



Hypoglycemic properties of *Ficus glomerata* fruits in alloxan-induced diabetic rats

K. S. Patil^{1*}, P. D. Warke¹, S.C. Chaturvedi².

1. Department of Pharmacognosy and Phytochemistry, K.L.E. Society's, College of Pharmacy, J.N.M.C. Campus, Belgaum - 590 010, Karnataka.
2. School of Pharmacy, Devi Ahilya Vishwavidyalaya, Indore, India.

Abstract

Objective: To study the hypoglycaemic properties of *Ficus glomerata* fruits in alloxan induced diabetic rats. **Materials and methods:** Petroleum ether, benzene, chloroform, ethanol and aqueous extracts of *F. glomerata* fruits were screened for hypoglycemic properties in alloxan-induced diabetic rats. The effect was assessed by blood glucose, serum cholesterol, serum urea and serum triglyceride levels. Oral doses of petroleum ether extracts of 250 mg/kg body weight produced significant lowering of blood sugar, serum cholesterol, serum urea and serum triglyceride levels in alloxan-induced diabetic treated rats. The hypoglycemic effects were compared with those of glibenclamide. **Conclusion:** The present study shows that petroleum ether extracts of fruits of *F. glomerata* produce better hypoglycemic actions compared to other extracts.

Keywords: Acute toxicity, alloxan, *Ficus glomerata*, hypoglycemic activity, Moraceae.

1. Introduction

Ficus glomerata Roxb. Family Moraceae is a large deciduous tree distributed throughout India, particularly in evergreen forests, moist localities [1, 2]. The Tribal of Chotanagpur used *Ficus glomerata* in diabetes [3]. The fruits of the plant contain Hentriacotane, β sitosterol, gluanol acetate, glucose, lupeol acetate, friedelin [4, 5]. The plant also contains tannins, wax and ash containing silica and phosphoric acid [6]. This study was carried out to investigate the

claimed folkloric antidiabetic property of the fruits of *F. glomerata*, which is widely used in Chotanagpur of India for its hypoglycemic activity.

2. Materials and Methods

The ripe fruits of *F. glomerata* were collected from Belgaum in Karnataka state, India during March 2003 and were identified and authenticated at the Botanical Survey of India,

* Corresponding author
E-mail: kalpatil@yahoo.com

Pune. A voucher specimen has been deposited in the college herbarium. About 200 gm of the air-dried powdered fruits were subjected to hot continuous extraction with petroleum ether (40-60°) in a soxhlet extractor.

After complete extraction the solvent was evaporated and concentrated on a water bath to a dry residue. The marc was dried completely at 50°C and further extracted successively with benzene, chloroform and ethanol.

Finally, the marc was macerated with distilled water to obtain the aqueous extract. The different extracts were subjected to qualitative chemical investigation and were subjected for pharmacological studies. Healthy adult Wistar albino rats of either sex 150-200 gm were kept in the experimental Animal House of the Department for 7 days with free access to food and water before treatment.

The acute oral toxicity study was carried out as per the guidelines set by Organization for Economic Co-operation and Development (OECD). The study protocol was approved by

the Animal Ethics Committee of the Institution (CPCSEA Registration No.221). The animals were starved overnight and were divided into 5 groups (n = 3), which were fed with increasing dose (10, 30, 100, 300, 1000, 2000 mg/kg) of the petroleum ether, benzene, chloroform, ethanol and aqueous extracts. The animals were continuously observed for mortality and behavioural responses for 48 h and thereafter once daily for 14 days after administration.

Alloxan monohydrate induced diabetes mellitus was produced in a batch of albino rats by injecting intraperitoneally a single dose (200 mg/kg body weight) of 2 % alloxan monohydrate solution in saline, after they had been fasted for 12 h. This single dose of alloxan produced persistent hyperglycemia after 24 h.

Rats showing fasting blood glucose levels around 150 mg/100 ml were selected for the study. Eight groups of animals having six rats in each group were used. The first group served as a normal control where as a second group served as a diabetic control. A third group

Table 1.

Effect of *F. glomerata* fruit extract, glibenclamide and normal saline on the serum urea, serum cholesterol and serum triglyceride levels of alloxan diabetic rats after prolonged treatment

Parameter	Control	Positive control	Glibenclamide	Pet. Ether Extract	Benzene extract	Chloroform extract	Alcohol extract	Aqueous extract
Serum triglycerides level in mg/100 ml	9.417±0.51	20.83±1.11	14.22±0.59*	13.35±0.60*	21.78±0.92	15.25±0.46*	18.90±0.62	23.05±1.08
Serum cholesterol level in mg/100 ml	55.67±1.76	148.8±8.59	57.00±1.07*	60.50±1.06*	109.8±3.34*	145.2±4.01	70.00±2.78*	72.67±1.87*
Serum urea level in mg/100 ml	19.33±1.33	104.5±9.83	31.83±1.74*	41.67±2.04*	84.67±4.70	46.67±3.81*	37.17±2.41*	66.67±2.23*

*p<0.01 vs. control; values are in Mean ± SEM, n=6

Table 2.

Effect of *F. glomerata* fruit extract, glibenclamide and normal saline on blood glucose levels of alloxan diabetic rats after prolonged treatment

Drug	Initial mg/100 ml	15th day mg/100 ml
Control	102.3 ± 5.01	108.2 ± 4.59
Positive control	466.5 ± 16.36	966.2 ± 14.13
Glibenclamide	525.8 ± 10.57	114.8 ± 4.42*
Petroleum ether extract	531.5 ± 9.04	140.7 ± 12.08*
Benzene extract	550.8 ± 9.89	211.7 ± 14.02*
Chloroform extract	571.2 ± 16.91	865.3 ± 17.17
Alcohol extract	570.3 ± 22.87	633.2 ± 51.45*
Aqueous extract	544.0 ± 13.79	531.7 ± 34.51*

*p<0.01 vs. control; values are in Mean ± SEM, n=6

received the standard drug glibenclamide at a dose of 10 mg/kg, the fourth, fifth, sixth, seventh and eighth groups received petroleum ether, benzene, chloroform, alcohol and aqueous extracts orally at a dose of 250 mg/kg daily a period of 15 days.

The blood samples were withdrawn from the rats by tail vein puncturing with hypodermic needle at '0' day and the end of 15th day. The blood samples were analysed for blood glucose level, serum urea level, serum cholesterol level and serum triglycerides level. Results were expressed as mean ± SE. The data was analysed by one-way ANOVA followed by Dunnet's test at a level of significance p<0.01.

3. Results and Discussion

Phytochemical analysis indicated that the fruit extracts of *F. glomerata* contain flavonoids, carbohydrates, tannins, glycosides, sterols and triterpenoids.

After 15 days of treatment, the serum glucose levels in diabetic treated animals were significantly decreased in comparison with diabetic control animals. The maximum decrease has been observed with the petroleum ether extract. Serum urea level, serum cholesterol level and serum triglyceride levels of diabetic extract treated and diabetic glibenclamide treated animals were decreased in comparison to diabetic control.

Mean levels of plasma triglycerides and cholesterol in individuals with various types of diabetes are higher than levels in non-diabetic subjects, reflecting an elevation in at least 50 per cent patients [7]. Steroid containing plants known to exhibit antidiabetic activity include the barks of various species of Ficus [8]. β-sitosterol was confirmed in the petroleum ether extract of fruits of *F. glomerata* by TLC [9].

In this study we observed that petroleum ether extract of *F. glomerata* provides significant hypoglycaemic activity.

References

1. Kirtikar KR, Basu BD. (1975) *Indian Medicinal Plants*, Vol. III, II Edn., Indian International Book Distributors; 2327-2329.
2. Ramankutty C, Nambair VPK. (1996) *Indian Medicinal Plants – A Compendium of 500 species*, Vol. III Orient Longman Limited: Kottakkal; 34-37.
3. Topno KK. (1997) *Botanica*, 47: 99-101.
4. Chatterjee A, Parkashi S. (1994) *The Treatise of Indian Medicinal Plants*, Vol. I Publication and Information Directorate: New Delhi; 41-42.

5. Rastogi Ram P, Mehrotra BN. (1993) Compendium of '*Indian Medicinal Plants*', Vol. III, Publication and Information Directorate: New Delhi; 295.
6. Nadkarni AK, Nadkarni KR. (1998) *Indian Materia Medica*, Vol. I, II Edn., Bombay Popular Prakashan: Mumbai; 548.
7. Ghosh S, Suryawanshi SA. (2001) *Indian J. Exp. Biology*, 39: 748-759.
8. Evans WC. (1997) *Trease and Evans Pharmacognosy*, XIV Edn., Bailiere Tindall: London; 439.
9. Harborne JB. (1984) *Phytochemical Methods*, II Edn., Chapman & Hall, Academic Press: New York; 126.