# EVALUATION OF ANTI-DIABETIC ACTIVITY OF ETHANOLIC EXTRACT OF THE BARK OF *FICUS BENGELENSIS* ON ALLOXAN INDUCED DIABETIC RATS

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## ABSTRACT

The ethanolic extracts of the barks of *Ficus bengelensis* Linn. Were comparatively evaluated for their blood glucose lowering activity (anti-diabetic activity) in normal and alloxan induced diabetic rats. The ethanolic extract of the barks, at a dosage of 350 mg/kg body weight, was found to exert a more pronounced antidiabetic activity than a 600mg/kg body weight Metformin dose. Barks extracts were found to have no effect on normal rats.

**Keywords:** *Ficus Bengelensis,* Alloxan, Ethanolic Extract.

## I.    INTRODUCTION

Diabetes mellitus (DM) presently is a major health problem for the people of the world. It is a chronic metabolic disorder resulting from a variable interaction of hereditary and environmental factors and is characterised by abnormal hypoglycaemic agent secretion or hypoglycaemic agent receptor or post receptor events affecting metabolism involving carbohydrates, proteins and fats additionally to damaging liver, urinary organ and -cells of pancreas. It is characterized by elevation of both fasting and post-prandial blood sugar levels. Chronic hyperglycemia during diabetes causes glycation of body proteins that successively ends up in secondary complications moving eyes, kidneys, nerves and arteries. Hence is also delayed, lessened or prevented by maintaining blood sugar values close to normal. [1]

In modern medication, no satisfactory effective therapeutic effect remains on the market to cure the diabetes. Though insulin therapy is generally used for the management of diabetes mellitus, but there are various drawbacks like insulin resistance, anorexia, brain atrophy and liver disease when chronic treatment. Besides the utilization of hypoglycaemic agent for the treatment of hypoglycaemic agent dependent diabetes (IDDM), different approaches for the management of symptom embrace the utilization of amylin analogues that gastric emptying and inhibitors of intestinal alpha glucosidases like acarbose, miglitol and voglibiose that delay postprandial symptom. [2] Sulphonylureas, the foremost wide used category of medication act by closure of adenosine triphosphate dependent channel. Metformin, a biguanide oral antibiotic limits intestinal-glucose absorption. These medication have sure effects like inflicting hypoglycaemia at higher doses, liver issues, drink pathology and looseness of the bowels. It's apparent that because of the aspect effects of the presently used medication, there's a desire for a secure agent with lowest adverse effects, which may be taken for long durations. [3, 4]



**Fig 1:** *Ficus bengelensis*

Recently, there has been increasing interest within the use of medicative plants. The utilization of medicative plants in utilize modern medicine suffers from the fact that though hundreds of plants are used in the world to prevent or to cure diseases, scientific evidence in terms of modern medicine is lacking in most cases. The ethanolic extracts of the barks of *Ficus bengelensis* were evaluated for their blood glucose lowering activity in normal and alloxan induced diabetic rats. The ethanolic extract of the barks, at a dosage of 350 mg/kg body weight, was found to exert a pronounced antidiabetic activity. Bark extract was found to have no effect on normal rats. [5, 6, 7]

## II.     MATERIALS AND METHODS

### A. Collection of plant material

Bark of *Ficus bengelensis* were collected from village area of Uluberia, Howrah and in the manth of January. The plant part were identified and authenticated by Head, Depertment of Pharmacognosy, Bharat Technology, Uluberia, Howrah.

### B. Preparation of extract [8]

The materials were cleaned thoroughly with distill water to remove any type of contamination. Washed bark were air dried in shade for 20-25 days, kept in Hot air oven for 2 hours to remove the moisture, pulverized to coarse powder. It macerated in petroleum ether for 24-48 hrs to remove the chlorophyll and fat. Filter it and keep the residue and remove the filtrate. Dried the residue. Dried the residue again and Soxhlet it. Distillation is done with the extracted solvent. After this drug was collected and packed into Eppendorf & put into refrigerator.

### C. Preliminary phytochemical screening [9]

Phytochemical analysis of plant materials for presence of major chemical groups like flavonoids, steroids, phenolics, terpenoids, alkaloids, glycosides etc. was carried out.

### D. Experimental animals

Wistar albino rats weighing between 150-180 gm were obtained from Sarada bio farms Pvt. Ltd., Uluberia. The rats were housed in cleaned polypropylene cages and kept in well ventilated room and allowed to acclimatized to the laboratory condition for one week before being used. They were fed with standard animal pellet and had free access to water. The protocol of the experiment was approved by Institutional Animal Ethics Committee of Bharat Technology, Uluberia.

### E. Induction of Diabetes Mellitus [10]

All rats were fasted overnight before the administration of Alloxan monohydrate. Diabetes was induced by injecting a dose of 120 mg/kg of Alloxan monohydrate by intravenous route through tail vein. The alloxan induced rats were kept for 5 days with free access to food and water. The rats were fasted 6th day for 12 hours and their blood glucose levels were determined.

### F. Acute toxicity Study [11]

Acute toxicity studies were performed according to OECD-423 guidelines. Wistar rats selected by random sampling technique were employed in this study. The animals were fasted for 5 hr. with free access to water only. The extracted drug administered orally at a dose of 5 mg/kg initially and observed mortality, all rats were live normally then 50 mg/kg and 300 mg/kg also resulted that all rats were normally alive, after final toxicity pass 2000 mg /kg as for 2 animals also alive and one is suffering few days and then died. It was observed for 3 days all rats. The final acute toxicity test is passed out the ethanolic extract of bark of *Ficus bengelensis* 2000mg/kg orally.

### G. Experimental Designed

A total number of 24 rats (18 diabetic surviving rats, 6 normal rats) were used. The rats were divided into 4 groups of 6 rats each. The rats of group 1 was normal while the rats of group 2 to group 4 were diabetic surviving. The treatment was carried out for 28 days. All the drugs were given through oral route, once daily to the rats.

Group 1: Normal control: Normal healthy rats without treatment.

Group 2: Diabetic control: Diabetic rats treated with normal saline.

Group 3: Standard drug treated: Diabetic rats treated with Metformin, 600 mg/kg/day.

Group 4: Diabetic + Bark extract: Diabetic rats treated with Bark extract, 350 mg/kg/day.

### H. Analysis of blood sugar levels

Blood samples were collected by Sino-ocular puncture at the intervals of 0 Day, 7 Day, 14 Day, 21 Day, and 28 Day. The blood glucose level in the samples was estimated.

### I. Histopathological Investigation [12, 13, 14]

At the end of the study, all rats were sacrificed and pancreas of rats were collected. The tissue was fixed in 10% formalin solution immediately after removal from animal for avoid decomposition. Embedding in paraffin wax was meeted out removal of water exploitation alcohol dehydration and infiltration of chloroform as a solvent for wax. Thin section of the tissue (6μm) were cut by using a microtome and these were stained with hematoxylin, eosin. The tissue section were rehydrate by 30% alcohol and then stained with hematoxylin (aqueous base). The section were dehydrate by using high concentrated alcohol and then stained with eosin. They were then treated with Diphenyl xylene and examine under electron microscope.

### J. Statistical analysis

Values were represented as mean ± SEM. for 6 animals in each group. Data were analyzed using one-way analysis of variance (ANOVA) using Graphpad instat III trial, Individual groups were critically compared.

## III.     RESULTS AND DISCUSSION

Effect of the ethanolic extract of bark of *Ficus bengelensis* on blood glucose levels in alloxan induced diabetic rats is shown in Table- 1. The initial blood glucose levels of diabetic rats selected for the study were in the range of 85-87 mg/dl. In untreated control (diabetic) rats the blood glucose levels increased to 275 mg/dl on the seventh day. In ethanolic extract (350 mg/kg) treated rats, the blood glucose levels steadily decreased and it was 91 mg/dl on the 28th day. Thus the drug treatment restored the blood glucose levels almost nearer to normal values. The ethanolic extract of bark of *Ficus bengelensis* decreases glucose level in Alloxan induced diabetic in rat. Hence, *Ficus bengelensis* extraction may effective in some pathway which aggravate the diabetes mellitus. Such this experiment indicates this *Ficus bengelensis* extraction may stimulate the secretion of insulin or the activity of insulin increase.

**Table 1:** Effect of Ethanolic Extracts of Barks of *Ficus bengelensis* on Blood Glucose Level.

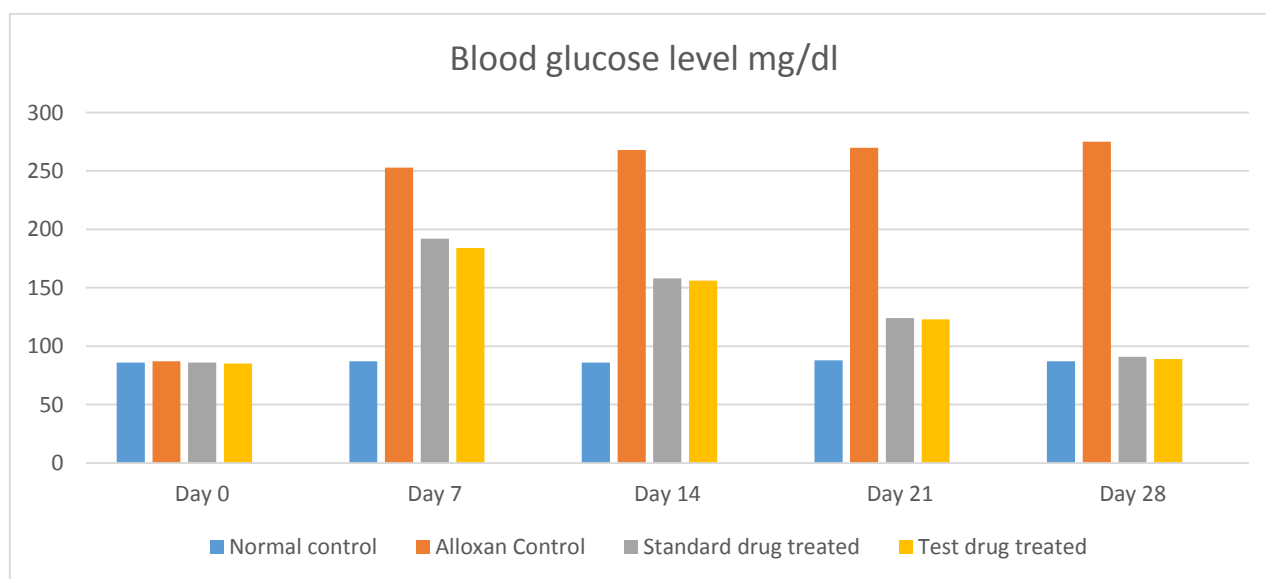| Group | Treatment | 0 Day | 7th Day | 14th Day | 21th Day | 28th Day |
|-------|-----------|-------|---------|----------|----------|----------|
| I | Normal control | 86±1.96 | 87±1.99 | 86±1.20 | 88±1.54 | 87±1.32 |
| II | Alloxan control | 87±1.86 | 253±6.58 | 268±3.02 | 270±3.40 | 275±3.06 |
| III | Standard drug treated | 86±1.64 | 192±3.06 | 158±2.46 | 124±2.87 | 91±1.53 |
| IV | Test drug treated | 85±1.98 | 184±3.14 | 156±1.98 | 123±2.34 | 89±1.87 |



**Figure 1:** Graphical representation of effect of ethanolic extract of barks of *Ficus bengelensis* on blood glucose level.
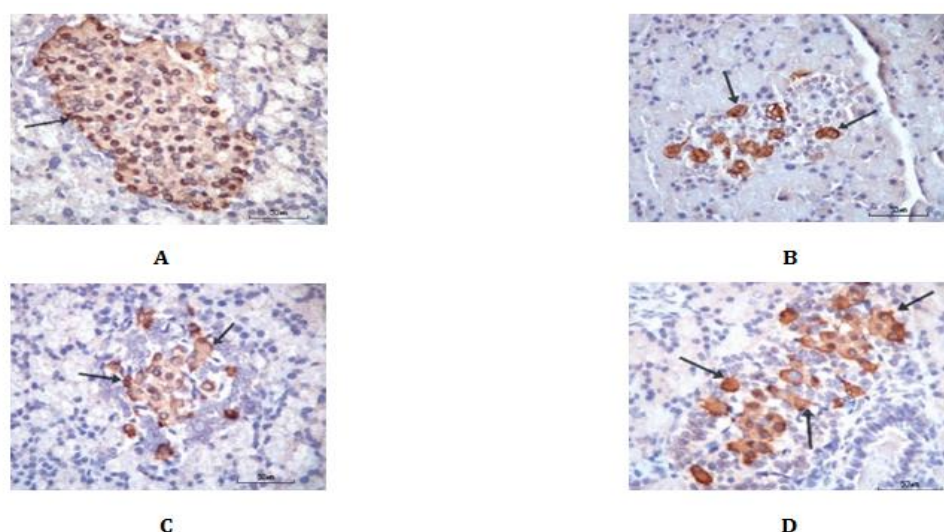
**Figure 2:** Histological evidence of ethanolic extract of bark of *Ficus bengelensis* on rat's pancreas (A) Histology of normal rat (B) Histology of alloxen induced diabetic rat (C) Histology of alloxen induced diabetic rats treated with Metformin (D) Histology of alloxen induced diabetic rats treated with Bark extract.

## IV.    CONCLUSION

The present study reveals that the ethanolic extract of bark of *Ficus bengelensis* significantly improve the effect of diabetic in alloxan induced diabetic rats. Thus it concluded that the ethanolic extract of bark of *Ficus bengelensis* is potential against to diabetic.

## ACKNOWLEDGEMENT

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