cholesterol[2]. Coriander leaves extract expressed stronger activity in *in-vitro* anti-diabetic studies, by inhibiting the alpha-glucosidase activity. In *in vivo* studies, ethanolic extract of leaves was orally administrated to alloxan-induced mice. 200mg/kg of the extract showed a significant effect on hyperglycemic mice. Thus, ethanolic extracts of leaves have the efficiency to decrease the blood sugar level, enhance the pancreatic β-cell regeneration, and inhibit alpha-glucosidase enzyme activity[3].

***Cinnamomum verum***

Common name: Cinnamon also called as True cinnamon

Family: Lauraceae

**Figure 2:** Cinnamon bark

It is also known as *Cinnamomum zeylanicum* and is widely distributed in India, Sri Lanka, and South Asia regions. *Invitro* studies of cinnamon carried out on α-amylase and α-glucosidase inhibitory assays using bark extracts which shown great effectiveness for diabetes by inhibited both alpha-amylase and alpha-glucosidase activity[4]. 200 mg/kg of *Cinnamomum verum* bark extracts exhibits dormant activity on alloxan-induced rats with the decrement in blood glucose level and total cholesterol, LDL, TG, and Improved the bodyweight gain[5]. So, *Cinnamomum verum* has well effective in diabetes mellitus treatment.

***Cuminum cyminum***

Common name: Cumin
Family: Apiaceae

**Figure 3:** Cumin seeds

It is widely found in the Middle East region and India. Anti-hyperglycemic activity of ethanolic extracts of cumin seeds shown great potential in normoglycemic rats and also in models of type-2 diabetes mellitus such as STZ-induced diabetic rats. They perform oral glucose tolerance test, glucose uptake assay, alpha-glucosidase assay, and aldose reductase activity etc., for confirmation. This result suggested that cumin seeds may helpful for the enhancement of lipid profile which is the main risk factor for cardiovascular disease and heart attack during diabetes[6].

***Syzygium aromaticum***

Common name: Clove also called as Lavang

Family: Myrtaceae

**Figure 4:** Cloves

It is highly originated from Maluku islands in Indonesia, also found in tropical areas of Africa, Asia throughout oceanic regions. *In-vitro* studies of essential oils of *Syzygium aromaticum* was carried out and 100 µg/ml concentration shown more inhibition activity on alpha-amylase enzyme. So, the essential oils from cloves have the ability to treat diabetes by inhibiting the enzyme activity[7].

***Murraya koenigii***

Common name: Curry leaves
Family: Rubataceae

**Figure 5:** Curry leaves

It is widely distributed in India, Sri Lanka, Pakistan, China and is mainly cultivated from East Asia and Australia. Anti-hyperglycemic activity of aqueous extract of curry leaves indicates a significant effect on STZ-induced rats. 200 mg/kg of aqueous extracts of leaves enhance tissue damage and body weight gain in STZ-induced rats[8]. Combination of curry leaves and *Vitis venifera* seeds extracts down elevated activity if alkaline phosphatase enzyme and decreases the cholesterol level in alloxan-induced diabetic rats[9].

***Zingiber offficinale***

Common name: Ginger
Family: Zingiberaceae

**Figure 6:** Ginger

It is generally found in China, India, Maluka islands, and West Africa. The anti-hyperglycemic activity was carried out using aqueous extracts of *Zingiber officinale* rhizomes on Sprague Dawley eats which is induced by Streptozotocin. 60 mg/kg concentration of aqueous extract shown great potential and exhibits hyperglycemia with weight loss. This extract also possesses hypoglycemic properties[10]. An anti-hyperglycemic study of *Zingiber officinale* was performed on alloxan-induced rats and insulin-resistant rats. This study revealed ginger reduced blood sugar levels and enhance insulin sensitivity in both diabetic rats[11].

***Allium sativum***

Common name: Garlic
Family: Alliaceae

**Figure 7:** Garlic

It is a common worldwide seasoning, distributed in Central Asia mainly in India, Sri Lanka, and Northeastern Iran. Aqueous extracts of *Allium sativum* bulb shown dormant *invitro* anti-diabetic potential with increased alpha-amylase inhibitory activity. This inhibition helps to drop the release of glucose in blood[12]. The anti-hyperglycemic activity was done by using bulb extract of *Allium sativum.* Depletion of blood sugar level and lipid profile were observed. Thus, the bulb of *Allium sativum* has great efficiency for the treatment of diabetes melllitus[13].

***Allium cepa***

Common name: Onion
Family: Amarylidaceae

**Figure 8:** Onion

It is cultivated globally and mainly in India, China, Netherland, and Central Asia. Hypoglycemic activity of *Allium cepa* was performed on alloxan-induced diabetic rats by using aqueous extracts. It lowered the levels of blood glucose, serum cholesterol and serum lipids. So, it has the protective mechanism against Diabetes mellitus[14]. Hypoglycemic properties of *Allium cepa* was compared by using raw, and boiled bulbs. Raw bulbs showed notable hypoglycemic activity in alloxan-induced diabetic rats where boiled bulbs reduced its hypoglycemic potential in rats. Thus, heat reduces the ability of onion towards diabetes mellitus[15].

***Curcuma longa***

Common name: Turmeric
Family: Zingiberaceae

**Figure 9:** Turmeric

It is mainly cultivated in Southeast Asian countries such as India, Sri Lanka, and China. Anti-diabetic activity of *Curcuma longa* rhizome was studied in normal and alloxan-induced diabetic rats. 200 mg/kg concentration shown a notable decreased in levels of blood glucose, cholesterol, LDL. and increased the levels of HDL, total protein, body weight pain in diabetic rats, In normal rats, it results in a reciprocal manner. Thus, aqueous extract of *Curcuma longa* has effectiveness for the treatment of diabetes mellitus[16]. Methanolic extracts of *Curcuma longa* roots have high efficiency than aqueous extract on alloxan-induced diabetic rats for hypoglycemic activity[17].

***Foeniculum vulgare***

Common name: Fennel
Family: Apiaceae/Umbelliferae

**Figure 10:** Fennel seeds

Fennel is cultivated throughout India, Russia, Japan, Germany, Italy, and the USA. The essential oils from fennel seeds shown important hypoglycemic results in Streptozotocin-induced diabetic rats. Ingestion of fennel oil helps to regenerate the damaged tissues during diabetes mellitus and it corrected hyperglycemia[18]. *Invitro* hyperglycemic activity was carried out on *Foeniculum vulgare* seeds using three solvents namely, ethyl acetate, n-butanol, and benzene. In this study, ethyl acetate and benzene extracts of seeds have a high repressive effect on α-amylase and α-glucosidase enzyme activity than n-butanol seed extract[19].

## DISCUSSION

Spices do not only enrich the taste, flavor, and color of foods, also have distinctive medicinal properties as medicinal plants. Spices are used as a worldwide ingredient in foods that have significant capability towards diabetes. This review article elucidates some spices having anti-diabetic properties and the part of plants like leaf, root, seed, and specific extract such as ethanol, aqueous which have more efficiency also reported.

## CONCLUSION

In India, various spices have anti-diabetic potential and are used traditionally for the approach and management of diabetes mellitus. Ongoing research on the anti-diabetic activity of spices helps for the discovery of new potent drugs which are used for the treatment and management of diabetes. For this, appropriate information about the spices is needed. This article provides genuine information about the spices which possess anti-diabetic properties.

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