

HYPOGLYCEMIC EFFECT OF AQUEOUS EXTRACT OF FERONIA ELEPHANTUM FRUITS IN ALLOXAN DIABETIC RATS

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ABSTRACT

The objective of the present investigation is to elucidate hypoglycemic activity of aqueous Fruit extract of *Feronia elephantum* in Alloxan induced diabetes in Wistar rats. Alloxan induced hyperglycemic male wistar rats were orally administered, the Plant extract (500mg/kg, p.o.) and GLB 0.9mg/kg for 30 days. Blood glucose was estimated on 31st day by Kit method. The Aqueous Fruit extract of *Feronia elephantum* exhibited significant hypoglycemic effect in hyperglycemic rats.

Keywords: *Feronia elephantum*; Glibenclamide, hyperglycemia.

INTRODUCTION

Diabetes mellitus (DM) is a group of metabolic disorders characterized by hyperglycemia and abnormalities in carbohydrate, fat, and protein metabolism. It results from defects in insulin secretion, insulin sensitivity, or both.¹ The prevalence of diabetes for all age-groups worldwide was estimated to be 2.8% in 2000 and 4.4% in 2030. The total number of peoples with diabetes is projected to rise from 171 million in 2000 to 366 million in 2030.² Although, oral hypoglycemic agents (OHA) / insulin are the mainstay of treatment of diabetes and are effective in controlling hyperglycemia, they have prominent side effects and fail to significantly after course of diabetic complications. Though there are various approaches to reduce the ill effects of diabetes and its secondary complications, herbal formulations are preferred due to lesser side effects and low cost. These include, *Ficus bengalensis*³, *Ipomoea batatas*⁴, *Aegle marmalos*⁵, *Tinospora crispa*⁶ & *Vinca rosea*⁷

F. elephantum Correa (family- *Rutaceae*) is a moderate size slow growing tree, with sharp strong spines. It is commonly known as wood apple, curd apple or kath bel. The fruit are sour, sweet and used in India as liver and cardiac tonic. It is effective in treatment of diarrhea, dysentery, hiccough, sore throat, asthma, consumption.⁸ The fruit contains flavonoids⁹, phytosterols, tannins, carbohydrates, triterpenoids, vitamins and amino acids as its chemical constituents.¹⁰ It contains 0.015% stigmaterol.¹¹ The leaves, bark, roots and fruit pulp are all used against snakebite and have been studied for antitumor, larvicidal and antimicrobial activity.⁸ Oral administration of aqueous extract of leaves produced hepatoprotective activity in albino rats.¹² The fruit pulp of FE have also been studied for antiulcer activity.¹³ The literature survey reveals that the aqueous extract of fruits of FE has not been studied experimentally for its blood glucose lowering potential, thus the present study was planned to investigate the blood glucose lowering activity

of extract of fruits of FE in normal and alloxan induced diabetic rats and compared this effect with the standard Glibenclamide (GLB) antidiabetic drug.

MATERIALS AND METHODS

Plant material and Extraction

The fresh fruits of *Feronia elephantum*, were collected in month of November from Kolhapur district, Maharashtra, India, identified and authenticated by Prof. Rashinwadkar, Selection grade lecturer, Head of Dept of Botany, with the reference no. MMDC/4.

Fruits of *Feronia elephantum*, were sliced, air dried in shade and powdered mechanically. The powder was subjected to extraction in Soxhlet extractor, was defatted with petroleum ether (40-60) and later extracted. The collected extract was concentrated under reduced pressure below 45^oC using vacuum pump and rotatory evaporator ensuring complete removal of the solvent and the dry extract was used for all experimental studies.

Experimental animals

Male albino rats (150-200 gm) of Wistar strain were used throughout the studies. Animals had *ad lib* access to standard laboratory diet, except during the day of blood sampling when animals were used after an overnight fast. The animals were acclimatized under standard condition of temperature (23±2^oC), relative humidity (55±10%) with 12 h each of dark and light cycle in the departmental animal house. All experimental protocols were prepared and performed based on ethical guidance of Institutional Animal Ethical Committee.

Chemicals

Alloxan monohydrate, a most widely used chemical diabetogen was procured from Loba chemie, Mumbai, India and other reagents used in the experiment were of analytical grade. Glibenclamide, a standard antidiabetic



agent was purchased from Aventis Pharma. Ltd. Goa, India.

Induction of diabetes in rats

Diabetes was induced by single intraperitoneal injection of freshly prepared alloxan (60 mg/Kg). The diabetes was assessed by determining the blood glucose concentration after 48 hrs of alloxan injection. The rats with blood glucose level above 200 mg/dL were selected for the experimental studies.

Experimental design

In the experiment a total number of 24 rats (18 diabetic rats, 6 normal rats) were used. The rats were divided into 4 groups of six each.

Group I : Control group (Vehicle treated)

Group II : Diabetic control (alloxan 60mg/kg b.w i.p)

Group III : Diabetic rats receiving "FE fruit extract" (500 mg/kg b.w orally)

Group IV : Diabetic rats receiving Glibenclamide (900 µg/kg b.w orally)

The blood glucose and body weight of all the rats were measured at weekly interval for 30 days. On 31st day blood glucose level was measured by using standard glucose kits.

Statistical Analysis

Statistical analysis was performed using one way analysis of variance (ANOVA) followed by Dunnet's test. Results were expressed as mean±S.E.M. from six rats in each group. *P*-values <0.05 were considered significant.

RESULTS

The level of blood glucose was significantly increased in alloxan alone treated rats (Group II) as compared to control animals (Group I). However, the level of blood glucose was returned to near normal concentrations in diabetic rats treated with "FE extract" and Glibenclamide. "FE extract" showed comparable effect to that of Glibenclamide. (Table 1)

Table 1: Effect of FE extract in hyperglycemic rats

Groups	Before treatment	After treatment
Control	89.42± 1.42	83.34± 2.82
Diabetic control	383.3± 5.38	400 ±12.73
Standard (GLB0.9)	360.2 ±5.94	243.3±3 15.38**
FE extract	374.7 ±4.75	169± 4.033**

ANOVA followed by Dunnet's test, ***p*<0.01

DISCUSSION AND CONCLUSION

Findings of the present study clearly indicate that treatments with FE extract showed significant hypoglycemic activity. As eluded earlier the objective of the study was to investigate hypoglycemic activity of aqueous extract of *Feronia elephantum*. Though the present study was not aimed to elicit the mechanism of hypoglycemic activity of the extract, the phytochemical constituents of *Feronia elephantum* bioflavonoid, triterpenoids, stigma sterol, bergapten could be responsible for its hypoglycemic activity by virtue of their antioxidant property. Antioxidants have been reported to exert beneficial effects on pancreatic β-cell function by preventing or delaying β-cell dysfunction due to glucose toxicity. If the findings of the present study extrapolated to clinical situation, the fruits are good for consumption by the diabetics and by patients on oral hypoglycemic as it is not expected to develop sever hypoglycemia. However the impact of such consumption on chronic basis by the patients on oral hypoglycemic needs to be explored clinically and experimentally.

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