

## HYPOGLYCEMIC ACTIVITY OF AQUEOUS ROOT EXTRACT OF *CANSJERA RHEEDII*

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### Summary

The purpose of this study was to evaluate the hypoglycemic effect of aqueous extract of roots of *Cansjera rheedii* (AECR) in normal and antidiabetic activity in alloxan induced diabetic rats. In this study two doses (200 and 400 mg/kg) of AECR were used. Treatment with AECR, 200 and 400 mg/kg. p.o. had shown significant reduction in the blood glucose levels in normal and in alloxan induced diabetic rats. The aqueous extract of roots of *Cansjera rheedii* showed a significant hypoglycemic activity compared to control and the hypoglycemic effect of high dose 400 mg/kg of AECR was comparable with that of glibenclamide 10 mg/kg in alloxan induced diabetic rats.

**Key Words:** Hypoglycemic activity, Alloxan induced diabetes, *Cansjera rheedii*.

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### Introduction

Diabetes mellitus is a major disease characterized by derangement in carbohydrate, fat and protein metabolism, affecting nearly 10% of population. In recent, past, many hypoglycemic agents are introduced, still the diabetes and the related complications continue to be a major medical problem not only in developed countries, but also in developing countries. Many Indian medicinal plants are reported to be useful in diabetes (1, 2). However, search for new anti-diabetic drugs continue. The plant *Cansejera rheedii* (Opiliaceae) commonly named as Mallimadugu teega or Adavi karedu in Telugu, commonly grown in slops and altitudes of forests in all over Chittoor District, A.P., India, and abundant in kapalitheertham area (Tirumala). It plays an important role in curing diseases like Diabetes, Jaundice, Cancer and Kidney stone problems (3). Although there are reports on the medicinal uses of this plant, there is no scientific report on its antidiabetic activity. Therefore, it was thought worthwhile to evaluate its antidiabetic activity.

## Materials and Methods

### Drugs and chemicals

Alloxan monohydrate was purchased from sigma chemicals (St. Louis, USA). All other chemicals used for this study were of analytical grade.

### Plant material and preparation of extract

The roots of *Cansejera rheedii* were collected in the month of July, 2008 from Kapalitheertham forest, A.P., India. The plant was identified and authenticated by Dr. K. Madhavachetty, Asst. Professor, Botany Department, Sri Venkateswara University, Tirupati, A.P., India. The roots were dried for a period of thirty days. It was powdered with mechanical grinder and then 100gm of the powder was macerated in 300ml of distilled water in a conical flask for 72hr. The liquid filtrate was concentrated in *vacuo* at 40°C. The yield was 2.75%. The dried extract was formulated as suspension in distilled water using 2% Tween 80 as suspending agent. The extract was chemically tested for the presence of different chemical constituents using standard methods (4).

### Animals

Adult albino Wistar rats (150 – 180gm) of either sex were selected for present study. The animals were grouped and housed in polyacrylic cages with not more than six animals per cage and maintained under standard laboratory conditions. They were allowed access to standard drug pellet diet and water *ad libitum*. Approval for animal studies was obtained from the ethical committee.

### Acute oral toxicity

Acute oral toxicity of extracts of stem bark of *Cansejera rheedii* was determined by using female, nulliparous and non pregnant mice weighing 18-22 g. The animals were fasted for 3 hrs prior to the experiment. Up and down procedure OECD guideline no. 425 (5) was adopted for toxicity studies. Animals were administered with single dose of extract and observed for their mortality during 48 hours study period (short term) toxicity.

### Effect of the *Cansejera rheedii* extract on blood glucose level in normal rats:

To evaluate hypoglycemic activity in normal blood glucose level, the rats were divided into four groups of six each. Group-I of rats served as control and received (10 ml/kg) of 2% Tween 80 p.o aqueous solution. II and III group of rats received 200 and 400 mg/kg p.o of extract of *Cansejera Rheedii* respectively. Group IV of rats received a standard drug glibenclamide (10 mg/kg) for assessing comparative pharmacological significance. The animals were fasted for 18 hours prior to the experiment. The blood samples were collected by tail tipping method after treatments at 0 hr, 1.5 hr, 3 hr, 4.5 hr and 24 hr. The blood glucose level (BGL) was determined by glucometer (6) and results were analyzed by applying statistical method.

### Effect of the *Cansjera Rheedii* extract on alloxan – induced diabetic rats (7, 8):

Rats made diabetic by injecting alloxan monohydrate 100 mg/Kg body weight, dissolved in normal saline and injected intraperitoneally. After 1hr of alloxan administration the animals were fed on standard pellets and water *ad libitum*. The experimental animals were fasted 18hr before alloxan administration. After 72hr of alloxan treatments, the rats showing BGL above 200 mg/dl were selected for the study and divided into 4 groups of six rats each. Group- I rats served as control and received (10 ml/kg) of 2% Tween 80 aqueous solution. II and III group of rats received 200 mg and 400 mg /kg p.o of *Cansjera rheedii* extract respectively. IV group of rats received a standard drug glibenclamide (10 mg/kg) for assessing comparative pharmacological significance.

The blood samples were collected by tail tipping method before treatment with alloxan at 0 hr and after treatment with alloxan at 1.5 hr, 3 hr, 4.5 hr, 24 hr. Blood glucose level (BGL) was monitored by glucometer and the results were analyzed by applying statistical method.

### Statistical Analysis:

Results are expressed as mean  $\pm$  SEM and the results were analyzed by one- way ANOVA followed by Dunnett's multiple comparisons test *versus* control,  $P < 0.01$  implies more significant (9) and were given in table 1 and table 2.

## Results

### Acute oral toxicity

No mortality was recorded upto 2000 mg/kg with AECR; hence the extract was safe upto a dose level of 2000 mg/kg.

### Effect on normal blood glucose level:

The blood glucose lowering efficacy of the AECR was noticed in normal rats for 24hr after oral treatment at both the dose levels (200 and 400mg / Kg.). The extract at 400 mg/kg reduced the blood glucose level significantly ( $P < 0.05$ ) after 1.5hr of oral administration when compared to control group. It was also noted that the blood glucose lowering capacity persisted upto 24hr after treatment by showing more significant activity ( $P < 0.01$ ). The effect was comparable to that of the effect produced by the standard drug glibenclamide 10 mg. / Kg. Table 1.

**Table 1: Effect of *Cansejera rheedii* extract on normal blood glucose level in rats (n=6).**

Time Interval (in hrs)	Blood sugar level in mg / dl (mean $\pm$ SEM)			
	Group- I Control	Group II AECR 200 mg / Kg.	Group III AECR 400 mg / Kg.	Group IV GLIBENCLAMIDE 10 mg / Kg.
0	111.5 $\pm$ 1.727	118 $\pm$ 2.098	119 $\pm$ 1.174	117. 5 $\pm$ 0.7638
1.5	112.83 $\pm$ 2.023	108.33 $\pm$ 1.406	98.33 $\pm$ 1.229	107.83. $\pm$ 1.302
3	118.5 $\pm$ 1.945	91.83. $\pm$ 1.905**	88. 83 $\pm$ 1.22**	101.83. $\pm$ 2.664
4.5	120.166 $\pm$ 0.792	82.33 $\pm$ 1.961**	79.5 $\pm$ 1.310**	87.5 $\pm$ 2.391**
24	114.5 $\pm$ 6.4282	81 $\pm$ 2.00**	75 $\pm$ 1.265**	114.5 $\pm$ 0.4282

### Effect on blood glucose in alloxan induced diabetic rats:

The *Cansejera rheedii* extract was demonstrated significant hypoglycemic effect on alloxan induced diabetic rats after 1.5hr of drug administration and the activity also prolonged upto 24hr. The extract 200 mg/Kg., 400mg / Kg doses produced significant activity compred to control. The hypoglycemic efficacy of AECR was compared with that of control & standard antidiabetic agent glibenclamide shown by Table 2.

**Table 2: The effect of *Cansejera rheedii* extract on blood glucose levels of alloxan induced diabetic rats**

Time Interval (in hrs)	Blood sugar level in mg / dl (mean $\pm$ SEM)			
	Group I Control	Group II AECR 200 mg / Kg	Group III AECR 400 mg / Kg.	Group IV Glibenclamide 10mg /kg
0	114.33 $\pm$ 1.7	118.17 $\pm$ 1.2	118.33 $\pm$ 0.8	117 $\pm$ 0.5
1.5	307.5 $\pm$ 1.1	298.3 $\pm$ 4.0	299.1 $\pm$ 3.8	285.3 $\pm$ 3.9
3	288.5 $\pm$ 3.2	251.5 $\pm$ 4.7**	239 $\pm$ 4.28**	224.8 $\pm$ 2.8**
4.5	287 $\pm$ 1.3	228 $\pm$ 3.2**	213 $\pm$ 4.8**	168.16 $\pm$ 2.2***
24	298 $\pm$ 2.0	213.5 $\pm$ 3.3**	188.6 $\pm$ 7.1**	159.5 $\pm$ 1.2***

### Discussion and Conclusion

The currently available drug regimens for the management of diabetes mellitus have certain drawbacks and therefore, there is a need to find safer and more effective anti-diabetic drug (10). Alloxan causes a massive reduction in insulin release by the destruction of  $\beta$ -cells of the islets of langerhans and thereby induces hyperglycemia (11). In our present investigation AECR showed blood glucose lowering effect in both normal and alloxan induced diabetic rats. The glucose lowering potential exhibited by the AECR was more significant and the action is also similar fashion like the standard drug glibenclamide 10mg/kg. From this observation we concludes that the use of this plant in ethnomedical practice for diabetes management. This study warrants the investigation to study long term treatment with extract on blood glucose levels and to isolate and identify the hypoglycemic principles and to elucidate their exact mechanism of action.

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