

## Use of *Clerodendrum viscosum* for Diabetes Treatment: A Short Review

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### Abstract

Diabetes is a disorder characterized by high blood glucose (also called high blood sugar) levels and which progressively can cause serious damages to other organs of the body like the eyes (diabetic retinopathy), brain (diabetic neuropathy), kidneys (diabetic nephropathy), and cardiovascular disorders. There are no known medications for cure of diabetes; allopathic drugs can provide symptomatic treatment, but in turn causes side-effects. As a result, there is a continuous search to discover new and better drugs for diabetes treatment. Plant kingdom, being the most readily available and affordable sources of novel compounds is frequently the target of both modern scientists and traditional practitioners for discovery of new anti-diabetic medications. In this review we examine the significance of *Clerodendrum viscosum* as an anti-diabetic plant and conclude that the plant merits further scientific research towards discovery of lead compounds and anti-diabetic drugs.

**Keywords:** *Diabetes Mellitus; Clerodendrum viscosum; Phytochemicals; Ethnopharmacology*

### Abbreviations

DM: Diabetes Mellitus; DM1 = Diabetes Mellitus 1; DM1A = Autoimmune DM1; DM1B = Idiopathic DM1; ROS = Reactive Oxygen Species; WHO = World Health Organization

### Introduction

Diabetes is a disorder characterized by high blood glucose (also called high blood sugar and hyperglycemia) levels and which progressively can cause serious damages to other organs of the body like diabetic retinopathy, diabetic neuropathy, diabetic nephropathy, increased production of reactive oxygen species (ROS) and cardiovascular disorders. Other symptoms of diabetes include increased thirst, frequent urination with sweet smell and taste of urine, fatigue and irritability. There are two major types of diabetes, Type 1 and Type 2. Type 1, formerly called juvenile or insulin-dependent diabetes is divided into two types DM1A or autoimmune DM1 (where pancreatic  $\beta$ -cells are selectively destroyed by activated lymphocytic T cells) and DM1B or idiopathic DM1 (occurs in patients with initial insulinopenia. Type 2 diabetes is what previously used to be called non-insulin dependent diabetes [1-3].

According to the World Health Organization (WHO), there were 171 million people in the world with diabetes in the year 2000 and the figure was estimated to rise to 366 million by year 2030. Treatment of diabetes is costly; according to WHO, the national costs for treatment of diabetes in USA alone in year 2002 was US\$ 132 billion [4]. On top of it, in many developing countries, the remote area and rural

people have little or no access to modern doctors and diagnostic centers. As a result, not only medications like insulin are not available but also regular checks of blood sugar cannot be done even if the people can afford it. Moreover, as rural and poorer people in developing countries are illiterate on the most part (particularly the elderly who are more prone to having diabetes) there can be over-dosage of diabetes medications leading to hypoglycemia, diabetic coma and fatality.

Medicinal plants have been used against diabetes from possibly pre-historic times and still form a valuable tool for diabetes treatment in many traditional medicinal systems and in many countries [5]. Ethnobotanical information suggests that there are at least 800 plants used against diabetes throughout the world [6]. The advantages of using plants are their affordability and availability for most of them. And there always remains the possibility of discovery of new drugs from a plant that may totally cure diabetes. *Clerodendrum viscosum* Vent. (synonym *Clerodendrum infortunatum* L.) is a perennial shrub belonging to the Lamiaceae (also classified under Verbenaceae) family. The plant is used in Bangladesh in tribal and traditional medicine to treat diabetes [7]. This review will attempt to briefly discuss the ethnobotanical uses of the plant for diabetes treatment, pharmacological activity of plant extract demonstrating anti-diabetic activity, and reported phytochemicals from the plant with anti-diabetic activities.

### Ethnobotanical uses as anti-diabetic

The Marakh sect of the Garo tribe living in Mymensingh district, Bangladesh uses the plant for treatment of diabetes. Leaves of *Catharanthus roseus* and *Clerodendrum viscosum* are crushed in water. One teaspoonful of the water is taken daily before meals [7]. The Magar community of Palpa district, Nepal uses leaves of the plant to control blood sugar [8]. Leaves of the plant are combined with aerial parts of *Swertia chirayita*, leaves of *Azadirachta indica* and leaves of *Cassia fistula* and orally taken for diabetes by people in Nilphamari district, Bangladesh [9]. Tender leaves of the plant are cooked and eaten for 1 - 2 months as treatment for diabetes by the people of Manipur in North East India [10].

### Pharmacological activity studies

Aqueous extract of the aerial parts of the plant, when administered orally to streptozotocin-induced diabetic Wistar albino rats at 200 and 400 mg extract per kg body weight not only significantly reduced hyperglycemia but also ameliorated many diabetes-induced conditions [11]. Methanol extract of leaves of the plant dose-dependently and significantly reduced and normalized blood glucose levels in streptozotocin-induced diabetic rats, and further normalized serum parameters like glutamate pyruvate transaminase, glutamate oxaloacetate transaminase, and alkaline phosphatase [12]. Petroleum ether and methanol extracts of leaves of the plant reportedly lowered blood glucose levels in oral glucose tolerance tests in streptozotocin-induced diabetic rats [13].

### Phytochemicals

Relevant phytochemicals found in the plant include  $\beta$ -sitosterol and quercetin [14]. Both compounds have been shown to have beneficial effects against diabetes and so can possibly be among the responsible phytochemicals behind the plant's anti-diabetic effect [15,16].

### Conclusion

*Clerodendrum viscosum* is a common plant, which grows profusely by the roadsides and fallow lands of Bangladesh. Ethnobotanical and pharmacological studies along with reported phytochemicals of the plant indicate that the plant can be an affordable source of diabetes treatment.

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