ANTIDIABETIC ACTIVITY OF *TECOMA STANS* FLOWER

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Summary

In view of alleged anti-diabetic potential, effect of the ethanol and aqueous extracts of *Tecoma stans* flower, on fasting blood sugar levels in alloxan-induced diabetic rats were investigated. All the two extracts of *Tecoma stans* produced a significant antidiabetic activity at dose levels 1/10 of their lethal doses. Concurrent histological studies of the pancreas of these animals showed comparable regeneration by methanolic and aqueous extracts which were earlier, necrosed by alloxan.

Keywords*:* Antidiabetic activity, *Tecoma stans* flower, Alloxan-induced diabetes

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Introduction

Diabetes mellitus (DM) is a chronic disease caused by inherited and/or acquired deficiency in production of insulin by the pancreas or by the ineffectiveness of the insulin produced. Such a deficiency results in increased concentrations of glucose in the blood, which in turn damage many of the body's systems, in particular the blood vessels and nerves. As the number of people with diabetes multiply world wide, the disease takes an ever-increasing proportion of national and international health care budgets. Regions with greatest potential are Asia and Africa, where

DM rates could rise to two to three-folds than the present rates. Apart from currently available therapeutic options, many herbal medicines have been recommended for the treatment of diabetes. Traditional plant medicines are used throughout the world for a range of diabetic presentations. *Tecoma stans* (Bignoniaceae) is found throughout the warmer parts of India and called as pila kaner [1, 2]

In India there are 31.7 million people in 2000 and about 79.4 million people in 2030.In 2005 there are about 20.8 million people with diabetes in the United States alone. According to the American Diabetes Association, there are about 6.2 million people undiagnosed and about 41 million people that would be considered pre-diabetes. About 5%–10% of diabetes cases in North America are type one, with the rest being type two. For at least 20 years, diabetes rates in North America have been increasing substantially. In 2008 there were about 24 million people with diabetes in the United States alone, from those 5.7 million people remain undiagnosed. Other 57 million people are estimated to have pre-diabetes [3, 4].

Materials and methods

Plant material

The *Tecoma stans* plants flowers were collected from Jaipur National University, Jaipur, (Rajasthan) campus, in the month of October 2009. The *Tecoma stans* plants flowers authenticated in Department of Botany, Rajasthan University Jaipur, (Rajasthan) authentication no. is RUBL-20630.

Preparation of extracts

The shade dried coarse powder of the flowers (25gm) was packed well in soxhlet apparatus and was subjected for continuous hot extraction with 99.5% ethanol and distilled water until the completion of the extraction. The extrects were freez dried and kept in a desiccator's. The extract yield 23.5% (Ethanol) and 14.4% (Water) [5, 6]

Animals

Wistar albino rats (150–200 g) or Wistar albino mice of both sexes were obtained from the experimental animal facility of School of pharmaceutical sciences, JNU, Jaipur (Raj.). Before and during the experiment, rats were feed with standard diet. After randomization into various groups and before initiation of experiment, the rats were acclimatized for a period of 7 days under standard environmental conditions. Animals described as fasting were deprived of food and water for 18 h [7, 8].

Sample collection

Blood samples were collected by withdrawn from the tail vein of rats puncture method and blood glucose levels were estimated using an electronic glucometer (one touch ultra, Johnson & Johnson Ltd.).

Experimental design

Experimental models – Wister albino rat weighing 150 – 200gms

Chemicals used – Alloxan monohydrate, Glibenclamide

Standard drug used for treatment glibenclamide 2.5mg/kg, ethanolic and aqueous extract which is prepared 200mg/kg in 2% carboxy methyl cellulose and was given orally.

Groups and treatments:

Group 1: Served as Normal control and received saline 2 ml/kg orally.

Group 2: Served as diabetic control (Alloxan monohydrate, 150mg/kg)

Group 3: Served as Std. control and received Glibenclamide at 2.5mg/kg orally

Group 4: Received ethanolic extract of *Tecoma stans* at 200mg/kg orally.

Group 5: Received Aqueous extract of *Tecoma stans* at 200mg/kg orally

Diabetes was induced by administered orally freshly prepared aqueous solution of alloxan monohydrate 150 mg/kg, to overnight fasted rats. After 48 hours of the alloxan injection, the animal tested for the evidence of diabetes by estimation their blood glucose level by using Glucometer (one touch ultra, Johnson & Johnson Ltd.). The blood glucose level more than 140mg/dl of blood was criteria.

The animal test extracts (Alcoholic and aqueous) 200mg/kg according body weight administered orally and standard drug Glibenclamide 2.5 mg/kg were administered by dissolving in water. The blood samples were obtained through the tail vain puncture with hypodermic needle. 0.2 ml of blood was withdrawn at interval of initial 0hr, 1hr, and 3hrs of administration of single dose at 0 day and at the end of 3 & 7 day [9, 10].

Estimation of glucose:

Wister albino rats divided in to five groups of 6 animals in each group. Animals were fasted over night. Drug treatment was made as mentioned above. The blood samples were withdrawn from the tail vein of rats at 0 hour i.e. just prior to oral administration of all the drugs. A drop of blood was placed on the enzyme treated surface of the haemoglucostrip, which was kept in the glucometer. The glucometer was kept on then after 2 minutes glucomonitor reading was reported. The treatment was continued for next 3 & 7 days and again blood glucose level was measured after prolonged treatment for 3 and 7 days. The statistical analysis was done by Dunnett's test [11, 12].

Statistical analysis

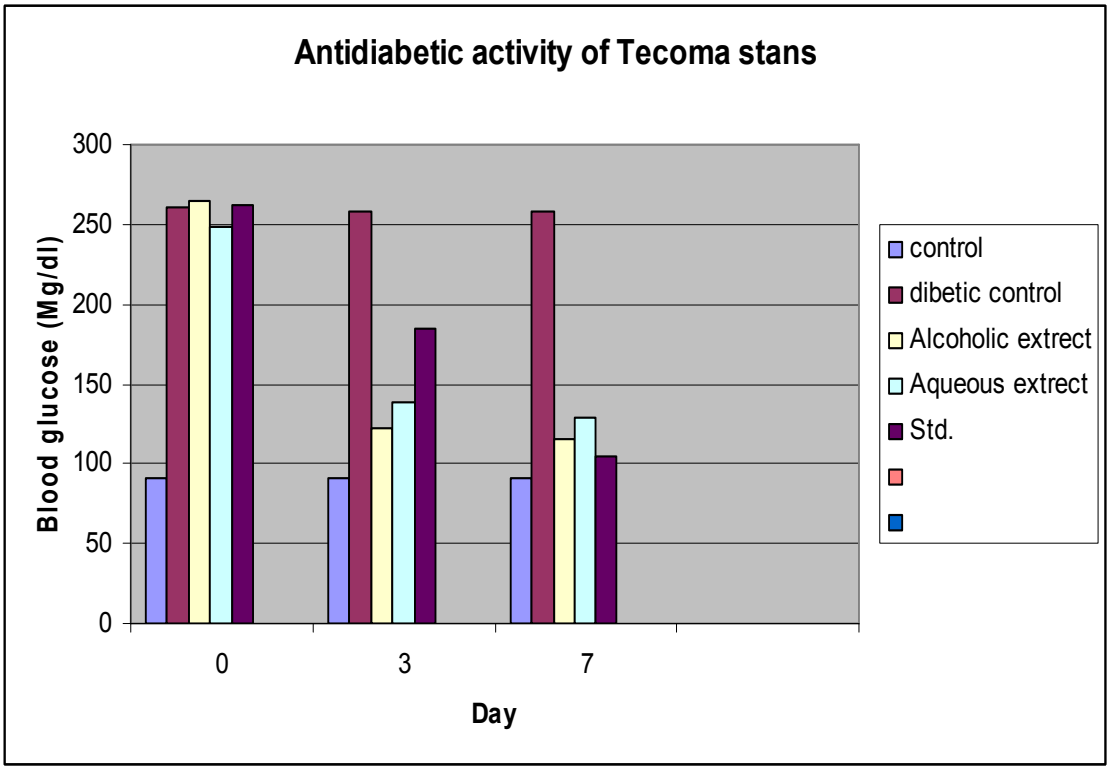
All the values of body weight, fasting blood sugar, estimations were expressed as mean ± standard error of mean (S.E.M.) and analyzed for Dunnet's *t*-test. Differences between groups were considered significant.

It was performed by using the Alloxan for induction of hyperglycemia and measuring the glucose level in the blood of rats. Standard drug used for treatment, Glibenclamide (2.5 mg/kg), Ethanolic test extract and aqueous test extract were prepared (200mg/kg) in 2% Carboxy Methyl Cellulose (CMC) and were given orally. The results were interpreted by measuring the decrease glucose level in blood sample of collected from tail tip of rats after giving test extracts and standard drug. Decrease in glucose level was recorded at time intervals of 0, 3, & 7 days after the treatment with the extract and standard drug in Table.

S. No.	Treatment	Dose	Blood glucose concentration (mg/dl)		
			0 day	3 day	7 day
1.	**Normal control**	2ml/kg	90.5±3.8	91.1±2.4	91.1±1.8
2.	**Diabetic control (Alloxan)**	150 mg/kg	260.4±18.2	258.5±17.8	257.3±18.6
3.	**Alcoholic Extract**	200 mg/kg	265.3±18.7**	122.8±12.3	114.8±6.8*
4.	**Aqueous extract**	200 mg/kg	248.6±15.3**	138.2±16.5*	129.6±8.2**
5.	**Glibenclamide**	2.5 mg/kg	262.3±12.4**	184.4±15.8**	104.26±1.5

TABLE 1: SHOWING RESULTS ANTIDIABETIC ACTIVITY EXTRACTS OF *TECOMA STANS*

n = 6 values as mean ± SEM *P>0.05–Significant, **P<0.01–more significant Vs control treatment by Dunnet's test.



GRAPH 1: SHOWING RESULTS ANTIDIABETIC ACTIVITY EXTRACTS OF *TECOMA STANS*

Results

The anti-hyperglycemic effect of the extracts on the fasting blood sugar levels of diabetic rats is shown in Figs. 1 and 2. Administration of alloxan (150 mg/kg,) of fasting blood glucose levels, which was maintained over a period of 7 days. Daily treatment of various extract of *Tecoma stans* to a dose-dependent fall in blood sugar levels.

Conclusions

Ethanolic and aqueous extracts of *Tecoma stans flower* exhibited significant antihyperglycemic activities in alloxan-induced diabetic rats. These extracts showed improvement in parameters like glucose level in diabetes treatment.

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