



SCREENING & EVALUATION OF ANTI-DIABETIC SPECTRUM OF WITHANIA COAGULANS

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ABSTRACT

Diabetes mellitus is a metabolic disorder. This review article is planned to The anti-diabetic effect of Withania Coagulans have been successfully used in Ayurvedic and other traditional formulations and found to be efficient and inexpensive as compared to synthetic drugs. It also aims to test and verify the W. coagulans fruits, showed significant inhibition on postprandial rise in hyperglycemia post-sucrose load in normoglycemic rats as well as streptozotocin-induced diabetic rats. which is comparable to the standard antidiabetic drug Glibenclamide for medical care, The present study defines the systematic evaluation and the role of minerals in glycemic potential of aqueous extract of Withania coagulans fruits in order to develop an effective and safe alternative treatment for diabetes mellitus.

These studies conducted to determine the antidiabetic effect of Withania coagulans and pancreatic histological features in streptozotocin induced diabetic rat.

Results: The study is based on results of lowering in blood glucose levels of normal, sub, mild diabetic rats assessed during fasting blood glucose, glucose tolerance test studies.

The dose of 1000mg/kg was identified as the most effective dose, which reduce the blood glucose level maximum by 35.2% at 5 hours in normal rats during blood glucose studies.

Glucose tolerance test studies is normal, sub and mild diabetic rats showed the maximum reduction of 16.7, 29.8 and 38.5% at 4hour respectively.

Long term study incase of severely diabetic rats showed reduction fasting glucose level respectively after 30 days of treatment.

The present study confirming antidiabetic effect of aqueous extract of Withania Coagulans, helps in identifying the role of trace minerals like Mg and Ca responsible for antidiabetic potential of this potent indigenous shrub.

Conclusion: The present research has presented comprehensive details of antidiabetic plants used in the treatment of diabetes mellitus. Most of these plant derived medicines.

Keywords: Anti-Diabetic effect, Screening & Evaluation, Streptozocin, Glibenclamide, Diabetic rats.

Introduction

Diabetes mellitus is a metabolic disorder characterized by a predisposition to developing significantly raised blood glucose, caused by the inability of the pancreas to produce insulin or to use the insulin produced in the proper way. Diabetes mellitus has been noted in almost all cultures, Diabetes is a major public health problem.

In normal individuals, glucose concentrations are tightly regulated by a number of hormonal factors. The disordered regulation of glucose metabolism that results in diabetes is usually due to a deficiency of insulin release from the pancreas and a reduced response to insulin.

Etiology

Type 2 diabetes mellitus (T2DM) is by far the more common type of diabetes and is characterized by

insulin resistance resulting from defects in the action of insulin on its target tissues (muscle, liver, and fat), but complicated by varying and usually progressive failure of beta cells' insulin secretory capacity. Most patients with T2DM in the US and Europe are obese, however in India and China, most T2DM patients have a lean body mass index (BMI), albeit with increased visceral and hepatic fat.

Common Causes of Anti-diabetic

1. sedentary lifestyle
2. obesity (weighing 21 percent above a healthy body weight)
3. family history of diabetes
4. improper functioning of the pancreas
5. minority race (higher risk in Black, Hispanic and native Hawaiian populations)
6. medication (cortisone and some high blood pressure drugs)

7. Women having given birth to a baby weighing more than 9 lbs.
8. Previously diagnosed gestational diabetes.

Objective

The use of *Withania coagulans*, a member of the solanaceae family, has been highlighted in Ayurveda. We have reviewed the chemical constituents and pharmacological properties of *W. coagulans*, as well as its morphology.

This has included therapeutic effects of the whole plant and its extracts, fractions and isolated withanolides. The Antidiabetic, hepatoprotective, anti-inflammatory, antihyperglycaemic, hypolipidaemic, free radical scavenging, antimicrobial, cardiovascular, central nervous system depressant, immunomodulating, antitumour and cytotoxic activities of *W. coagulans* have been described.

Material and Method

- Collection, authentication, storage and size reduction of plant material.
- Standardization of plant material according WHO.
- Extraction of dried fruit of *withania coagulans*.
- Phytochemical investigation of extract by chemical test.
- TLC analysis of extract.
- Study of anti-diabetic effect of *withania coagulans* of various dose of different model.
- Study of anti-diabetic activity of various doses of *withania coagulans* by in vivo model.
- *W. coagulans* Dunal, is commonly known as 'Indian cheese maker' or 'vegetable rennet' because fruits and leaves of this plant are used as a coagulant.
- The milk coagulating property of the fruits is attributed to the pulp and husk berries which contain an enzyme called Withanin, having milk-coagulating activity.
- One ounce of the fruits of *W. coagulans* when mixed with 1 quart of boiling water makes a decoction, one table spoonful of which is capable to coagulate a gallon of milk in just an hour. In Pakistan, the berries of *W. coagulans* are commonly used to clot milk which is called, 'paneer'. The milk of buffalo or sheep is boiled to 100oF and treated with crushed berries of the plant, tied in a cloth. This causes the milk to curdle within 30-40 minutes.
- Treatment with coagulanolide4 along with four known withanolides 1-3 and 5 isolated from *W. coagulans* fruits, showed significant inhibition on

postprandial rise in hyperglycemia post-sucrose load in normoglycemic rats as well as streptozotocin-induced diabetic rats.

- The compound 5 also caused significant fall in fasting blood glucose profile and improved the glucose tolerance of db/db mice. Further, compound 5 showed antidyslipidemic activity in db/db mice.
- The median effective dose of the compound 5 was determined to be around 25 mg/kg body weight in streptozotocin-induced diabetic rats, which is comparable to the standard antidiabetic drug metformin.

This explains the traditional use of *W. coagulans* as antihyperglycemic cum antidyslipidemic agent by the traditional medical practitioners

Treatment Data

- The dose of 1000mg/ kg was identified as the most effective dose, which reduces the Fasting Blood Glucose level maximum by 33.2% at 4h in normal rats during fasting blood glucose studies.
- Glucose tolerance test studies of normal, sub and mild diabetic rats showed the maximum reduction of 15.7, 28.9 and 37.8% at 3h respectively. Long-term study in case of severely diabetic rats showed reduction of 52.9 and 54.1% in Fasting Blood Glucose and Post Prandial Glucose levels respectively after 30 days of treatment.
- The present study, besides confirming hypoglycemic and antidiabetic activities of aqueous extract of *W. coagulans*, helps in identifying the role of trace minerals like Mg & Ca responsible for antidiabetic potential of this potent indigenous shrub.

These study are based on results of lowering in blood glucose levels of normal, sub, mild diabetic rats assessed during fasting blood glucose, glucose tolerance test studies.

The dose of 200mg/kg was identified as the most effective dose, which reduce the blood glucose level maximum by 35.2% at 5 hours in normal rats during blood glucose studies.

Glucose tolerance test studies is normal, sub and mild diabetic rats showed the maximum reduction of 16.7, 29.8 and 38.5% at 4hour respectively.

Long term study in case of severely diabetic rats showed reduction fasting glucose level respectively after 30 days of treatment.

The present study confirming antidiabetic effect of aqueous extract of *Withania Coagulans*, helps in identifying the role of trace minerals like Mg and Ca

responsible for antidiabetic potential of this potent indigenous shrub.

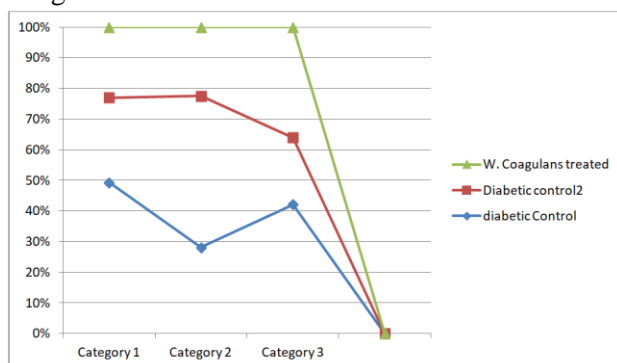


Figure 1: Effect of *Withania Coagulans* on blood glucose level diabetic treated rats showed significant decrease in blood glucose levels compared to diabetic controls.

Discussion

Diabetes Mellitus leads to many chronic/potential complications such as blindness, heart disease, nerve damage and renal failure, etc.

The study revealed that 108 plant species belonging to 56 families were generally used for treatment of diabetes. The majority of the experiments confirmed the benefits of medicinal plants with hypoglycemic effects in the management of diabetes mellitus. Among the plants used for the diabetes, *Annona squamosa*, *Momordica charantia*, Egyptian *Morus alba*, *Lycium barbarum*, *Allium sativum*, and *Aegle marmelose* seems to be most common plants used to treat diabetes and are available everywhere. The detailed natural plants not only used for the treatment of diabetes, but also treated for other ailments also. The fruits were most commonly used plant parts and other parts (leaf, root, stem, bark, flower, and whole plant) were also useful for curing.

Authors Contribution

Authors who contributed significantly read, and approved the paper are yogesh kumar Sharma, mayank bansal, anil kumar who conceived and designed the experiments.

Conclusion

Antidiabetic plants used in the treatment of diabetes mellitus. These cost effective management of diabetes through dietary interventions, nutrient supplementation, and combination therapies with synthetic drugs in the short term, and as the sole medication from natural sources over the long term. The presences of bioactive chemicals are mainly responsible for this antidiabetic action. However, many other active agents obtained from plants have

not been well characterized. More investigations must be carried out to evaluate the mechanism of action of medicinal plants with antidiabetic effect.

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