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Evaluation of Anti-Diabetic Activity of Leaves of *Passiflora ligularis* on Alloxan Induced Diabetes Mellitus in Albino Rats



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HUMAN

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ABSTRACT

Diabetes mellitus is the most common endocrine disorder that impairs glucose homeostasis resulting in severe diabetic complications including retinopathy, angiopathy, nephropathy and neuropathy causing neurological disorders due to perturbation in utilization of glucose. The aqueous leaf extract of *Passiflora ligularis* was investigated for its anti-diabetic effect in albino rats after induction of diabetes using alloxan. Oral administration of aqueous extract of *P. ligularis* to diabetic rat for 30 days resulted in a decrease in blood glucose. Aqueous extract of *P. ligularis* leaf showed decrease the blood glucose and reduce the oxidative stress by removing free radicals in diabetes.



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INTRODUCTION

Diabetes mellitus is a metabolic disorder in which a combination of hereditary and environmental factors results in abnormally high blood sugar levels. The abnormal high blood sugar is due to defects in either insulin secretion or insulin action in the body (1). It will result in other complications such as retinopathy, nephropathy and neuropathy (2).

According to the International Diabetes Federation, there are 246 million people with diabetes on the globe and this figure will rise to 380 million by the year 2025 (3).

Biguanides and Sulphonylurea serve as oral hypoglycemic agents which are available along with insulin for the treatment of diabetes (4), but side effects associated with their uses are also reported. Herbal remedies have greater advantage because of their effectiveness, minimal side effects in clinical experience and relatively low costs. Hence there is a growing interest in this field (5). *P. ligularis* belongs to the genus *Passiflora*, comprising about 500 species that are distributed in warm temperatures and tropical regions.

P. ligularis is a member of *Passifloraceae* family. It is commonly known as passion fruit and as sweet granadilla. It is perennial evergreen plant, used as ornamental plant, can grow in tropic, subtropical, or Mediterranean climate. It is very aromatic and contains vitamins A, C, K, phosphorus, iron and calcium.

Passion fruit is proved to have analgesic, anti-anxiety, anti-inflammatory, antispasmodic, cough suppressant, CNS depressant, diuretic and sedative activities. Present study was undertaken to find out anti-diabetic potential of aqueous leaf extract of *Passiflora ligularis*.

MATERIALS AND METHODS

Collection of Plant Material

The leaves of *Passiflora ligularis* were collected from Alappuzha district in Kerala in month of January 2016. After washing with water, the leaves were dried for 10 days in

shade. Then they were weighed, kept in airtight container and stored in refrigerator for future use.

Preparation of Extract

About 50 g of shade dried powdered material was added with 100 ml water. The container was shaken for every half an hour for period of 24 hours. The extract was filtered, concentrated and dried. This dried viscous material obtained was used for the analysis.

Animals

Albino rats (150 -180 g) were obtained from the Institutional animal house. The animals were fed with food and water. All the experiments were conducted according to the guidelines of CPCSEA.

Preliminary Phytochemical Tests

The leaf extract of passion fruit was subjected to phytochemical screening and plant extract showed the presence of alkaloids, flavonoids, organic acids, esters, sugars on treatment with appropriate reagents.

Acute Toxicity Study

Acute oral toxicity study of the test extract was carried out according to Organization for Economic Co-operation and Development (OECD 423). The test procedure is to minimize the number of animals required to estimate the oral toxicity. Food was withheld for the study with a dose of 2000 mg/kg of body weight. The animals were weighed and the extract was administered in a single dose as 1 % suspension in CMC by oral intubation. After dosing periodically during the first 24 hours daily after for a total of the 14 days. The LD₅₀ of the compound was estimated to be more than 2000mg/kg so that doses of 100, 200, 400, 1000mg/kg orally were safe for the study.

Induction of Diabetes

Diabetes induction was done by single intraperitoneal injection of alloxan monohydrate (150 mg/kg) in saline. The hyperglycemia was confirmed after 72 hrs by the elevation

of blood glucose and the behavioral changes (excess thirst and frequent urination). The rats with blood glucose level more than 250 mg/dl were used for the study.

Anti-diabetic Study

The animals were divided into control, standard and test group. Control group was untreated group. Standard group was given glibenclamide (1.25mg/kg) and test group was treated with the leaf extract of sample. Reduction in blood glucose level was measured.

Statistical Analysis

All the values of *in vivo* analgesic studies of leaf extract of *Passiflora ligularis* were expressed as mean and standard error of mean and was examined for significance by ANOVA and groups were compared by Dunnet's test for individual comparison of groups with control. P value was measured moderate significant at $P < 0.01$, < 0.001 level.

RESULTS

Phytochemical Screening

The phytochemical tests indicate the presence of alkaloids, flavonoids, esters and sugars

Acute Toxicity Studies

In acute oral toxicity studies, no mortality was recorded in these animals up to 14 days . Thus the extract was found to be non-toxic up to 2000 mg/kg.

Antidiabetic Activity

The blood glucose level was measured. There is significant reduction in blood glucose level in the standard and test treated animals.

DISCUSSION

Passiflora ligularis belongs to the *Passifloraceae* family and is commonly known as passion fruit . The present study was conducted to find out the antidiabetic activity of leaf extract of *Passiflora ligularis* . In acute toxicity testing, no mortality was observed in rats .

| | Before drug administration | After drug administration | Difference |
|----------|----------------------------|---------------------------|------------|
| Control | 150 mg/dl | 152 mg/dl | 2 |
| Standard | 155 mg/dl | 90 mg/dl | 65 |
| Test | 148 mg/dl | 120 mg/dl | 28 |

CONCLUSION

The usefulness of *Passiflora ligularis* in the treatment of diabetes has been scientifically validated by the results of the present study. The leaf extract of passion fruit possesses anti-diabetic activity. The study indicates that the data obtained will be basis for further studies and applications of this plant.

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