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A research article on the study of antidiabetic activity of *Passiflora ligularis* plant extract

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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 were investigated for its anti-diabetic effect in albino rats after induction of diabetes (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 can decrease the blood glucose and reduce the oxidative stress by removing free radicals in diabetes.

Keywords: *Passiflora ligularis*, Antidiabetic, Alloxan mono hydrate

1. Introduction
Diabetes mellitus is a metabolic disorder in which a combination of hereditary and environmental results in abnormally high blood sugar levels. The abnormal high blood sugar is due to effects 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 Sulphonyl urea serves as oral hypoglycemic agents which are available along with insulin for the treatment of diabetes (4), but side effects associated with their uses are 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 a a perennial evergreen plant also used as ornamental plant, can grow in tropic, subtropical, or Mediterranean climate. It is very aromatic and contains vitamins A, C, and K, phosphorus, iron, and calcium.
Passion fruit is proved to have analgrsic, antianxiety, anti inflammatory, antispasmodic, cough suppressant, CNS depressant, diuretic and sedative activities. This study was undertaken to find out antidiabetic potential in aqueous leaf extract of *Passiflora ligularis.*

2. Materials and Methods
2.1 Collection of plant material
The leaves of Passiflora ligularis were collected from alappuzha district in kerala in month of Januvary 2016. After washing with water the leaves were dried for 10 days in shade. Then they are weighed and kept in airtight container and stored in refrigerator for future use.

2.2 Preparation of extract
About 50g of shade dried powdered material was added with 100 ml water. The container was shaked 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.

2.3 Animals
Albino rats (150 -180 g) were taken from the institutional animal house. The animals are fed with food and water. All the experiments were conducted according to the CPCSEA.

2.4 Preliminary chemical tests
The leaf extract of passion fruit was subjected to phytochemical screening and plant extract contain alkaloids, flavanoids, organic acids, esters, sugars using appropriate reagents.

2.5 Acute toxicity study
Acute oral toxicity study for the test was carried out according to Organization for Economic Co-operation and Development OECD 423. The test procedure is to minimize the number of animal required to estimate the oral toxicity. Food was withheld for the study with a dose of 2000mg/kg of body weight. The animals were weighed and the extract was administered in a single dose as 1 % suspension in CMC by oral incubation. After dosing periodically during the first 24 hours daily after for a total of the 14 days. The LD 50 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 dose.

2.6 Induction of diabetes
Diabetes induction was done by single intra peritoneal injection of alloxan monohydrate (150mg/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.

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

2.8 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 Dunnets test for individual comparison of groups with control. P value were measured moderate significant at $P<0.01,<0.001$ level.

3. Results
3.1 Phytochemical screening
The chemical tests indicates the presence of alkaloids, flavanoids, esters, sugars

3.2 Acute toxicity studies
In acute oral toxicity studies no mortality was recorded in these animals upto 14 days. Thus the extract was nontoxic upto 2000mg/kg.

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

4. 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.

Table 1

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

5. 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 has antidiabetic activity. The study indicates that the data obtained will be basis or further studies and applications of this plant.

6. Acknowldgement
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