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A REVIEW ON *IN VIVO* EVALUATION OF ANTI DIABETIC ACTIVITY OF MEDICINAL PLANTS

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ABSTRACT

Diabetes mellitus is one of the most common non-communicable disease globally. Phytochemical extracts are constantly being evaluated for anti diabetic activity. Medicinal plants are significant source of biological compounds. Anti diabetic activity of medicinal plants like Aegle marmelos, Allium sativum, Bauhinia variegate, Brassica juncea, Echinops echinatus, Gymnema sylvestre, Mimosa pudica, Mangifera indica, Portulaca quadrifida L. Syzgium cumini(Eugenia jambolana) Plants of the constituents and crude extracts. These medicinal plants act on various mechanisms either by acting directly on pancreas and stimulate insulin levels in blood by altering the activities of regulatory enzymes in different pathways like glycolysis, glucogenesis and thus producing effect in tissue like liver, muscle, adipose tissue etc. Herbal formulations are being preferred due to lesser side effects, less toxic, low cost and effectiveness. The effect of these plants may delay the development of diabetic complications and maintain the metabolic levels.

INTRODUCTION

Diabetes is a chronic disease that occurs either when the pancreas doesn't produce enough insulin or when the body cannot effectively use the insulin it produces. Insulin is a hormone that regulates blood glucose. Hyperglycaemia , also called raised blood glucose or raised blood sugar, is a common effect of uncontrolled diabetes and overtime leads to serious damage to many of the body's system, especially the nerves and blood vessel. Between 2000 and 2019, there was a 3% increase in age-standardised mortality rates from diabetes [(1)]. The herbal drugs with anti diabetic activity are formulated as medicines which possess therapeutic potential and treatment aims to reduce insulin resistance and to stimulate insulin secretion, restoration of SGOT and SGPT activities to their respective normal level. The ethobotanical information reports that many indigenous Indian medicinal plant found therapeutically potential and used to successfully manage diabetes. The current medications of diabetes focus on controlling and lowering blood glucose level in the vessel at normal level.

Reasons for Diabetes: Increased stress, obesity and lack of physical activity has been ensnared in the prevalence of diabetes (2). Therefore our review focuses on the In vivo evaluation studies of some medicinal plants like Aegle marmelos, Allium sativum, Bauhinia variegate, Brassica juncea, Echinops echinatus, Gymnema sylvestre, Mimosa pudica, Mangifera indica, Portulaca quadrifida L. Syzgium cumini(Eugenia jambolana), possessing the ant diabetic activity.

DRUG NAME: ***Aegle Marmelos(L.) Correa***

Family name: Rutacea. **Common name:** Bael. **Part used:** Fruit. **Extract:** Aqueous extract, **Standard drug:** Glibenclamide, **Induced drug:** Streptozocin. **Route of administration:** Intraperitoneal. **IN VIVO Evaluation:** Aegle marmelos (L.) Correa aqueous fruit extract has anti diabetic activity which has shown a significant reduction of blood glucose in rats treated with extract. The lowered glutathione content in the heart and pancreas of diabetic rats was found to increase on treatment with extracts. The effect of 250 mg/kg dose was more than that of the reference drug, glibenclamide.

DRUG NAME: Bauhinia variegatel

Family: Fabacea. **Common name:** Kachnar tree. **Extract:** Ethanol extract. **Standard drug:** Glibenclamide, **Induced drug:** Alloxan. **Route of administration:** oral. ***IN VIVO* Evaluation:** Ethanolic extract of bauhinia variegata (at 250 and 500 mg/kg) exhibited a dose dependent significant anti-hyperglycemic activity on 4th, 7th, and 10th day part treatment. The extract dose of 100 mg/kg also caused reduction in blood glucose level but the result was found statistically insignificant. The antihyperglycemic effect of ethanol extract was found less effective than the reference standard. Glibenclamide produced a significant reduction in blood glucose compared to diabetic control. When the activity of extract was done by glucose tolerance test in glucose loaded rats ethanolic extract showed significant effect on the blood glucose level but extract of 100mg/kg did not show the significant result. Ethanolic extract 250mg/kg and 500mg/kg showed the significant decrease in blood glucose level.

DRUG NAME: Allium sativum

Family name: Liliaceous. **Common name:** garlic. **Part used:** Leaf **Extract** Ethanolic extract. **Induced drug:** Alloxan. **Standard drug:** Glibenclamide. **Route of administration:** oral.

IN VIVO Evaluation: administration of garlic ethanolic extract (0.1, 0.25, 0.5 g/kg of body weight) showed anti-diabetic effect in diabetic rats. *In vivo* treatment with aqueous garlic extract (100mg/kg/day; intra-peritoneal, for 8 weeks) inhibited the development of abnormalities in vascular reactivity induced by diabetes in diabetic rats. Daily Oral administration of 1 ml of either onion or garlic juices/100mg body weight for four week showed hypoglycaemic effects in alloxan diabetic rats.

DRUG NAME: Echinops echinatus

Family name: Asteracea. **Common name:** Indian globe thistle. **Part used:** root. **Extract:** Hydroalcoholic extract. **Induced drug:**

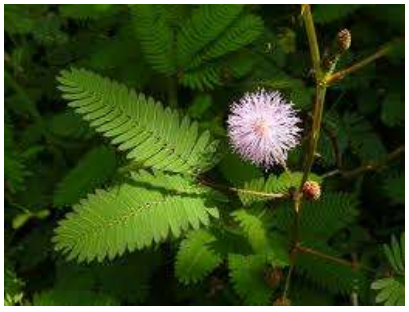
Alloxan. **Standard drug:** Slitagliptin. **Route of administration:** oral.

***IN VIVO* Evaluation:** : Anti diabetic activity effect of hydro-alcoholic root extract on blood glucose level in diabetic rats is shown that, The blood glucose level of diabetic rats treated with standard Sitagliptin 35mg/kg body weight significantly reduced from 163 mg/dL to 140.66 mg/dL and the blood glucose level of diabetic rats is treated with extract 100mg/kg b.w significantly reduced from 182.83mg/dL to 176.83mg/dL and significant reduction of glucose level is seen in with extract 200mg/kg,b.w which it has decreased from 171.66mg/dL to 164.33mg/dL.

DRUG NAME: Gymnema sylvestre:

Family name: Asclepiadaceae. **Common name:** woody climber. **Part used:** Leaves **Extract:** water soluble. **Induced drug:** streptozotocin. **Standard drug:** Insulin. **Route of administration:** Intravenous route.**IN VIVO Evaluation:** Water soluble extract of *Gymnema sylvestre* leaves decreased blood sugar levels by regeneration of the pancreatic islets and beta cells in diabetic rats.

DRUG NAME: Mimosa pudica



Family name: Mimosacea. **Common name:** Humble plant. **Part used:** Leaf

Extract: Ethanol extract. **Induced drug:** streptozotocin. **Standard drug:** Metformin.

***IN VIVO* Evaluation:** The diabetic rats were treated with ethanolic leaf extract of Mimosa pudica with four different doses of 100,200,300 and 400mg/kg/b.wt respectively and were compared with standard drug metformin (200mg/kg/b.wt) for 30 days. Increased level of glucose, glycosylated haemoglobin, lipid profile and reduced level of insulin were observed in diabetic rats. Treatment with Mimosa pudica leaf extract altered the level of glucose, glycosylated haemoglobin, lipid profile and insulin. The extract was found to be effective at the dosage of 300mg/kg/b.wt against high fat diet and streptozotocin induced type 2 diabetes.

DRUG NAME: **Mangifera indica**

Family name: Anacardiaciae**. Common name:** Mango. **Part used:** LStem bark **Extract:**aqueous extract . **Induced drug:** streptozotocin. **Standard drug:** Insulin. **Route of administration:** Intra-peritoneal administration

***IN VIVO* Evaluation:** Chronic intra-peritoneal administration of mangiferin (10 and 20mg/kg) once daily for 28 days showed ant diabetic activity in diabetic rats.

DRUG NAME: Portulaca quadrifida L

Portulaca quadrifida L.: Family name: Portulacacea. **Common name:** Chicken Weed. **Part used:** whole plant. **Extract:** Ethanol extract. **Induced drug:** streptozotocin.

Standard drug: Glibenclamide. **Route of administration:** oral.
IN VIVO Evaluation: Portulaca quadrifida L. extract (400mg/kg) was showed effective in reducing the total cholesterol, triglycerides, HDL levels (P<0.05) in streptozotocin induced diabetic rats and its hypolipidemic effect could represent a protective mechanism against the development of atherosclerosis which is usually associated with diabetes. It also revealed the glucose lowering effect& improved activity of carbohydrate metabolizing enzymes. Thus it was concluded that the ethanolic extract of Portulaca quadrifida L. has anti-diabetic activity.

DRUG NAME: Syzygium cumini (Eugenia jambolana)

Family name: Myrtacea. Common name: Skeels **Part used:** Seed **Extract:** Methanol. **Induced drug:** Alloxan. **Standard drug:** Glibenclamide. **Route of administration:** oral.
IN VIVO Evaluation: Oral administration of 2.5 and 5.0 g/kg body weight of the aqueous extract of *syzigium cumini* seed for 6 weeks showed hypoglycaemic activity and antioxidant property

DRUG NAME: Punica granatum (12)

Family: Punicaceae. **Common Name:** Pomegranate. **Part used:** Flower **Extract:** Ethanol extract. **Induced drug:** Alloxan. **Standard drug:** Tolbutamide. **Route of administration:** oral.
IN VIVO Evaluation: Oral administration of its aqueous-ethanolic (50%, v/v) extract led to significant blood glucose lowering effect in normal, glucose-fed hyperglycaemic and alloxan-induced diabetic rats.

Conclusion

In this review we, discussed the In vivo activity of medicinal plants which have shown potential anti diabetic activity in diabetic rats. The medicinal plants like *Acacia catechu,* like Aegle marmelos, Allium sativum, Bauhinia variegate, Brassica juncea, Echinops echinatus, Gymnema sylvestre, Mimosa pudica, Mangifera indica, Portulaca quadrifida L. Syzgium cumini(Eugenia jambolana), are widely available in rural areas and less expensive. Many medicinal plants are being used to treat diabetes. So, the medicinal plants continue to provide valuable ant diabetic agents, in both modern medicine and in traditional system. Therefore, treating diabetes with plant derived compounds are accessible and doesn't require laborious pharmaceutical synthesis seems highly attractive. In this review the in vivo activity of ant diabetic activity of medicinal plants may be useful for academics, health professional, scientists, and scholars working in the field of pharmacology and therapeutic to develop ant diabetic drugs.

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