Pharmacognosy Magazine
ISSN: 0973-1296

PHCOG MAG.
An official Publication of Phcog.Net

PHCOG MAG.: Research Article
A Comparative study on anti hyperglycemic activity of *Ficus bengalensis*, Linn aerial roots and barks.

E. Edwin*, E. Sheeja, M. Chaturvedi, S. Sharma, V. B. Gupta

*Department of Pharmacognosy and Phytochemistry, B.R. Nahata College Pharmacy& Research Center, Mandsaur – 458001, Madhya Pradesh, India.

*** Correspondence:** Tel No: 094250-70320. ; Fax No: 07422-255504. ; e-mail: ejeru@rediffmail.com.

Abstract:
The local traditional healers in Mandsaur use the barks and aerial roots of *Ficus bengalensis* Linn (Moraceae) in the treatment of diabetes. The Antihyperglycemic activity of barks was reported, in this direction our work was planned to evaluate and compare the antihyperglycemic activity of barks and aerial roots of *Ficus bengalensis*. The ethanolic extract of both the parts were used for the study using Alloxan induced diabetic model. The activities of both the extracts at a dose level of 100 mg/kg were compared with reference standard, Gilbenclamide 5 mg/kg. The study was done for 14 days and the effects of the extracts were compared with reference standard and control. The bark and aerial roots extracts at a dose of 100 mg/kg significantly ($P<0.001$), ($P<0.01$) lowered the blood sugar level of hyperglycemic rats respectively. Comparatively barks exhibited better activity than aerial roots. This study supports the claim of local healers.

Key Words: *Ficus bengalensis*, Alloxan, Diabetes, Moraceae

INTRODUCTION

Diabetes is a chronic metabolic disorder characterized by altered carbohydrate, fat and protein metabolism, and an increased risk of vascular complications (1, 2). Though different types of oral hypoglycemic agents are available along with insulin for the treatment of Diabetes, there is an increase demand by patients to use the natural products with antidiabetic activity (3). One such plant expected to have antidiabetic activity is *Ficus bengalensis*. Linn. The tree *Ficus bengalensis*, Linn (Moraceae), commonly known as Banyan tree (4) contains flavonoids (5), tannins and carbohydrates (4). The reported uses are anti atherosclerosis, antioxidant (6), antidiarrhoeal (7), etc. The barks were reported to have antidiabetic activity (8). In some places the aerial roots were also used with barks as drugs by the traditional medical practitioners. In this direction our efforts were devoted to compare the antidiabetic activity of aerial roots and barks of Banyan tree.

MATERIALS AND METHODS

Plant material

The aerial parts of *Ficus bengalensis*, Linn were collected, identified and authenticated by taxonomist in KNK College of Horticulture, Mandsaur. A Voucher specimen (F-004/2006) was deposited in the herbarium of Department of Pharmacognosy, B.R. Nahata College of Pharmacy, Mandsaur.

Preparation of the extract

The shade dried hanging roots and barks of *Ficus bengalensis*, Linn were coarsely powdered and defatted using Pet ether (60-80^{0}C) in soxhlet apparatus for 72 h and successively extracted using ethanol as the solvent. The obtained extracts were evaporated in vacuum to give residue. The % yield of ethanol extracts of aerial roots and barks were found to be 6.2 % w/w and 6.6 % w/w respectively. The phytochemical screening of both the extracts revealed the presence of alkaloids, tannins and glycosides.

Animals

After getting the approval from Institutional animal ethics committee, male wistar strain rats weighing between 200 – 250 g were used for investigation. The animals were housed in standard environmental conditions of temperature (21±2^{0}C), humidity (55±10%) and a 12 h light-dark cycle. Rats were supplied with a standard diet and tap water *ad libitum*.

Induction of experimental hyperglycemia

Diabetes was induced to healthy male wistar strain rats weighing between 200 – 250 g by injecting 150 mg/kg of Alloxan monohydrate (S.D Fine Chemicals Pvt Ltd, Baraoda) intraperitoneally in 0.9% w/v of NaCl (9, 10). After 72 h of injection blood glucose level was measured. The hyperglycemic rats (glucose level>250 mg/dl) were separated and used for the study.

Table 1: Effect of ethanolic extracts of aerial roots and barks of Ficus bengalensis Linn in Alloxan induced diabetic rats

Group	Treatment (p.o)	Dose mg / kg	Blood glucose concentration (mg/dl)			Percentage reduction
			0^{th} day	3^{rd} day (alloxan)	14^{th} day	
I	Aerial roots	100	85.6 ± 3.22	288.4 ± 19.14	220.66 ± 11.4**	23.5
II	Barks	100	92.8 ± 4.0	270.90 ± 23.12	185.42 ± 12.62*	31.6
III	Gilbenclamide	05	89.5 ± 2.43	302.66 ± 22.18	170.5 ± 12.53*	43.5
IV	Vehicle	….	95.68 ± 3.61	289.66 ± 24.33	341.83 ± 30.73	--

Vehicle: 2 % w/v of acacia, (n=6)
*Data are expressed in Mean ± SEM, *P< 0.001, **P< 0.01 vs group IV*

Effect of *Ficus bengalensis* barks and aerial roots on hyperglycemic rats

Diabetic animals were grouped in to four groups consisting of 6 animals each. 2 % w/v of acacia was used as vehicle for extract and drug. The first and second group of rats received ethanolic extracts of aerial roots and barks at a dose level of 100 mg/kg (p.o), daily, the third group received reference standard, Gilbenclamide 5 mg/kg, orally and the fourth was treated only with vehicle. After 14 days of the treatment blood samples were collected from rat-tail vein under mild anaesthesia. The blood sugar level was measured using Accu-chek Active ™ Test strips in Accu-chek Active ™ Test meter. Data were expressed in Mean ± SEM. The obtained data were analyzed by Student's 't'-test (11).

RESULTS AND DISCUSSIONS

The ethanolic extracts of aerial roots and barks of *Ficus bengalensis*, Linn at a dose level of 100 mg/kg showed significant activity (P<0.01), (P<0.001) when compared to control group. The effect of aerial roots of the plant was less when compared to barks, but still it has shown significant action. The results are given in Table 1. Chemically alloxan is 2, 4, 5, 6 tetra-oxo-hexahydropyrimidine. It is a beta cytotoxic induces chemical diabetes in a wide variety of animal species through damaging insulin-secreting cells (12). The experiment revealed that the extracts significantly decreased the glucose level in hyperglycemic animals. The glucose lowering activity observed in the diabetic animal may be due to the stimulation of β cells of pancreatic islets, also may be mediated through stimulation of insulin release resembling the oral hypoglycemic sulfonyl ureas or peripheral glucose utilization (13). This may be due to the presence of some hypoglycemic principles in the extracts, which were similar to insulin or oral hypoglycemic drugs. This study supports the claim of local traditional practitioners and makes a reason for using aerial roots and barks for their medicinal preparations. Further pharmacological investigations are needed to elucidate the mechanism of the observed antihyperglycemic effect.

ACKNOWLEDGEMENT

The authors are thankful to the management for providing all the necessary facilities to carry out this work.

REFERENCES

1. F.S.K. Barar, *Essentials of Pharmacotherapeutics*, (3rd Edn, S.Chand and Company Ltd, New Delhi, 2000) pp. 340-341.
2. M.T. Devlin, *Text book of Bio Chemistry*, (4th edn, Wileyliss Inc, NewYork, USA, 1997) pp. 287.
3. S. Venkatesh, G.D. Reddy, B.M. Reddy, M. Ramesh and A.V.N. Apparao. Antihyperglycemic activity of *Carulluma asttenuate*. *Fitoterapia*. **74:** 274-277 (2003).
4. A.K. Nadkarni *Indian Materia Medica*, (Vol. 1, 22nd Edn, Popular Book Depot, Mumbai, 2000) pp. 543-544.
5. K.T. Augusti, S.P. Anuradha Prabha, K.B Smitha, M. Sudheesh, A. George and M.C. Joseph. Nutraceutical effects of garlic oil, its non polar fraction and a Ficus flavonoid as compared to vitamin E in CCl_4 induced liver damage in rats. *Indian J. Exp Biol*. **43:** 437-444 (2005).
6. R.S. Daniel, K.S. Devi, K.T. Augusti and C.R. Sudhakaran Nair. Mechanism of action of antiatherogenic and related effects of *Ficus bengalensis* Linn. flavonoids in experimental animals. *Indian J. Exp Biol*. **41:** 296-303 (2003).
7. P.K. Mukherjee, K. Saha, T. Murugasen, S.C. Mandal, M. Pal, and B.P. Saha. Screening of anti-diarrhoeal profile of some plant extracts of a specific region of West Bengal. *J. Ethnopharmacol*. **60:** 85-89 (1998).
8. K.T. Augusti and S. Cherian. Antidiabetic effects of a glycoside of leucopelargonidin isolated from *Ficus bengalensis* Linn. *Indian J. Exp Biol*. **31:** 26-29 (1993).
9. E. Porchezian, S.H. Ansari and N.K.K. Shreedharan. Antihyperglycemic activity of *Euphrasia officinale* leaves. *Fitoterapia.* **71:** 522-526 (2000).
10. S.S. Ainapure, P.D. Arjaria, V.R. Sawant, P.S. Baid, S.S. Maste, and A.B. Varda. Hypoglycemic activity of an indigenous preparation. *Ind J. Pharmacol.* **17:** 238-239 (1985).
11. Kulkarni SK. (1999) *Hand Book of Experimental Pharmacology*, Vallabh Prakashan: Delhi; 172-189.

12. A. Hecht, H. Geishberg and M. Halse. Effect of Chlorpropamide treatment on insulin secretion in diabetes, its relationship to the hypoglycemic effect. *Metabolism*. **22:** 723-724 (1973).
13. M.A. Esmaeili and R. Yazdanparast. Hypoglycaemic effect of *Teucrium polium*: studies with rat pancreatic islets. *J. Ethnopharmacol*. **95:** 27-30 (2004).