

## PRELIMINARY STUDY OF ANTIDIABETIC ACTIVITY OF METHANOLIC EXTRACT OF *PAVETTA INDICA* LINN IN DIABETIC RATS

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### ABSTRACT

The present study was carried out to investigate the antidiabetic potential of Methanolic extract of *Pavetta indica* Linn (Rubiaceae) leaves. Oral administration of Methanolic extract in the doses of 250, 400 mg/kg body weight to white Wistar albino rats significantly reduced their blood sugar level in alloxane induced diabetic rats under acute toxicity studies.

**Keywords:** Antidiabetic, *Pavetta indica* Linn, Rubiaceae, Alloxane

### INTRODUCTION

The incidence of diabetes is rapidly increased in worldwide. For example, it is estimated that more than 180 million people worldwide are affected with diabetes and the prevalence is expected to more than double by the year 2030. In the United States, approximately 21 million people are estimated to suffer from diabetes and it is a major cause of morbidity and mortality. Diabetes is not a single disease. Rather, it is a heterogeneous group of syndromes characterized by an elevation of blood glucose caused by a relative or absolute deficiency of insulin. The American Diabetes Association (ADA) recognizes four clinical classifications of diabetes: Type 1 diabetes (formerly insulin-dependent diabetes mellitus), Type 2 diabetes (formerly insulin independent diabetes mellitus), gestational diabetes, and diabetes due to other causes (e.g., genetic defects or medication induced). Summarizes the characteristics of Type 1 and Type 2 diabetes<sup>1</sup>.

*Pavetta indica* Linn (Rubiaceae) is a stout bushy shrub, found in Srilanka, SouthChina and throughout India. The plant leaves are used in the treatment of liver diseases, pain of pile, urinary diseases and fever<sup>2</sup>. The leaves contain Carbohydrate, Glycosides, Phytosterols, Saponins, Flavonoids and Alkaloids. During the present study a herbal drug *pavetta indica* Linn is chosen for evaluation of antidiabetic activity.

### MATERIALS AND METHODS

#### Plant Materials

The plant material used in the study was collected from Trichy. It was authentically verified by the Botanist, Dr.V.Ganesan, Department of Botany, Ayya-Nadar Janakiammal College of Arts and Science, Sivakasi, Tamil Nadu, India.

#### Preparation of Extract

The plant *Pavetta indica* Linn was collected and it was size reduced into small pieces and shadow dried. The dried materials were coarsely powdered before maceration. After maceration the extract was distilled and solvent was recovered and crude extract was collected<sup>3</sup>.

#### Animals

Male wistar rats weighing 190-210g were used in the experiments. They were maintained in standard environmental conditions of temperature (25±2°C), relative humidity (55±10%) and 12 hrs dark/light cycle. They were fed with standard diet and water *ad libitum* <sup>4</sup>. Ethical clearances for performing the experiments on animals were obtained from Institutional Animal Ethical Committee (IAEC) Ref: SBCP/2012-13/IAEC/CPCSEA/06.

#### Acute toxicity study

Acute oral toxicity test was performed as per OECD-423 guidelines. All the animals were randomly distributed into one control group and three treated groups, containing three animals per group

Groups 1, 2, 3 and 4 were orally administered 5, 50, 300 and 2000 mg/kg body weight change. The control group received vehicle alone. The animals were observed continuously for first 72 hours and 7 days for any signs of behavioral changes, toxicity, mortality and body weight<sup>5</sup>.

#### ANTI DIABETIC ACTIVITY (Oral Glucose Tolerance Test (OGTT))

GROUP-I = Normal control (saline)

GROUP-II = Glucose 2g/kg p.o.

GROUP-III = Glibenclamide (600µg/kg p.o.) + Glucose 2g/kg p.o.

GROUP-IV = Methanolic extract (250mg/kg p.o.) + Glucose 2g/kg p.o.

GROUP-V = Methanolic extract (400mg/kg p.o.) + Glucose 2g/kg p.o.

Blood samples from the rat tail vein just prior to glucose administration and at 0, 30, 60 and 90 mins after glucose loading were measured for glucose level using glucometer<sup>6</sup>.

#### ALLOXANE INDUCED DIABETIC RATS

- Diabetes was induced by injecting Alloxane monohydrate of 150mg/kg body weight intraperitoneally.
- After one hour of alloxan administration the animal was given feed *ad libitum* and 5% dextrose solution for a day (24 hrs) to overcome hypoglycemic phase.
- Animals were kept under administration for 48hrs and blood glucose was measured.
- Fasting glucose level should be more than 250mg/dl.

#### Experimental groups

GROUP-I = Normal control (saline)

GROUP-II = Diabetic control (Alloxane 150mg/kg) i.p

GROUP-III = Diabetic rat + Glibenclamide 600µg/kg p.o

GROUP-IV = Diabetic rat + Methanolic extract 250mg/kg p.o

GROUP-V = Diabetic rat + Methanolic extract 400mg/kg p.o

- Extracts were given orally for 7 days at maximum dose 400 mg/kg p.o.
- Fasting blood glucose levels were estimated after 7 days at time intervals of 0, 1, 3, 5 and 7hrs of drug administration<sup>6</sup>.

#### RESULTS AND DISCUSSION

##### Effect of *Pavetta Indica* Linn on OGTT

The Methanolic extract of *Pavetta Indica* Linn, in the dose 250mg/kg p.o and 400mg/kg p.o lowered the increased blood glucose level respectively. Methanolic extract at the dose 400mg/kg p.o significantly reduce the increased blood glucose level as compared to the standard drug glibenclamide (600µg/kg) p.o.

In the present study revealed the diabetic rats had high blood glucose level as compared to normal rats, however orally administered Methanolic extract of *pavetta indica* Linn at the dose of

400mg/kg significantly reduced the blood glucose level in the diabetic rats. This may be due to improving the glycemetic control mechanisms and insulin secretion from remnant pancreatic beta cells in diabetic rats. The active constituents responsible for the antidiabetic property, with this lone observation that it is used in folklore diabetic treatment. Results were presented in the table (1)

**Effect of *Pavetta Indica* Linn on Alloxane induced**

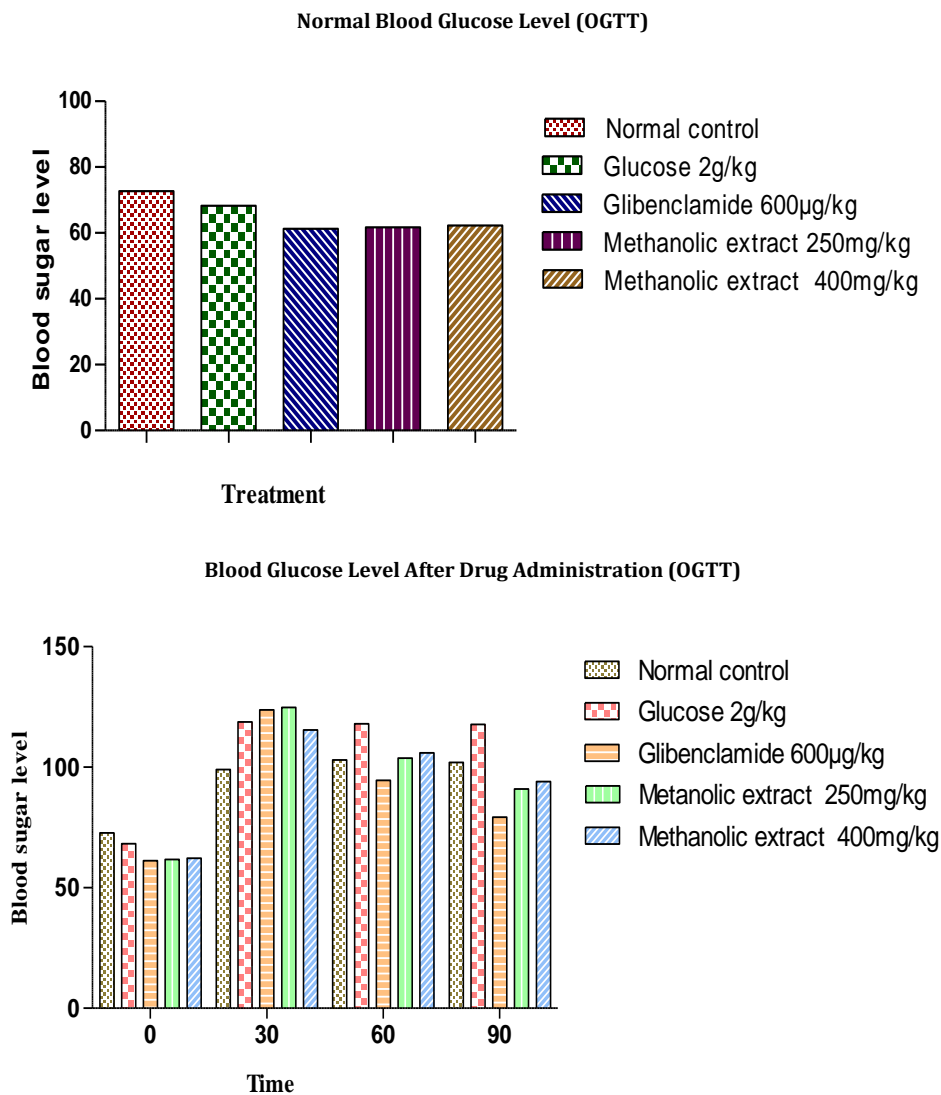
It was observed that the diabetic control shows severe hyperglycemia as compared to normal animal. When the diabetic

control was compared with the Methanolic extract of *Pavetta indica* Linn at the doses of 250mg/kg p.o and 400mg/kg p.o of body weight lowers the elevated blood glucose level in the acute treatment respectively. The standard drug glibenclamide at the dose 600µg/kg p.o of body weight lower the blood glucose level significantly bring it nearly back to normal, whereas the Methanolic extract of *Pavetta indica* Linn at the dose of 400mg/kg p.o significantly ( $p < 0.001$ ) decrease the blood serum glucose level as compared to standard drug glibenclamide (600µg/kg p.o). Results were presented in the table (2).

**Table 1: oral glucose tolerance test (ogtt) of *pavetta indica* linn.**

G. NO	Drug & Treatment	Normal blood glucose (before)mg/dl	Blood glucose level after drug administration (min) mg/dl			
			0	30	60	90
I	Normal control(saline)	72.75±4.83	72.75±4.83	99±10.15	103±9.6	102±9.06
II	Glucose 2g/kg p.o	68.25±3.66	68.25±3.66	118.75±10.25##	118±6.72##	117.75±6.78##
III	Glibenclamide 600µg/kg p.o +glucose 2gm/kg.p.o	61.25±5.55	61.25±5.55*	123.75±4.81***	94.5±3.88	79.25±6.2***
IV	Methanolic extract 250mg/kg p.o +glucose 2gm/kg p.o	61.75±3.96	61.75±3.96*	124.75±3.19***	103.75±3.96	91±0.20
V	Methanolic extract 400mg/kg p.o + glucose	62.25±2.6	62.25±2.6*	115.5±2.10*	106±1.91	94±1.29

Values were expressed as mean blood sugar level (mg/dl) ± SEM (n=6). Statistical analysis was performed using one way ANOVA followed Dunnett’s test by using Graph Pad prism 5.0. ##p < 0.01 glucose vs normal control and \*p < 0.05, \*\*p < 0.01, \*\*\*p<0.001 normal control vs other treatment groups.



**Fig-2: oral glucose tolerance test of *pavetta indica* linn.**

Table 2: Alloxane Induced Antidiabetic Activity Of *Pavetta Indica* Linn

G. No	Drug & Treatment	Normal blood glucose (before)mg /dl	Blood glucose level (after 48hrs) mg/dl	Blood glucose level after drug administration (min) mg/dl (hrs)				
				0	1	3	5	7
I	NormalControl(Saline)	73.75±4.23	81±3.02	71.5±1.443	64.5±2.62	58±3.39	58±1.77	54.75±3.4
II	Alloxane 150mg/kg, ip.	71.5±1.85	345.5±92.66#	344.75±91.1##	351.25±91.8##	347±91.0##	353.75±91.0##	354±90.72##
III	Diabetic rat+Glibenclamide 600µg/kg p.o	70.25±0.85	505.5±18.90* **	74±1.82	65.5±1.190	63.25±1.49	59.5±1.84	58.25±1.79
IV	Diabetic rat+ Methanolic extract 250mg/kg p.o	71.75±1.31	340±40.307*	70.5±0.645	69.5±0.645	68.5±1.44	66.75±1.10	65.5±0.866
V	Diabetic rat+ Methanolic extract 400mg/kg p.o	67.5±3.796	276±93.69	71.25±6.394	67.75±4.36	65.75±4.21 0	61.5±4.17	60.25±1.89

Values were expressed as mean blood sugar level (mg/dl) ± SEM (n=6).

Statistical analysis was performed using one way ANOVA followed Dunnett’s test by using Graph Pad prism 5.0.

#p < 0.05 and ###p < 0.001 Alloxane vs normal control and \*p < 0.05, \*\*\*p<0.001 normal control vs other treatment groups.

NORMAL BLOOD GLUCOSE LEVEL (BEFORE & AFTER)

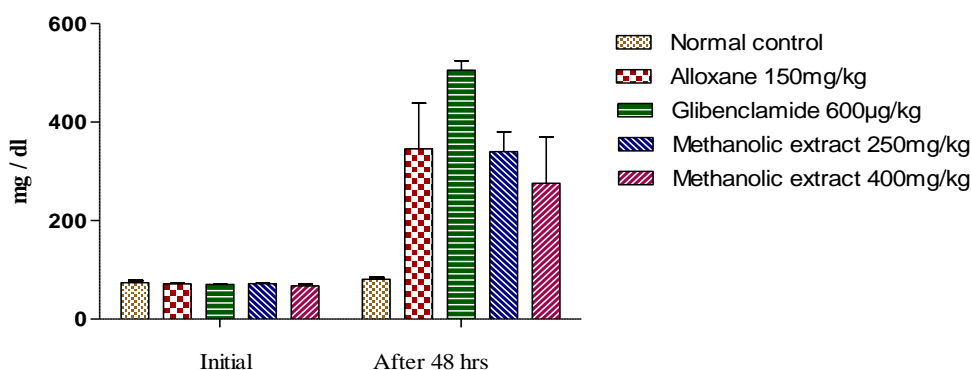


Fig-3: alloxane induced antidiabetic activity of *pavetta indica* linn.

BLOOD GLUCOSE LEVEL AFTER DRUG ADMINISTRATION (Min) mg/dl

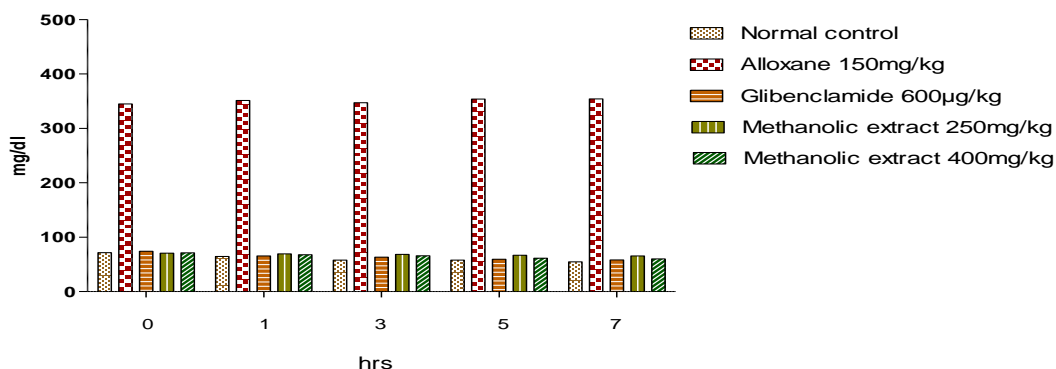


Fig 4: alloxane induced antidiabetic activity of *pavetta indica* linn.

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