



## Research Article

### ANTI-DIABETIC POTENTIAL OF *DELONIX REGIA*

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Article Received on: 27/10/14 Revised on: 22/11/14 Approved for publication: 02/12/14

**DOI: 10.7897/2230-8407.0512179**

#### ABSTRACT

Gulmohar (*Delonix regia*) is well known for its nutritional and medicinal properties in all over world. This research was undertaken to test the effect of gulmohar leaves extract on the diabetes of Rat. Gulmohar leaves extract (100 mg/kg, 200 mg/kg) was administered orally to Rat with the help of oral feeding needle. A total of 84 rats divided in 14 groups were employed in this study. Alloxan induced diabetes model was used in whole study. Serum total cholesterol, serum triglyceride, total protein, was also estimated before and after administration of leave extract. Leave extract was significantly ( $P < 0.001$ ) reduce blood glucose level in alloxan induced diabetic rats. Leave extract was significantly ( $P < 0.001$ ) reduce total cholesterol level it also decrease ( $P < 0.001$ ) triglyceride level. This drug was also increase ( $P < 0.001$ ) total protein level.

**Keywords:** Diabetes, Alloxan, Gulmohar, Cholesterol, Blood glucose.

#### INTRODUCTION

Gulmohar (*Delonix regia*) is a deciduous, large tree with fern-like leaves.<sup>1</sup> Gulmohar (*Delonix regia*) is also known as flame tree or royal poinciana or the peacock flower tree.<sup>2</sup> It is mostly planted for their shade-giving properties and as an ornamental tree.<sup>3</sup> Phytochemical screening yielded sterols, phenolic compounds, triterpenoids, and flavonoids.<sup>4</sup> The major medicinal properties of *Delonix regia* include Anti-microbial, Anti-diarrhea, Hepatoprotective, Anti-inflammatory, Anti-oxidant, Anti-diabetic, Anti-bacterial, and Carminative, Anti-pyretic.<sup>5</sup> It used for the diabetes treatment in Bangladesh folk medicine.<sup>6</sup> Diabetes mellitus is a chronic metabolic disorder. It is characterised by high blood glucose, caused by insulin deficiency, often combined with insulin resistance. Effects of diabetes mellitus Raised blood glucose level, Glycosuria, polyuria, Ketoacidosis, polydipsia and unexplained weight loss.<sup>7,8</sup> Phenolic and flavonoid compounds are reported to have antidiabetic property.

#### Objective

The present study was undertaken to explore the effect of extract of *Delonix regia* leaves on diabetes using alloxan induced diabetes model

#### MATERIALS AND METHODS

##### Plant material

Fresh leaves of *Delonix regia* were collected from street of Bhopal in the month of March, and got authenticated from Department of Botany Dr. H. S. Gour University, sagar (M. P.), India (refer no. 295, herbarium no. bot/her/2014). Extract of *Delonix regia* leaves was administered in different concentration (100 mg and 200 mg per kg b.wt.) daily for duration of 15 days to rats with the help of an oral feeding needle.

##### Animal

Wistar rats (150–200 g) were group housed ( $n = 6$ ) under a standard 12 h light/dark cycle and controlled conditions of temperature and humidity ( $25 \pm 2^\circ\text{C}$ ).<sup>9</sup> Rats received standard

rodent chow and water *ad libitum*. Rats were acclimatized to laboratory conditions for 7 days before carrying out the experiments. All the experiments were carried in a noise-free room between 08.00 to 15.00 h. Separate group ( $n = 6$ ) of rats was used for each set of experiments. The animal studies were approved by the Institutional Animal Ethics Committee (IAEC), constituted for the purpose of control and supervision of experimental animals by Ministry of Environment and Forests, Government of India, New Delhi, India. Ethical clearance no is TIT/IAEC/831/pcol/2014/29.

#### Drug

Alloxan monohydrate, Normal saline, Glibenclamide and *Delonix regia*. Normal saline (0.5 ml distilled water/day/rat), Glibenclamide (600  $\mu\text{g}/\text{kg}$ ) and *Delonix regia* extract (100 mg and 200 mg per kg b.wt.) were administered for 15 successive days to rats. Biochemical studies were carried on after 15<sup>th</sup> day of treatment.

#### Experimental Design

Hypoglycemic Activity in Rats- Animals were divided into three groups of 6 rats each group.

Group I: Rats served as normal-control and received the vehicle (0.5 ml distilled water/day/rat)

Group II: Rats (normal) were administered DR (100 mg/kg b.wt./day) in distilled water as a fine aqueous suspension orally for 7 days.

Group III: Rats (normal) were administered DR (200 mg/kg b.wt./day) in distilled water as a fine aqueous suspension orally for 7 days.

#### Induction of Experimental Diabetes in Rats

After fasting, diabetes was induced by a single intra peritoneal injection of 120 mg/kg body weight of 'Alloxan monohydrate' in distilled water. The animals were allowed to drink 5 % glucose solution overnight to overcome the drug-induced hypoglycemia. These animals were tested for

diabetes after 15 days and animals with blood glucose (fasting) were selected for experimentation

### Experimental Protocol

Animals were divided into five groups of 6 rats each

Group I: Rats served as normal-control and received the vehicle (0.5 ml distilled water/day/rat)

Group II: Rats served as diabetic-control and received the vehicle (0.5 ml distilled water/day/rat)

Group III: Rats (diabetic) were administered DR (100 mg/kg b.wt./day) in distilled water as a fine aqueous suspension orally for 15 days.

Group IV: Rats (diabetic) were administered DR (200 mg/kg b.wt./day) in distilled water as a fine aqueous suspension orally for 15 days.

Group V: Rats (diabetic) were administered Glibenclamide (600 µg/kg) in distilled water as a fine aqueous suspension orally for 15 days.

### Biochemical Determinations

After 15<sup>th</sup> day of treatment, blood was collected from the retro orbital sinus of overnight fasted rats. The serum was separated and triglycerides and cholesterol level were determined by using, triglycerides test kit and cholesterol test kit (Span diagnostic Ltd., Surat, India) respectively. The serum total protein was determined by Biuret method.<sup>10</sup>

### Statistical Analysis

The data were expressed as mean ± SEM. The data of hypoglycemic activity and antidiabetic activity were analyzed by one way analysis of variance (ANOVA) followed by "Tukey's post hoc test." p value less than 0.05 was considered as statistically significant.

## RESULT

Effect of *D. regia* on hypoglycemic activity in normal rats

Table 1: Effect of *Delonix regia* on hypoglycemic activity in normal rats

Group	Treatment	Hypoglycemic (mg/dl)	
		Onset of study	End of study
I	Normal	96.17 ± 3.88	98.83 ± 1.26
II	<i>Delonix regia</i> (100 mg/kg)	97.34 ± 1.98	101.12 ± 1.56
III	<i>Delonix regia</i> (200 mg/kg)	100.27 ± 2.51	106.33 ± 1.97

Effect of *D. regia* treatment on blood glucose (mg/dl) in normal and diabetic rats

Table 2: Effect of *Delonix regia* treatment on blood glucose (mg/dl) in normal and diabetic rats

Group	Treatment	Blood glucose (mg/dl)	
		Onset of study	End of study
I	Normal	100.16 ± 3.36	105.0 ± 5.61
II	Diabetic Control	241.83 ± 4.0	265.16 ± 7.38***
III	<i>Delonix regia</i> (100 mg/kg)	250.05 ± 3.2	210.16 ± 9.16***
IV	<i>Delonix regia</i> (200 mg/kg)	247.07 ± 2.9	199.6 ± 2.67***
V	Glibenclamide (600µg/kg)	250.13 ± 1.9	120.40 ± 2.88***

Values are expressed as mean ± S.E.M (n = 6). Values are statistically significant at \*\*\*P < 0.001 vs. normal group; \*\*\*P < 0.001 vs Diabetic control group (One-way ANOVA followed by Tukey's post hoc test)

Effect of *D. regia* treatment on biochemical parameters in normal and diabetic rats

Table 3: Effect of *Delonix regia* treatment on biochemical parameters in normal and diabetic rat

Group	Treatment	TC (mg/dL)	TG (mg/dL)	Total protein(g/dl)
I	Normal	93.22 ± 5.24	76.10 ± 5.92	11.10 ± 1.00
II	Diabetic Control	191.02 ± 11.10	115.12 ± 11.05	6.12 ± 0.13
III	<i>Delonix regia</i> (100 mg/kg)	110.46 ± 6.92***	91.16 ± 9.05***	7.35 ± 0.49***
IV	<i>Delonix regia</i> (200 mg/kg)	104.5 ± 8.20***	88.53 ± 8.35***	8.37 ± 1.00***
V	Glibenclamide (600µg/kg)	100.44 ± 4.93***	85.44 ± 6.12***	9.04 ± 1.18***

Values are expressed as mean ± S.E.M (n = 6). Values are statistically significant at \*\*\*P < 0.001 vs. normal group; \*\*\*P < 0.001 vs. Diabetic control group (One-way ANOVA followed by Tukey's post hoc test)

Effect of *D. regia* treatment on biochemical parameters in normal and diabetic rats

Table 4: Effect of *Delonix regia* treatment on biochemical parameters in normal and diabetic rat

Group	Treatment	TC (mg/dL)	TG (mg/dL)	Total protein(g/dl)
I	Normal	93.22 ± 5.24	76.10 ± 5.92	11.10 ± 1.00
II	Diabetic Control	191.02 ± 11.10	115.12 ± 11.05	6.12 ± 0.13
III	<i>Delonix regia</i> (100 mg/kg)	110.46 ± 6.92***	91.16 ± 9.05***	7.35 ± 0.49***
IV	<i>Delonix regia</i> (200 mg/kg)	104.5 ± 8.20***	88.53 ± 8.35***	8.37 ± 1.00***
V	Glibenclamide (600µg/kg)	100.44 ± 4.93***	85.44 ± 6.12***	9.04 ± 1.18***

Values are expressed as mean ± S.E.M (n = 6). Values are statistically significant at \*\*\*P < 0.001 vs. normal group; \*\*\*P < 0.001 vs. Diabetic control group (One-way ANOVA followed by Tukey's post hoc test)

## CONCLUSION

The current research concludes that the extracts of leaves of *D. regia*, based on acute toxicity studies are safe at the decided dose level of 100 and 200 mg/kg of body weight. Extract showed the significant hypoglycemic activity which may lower the blood glucose level in hyperglycemia condition and may be helpful in antidiabetic study. Our study provides a way to study the antidiabetic study of the Extract for the development of anti diabetic formulation. In our study the biochemical parameters are significantly reduced which may be helpful in diabetic complication. From the literature survey it has been reported phytoconstituents alkaloids, glycosides, flavonoids, tannins, steroids and carbohydrates are responsible for the anti-diabetic activity. Some of these phytoconstituents are present in our extracts. We can say that intake of this plant product may help not only in glycaemic control but also in minimizing the complications associated with diabetes. In future the activity of product and in house combination could be checked in other animal models.

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## Cite this article as:

Chaturvedi Dev, Suhane Nidhi, Singh Deepa, Chaturvedi Neha, Mishra Asutosh. Anti-diabetic potential of *Delonix regia*. *Int. Res. J. Pharm.* 2014; 5(12):884-886 <http://dx.doi.org/10.7897/2230-8407.0512179>

Source of support: Nil, Conflict of interest: None Declared