

HYPOGLYCAEMIC ACTION OF BENGALENOSIDE, A GLUCOSIDE ISOLATED FROM *FICUS BENGALENSIS* LINN. IN NORMAL AND ALLOXAN DIABETIC RABBITS

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Summary: A comparative study of the hypoglycaemic action of the ethanolic extract of the bark of *Ficus bengalensis* and a glucoside isolated from it has been made with tolbutamide, both in normal and alloxan diabetic rabbits. The glucoside is more active than the crude extract and it is half as potent as tolbutamide.

Key words: hypoglycaemic action *Ficus bengalensis* Linn bengalenoside
tolbutamide alloxan diabetes

INTRODUCTION

The presence of an orally effective hypoglycaemic glycoside in the alcoholic extract of the bark of *Ficus bengalensis* Linn. has been reported earlier (5). Brahmachari and Augusti (4) isolated three hypoglycaemic principles from the same active extract and found that a glucoside, here after called bengalenoside produced the maximum fall in blood sugar in normal rabbits. The hypoglycaemic action of this compound and the crude extract has been further compared with that of tolbutamide in both normal and alloxan diabetic rabbits and the results are described in this paper.

MATERIALS AND METHODS

The dry bark powder of *F. bengalensis* was extracted in a soxhlet with petroleum ether (40–60°C), diethyl ether and 90 percent ethanol successively. A portion of the active ethanolic extract, after the removal of alcohol under reduced pressure was further fractionated as described earlier by Brahmachari and Augusti (4) and the glucoside compound was isolated. Alcohol from the remaining extract was also removed under reduced pressure and the hypoglycaemic action of this crude extract and bengalenoside were then compared with tolbutamide by the usual procedure of biological assay described previously (2). 18 hour fasting normal male albino rabbits were used in the experiments and their blood sugar was estimated by the method of Asatoor and Kirg (1) with the modifications of Somogyi (8). The results are given in Table I. Alloxan diabetes was then produced in healthy male albino rabbits according to the previous procedures (3) and they were divided into two groups, moderately diabetic (blood sugar range 180-250 mg percent) and severely diabetic (blood sugar above 250 mg percent). The hypoglycaemic action of the crude extract and bengalenoside were then compared with that of tolbutamide in both the groups of diabetic rabbits fasted for 18 hrs. Controls were studied after feeding distilled water. As the drugs produced no hypoglycaemic action in severely diabetic rabbits the results obtained with the moderately diabetic group only are presented in Table II.

RESULTS AND DISCUSSION

The presence of three flavonoid compounds in the crude alcoholic extract of *F. bengalensis* and their hypoglycaemic actions in normal rabbits were reported earlier (4). Out of the three compounds the glucoside produced the maximum hypoglycaemic activity. The present study was undertaken to find out whether the glucoside named bengalenoside or the crude extract is more active in normal and alloxan diabetic rabbits. The results given in Tables I & II indicate that the hypoglycaemic action of bengalenoside is greater than that of the crude extract and it has got about 50 per cent activity of tolbutamide. The maximal blood sugar fall was found at the 3rd hour after drug administration showing slow and gradual onset of its action. Shrotri and Aiman (7) first established the hypoglycaemic action of the aqueous extract of *F. bengalensis* in normal and alloxan diabetic rabbits and then Joglekar *et al.* (6) reported its similar action in diabetic patients. Bengalenoside is water soluble and hence the activity of the aqueous extract which the other workers prepared, was definitely due to

TABLE I: Hypoglycaemic effects of the crude extract and bengalenoside obtained from *F. bengalensis* Linn. compared with that of tolbutamide.

Substance administered orally 0.25 g/kg	Blood sugar (mg/100 ml) Average values for six rabbits in each group					Mean average of maximum reduction percent \pm S.E.	Maximum hypogly- caemic effect as % of tolbuta- mide activity
	F.B.S.	1 hr.	2 hr.	3 hr.	4 hr.		
Tolbutamide	110.0	100.5	90.5	80.1	62.7	43.0 \pm 2.0*	
Crude extract	114.0	100.0	100.5	97.0	100.0	15.0 \pm 1.5*	34.8
Bengalenoside	115.5	100.5	92.0	90.5	95.0	21.6 \pm 1.2*	50.2
Control (dist. water)	110.0	108.5	107.2	110.1	110.5	2.5 \pm 0.5	

Student's t - test *P<0.01 Significantly different from the control.

TABLE II: Effects of the crude extract and bengalenoside from *F. bengalensis* Linn on the blood sugar of alloxan diabetic rabbits compared with tolbutamide.

Substance administered orally 0.25 g/kg.	Average blood sugar values for six rabbits (mg/100 ml)					Mean average of maximum fall in fasting blood sugar percent \pm S.E.
	F.B.S.	1 hr.	2 hr.	3 hr.	4 hr.	
Tolbutamide	200.00	170.5	160.0	162.5	165.0	20.0 \pm 1.0*
Crude extract	195.0	185.5	182.0	178.4	184.0	8.5 \pm 0.5*
Bengalenoside	210.0	200.5	195.5	184.8	185.0	12.0 \pm 0.5*
Control (dist. water)	205.0	207.0	200.0	210.0	206.5	2.4 \pm 0.5

Student's t - test *P<0.01 Significantly different from the control.

this glucoside. But the required dose of the aqueous extract which they used was high (2.5 g rabbit) as it contained other water soluble substance also. Deshmukh *et al.* (5) also attributed the hypoglycaemic action of *F. bengalensis* to a glycoside. The present study shows that alcohol is an ideal solvent for bengalenoside and its dose can be one tenth of the aqueous extract for a significant hypoglycaemic action ($P < 0.01$). Orally effective hypoglycaemic principles isolated from plants and tolbutamide were found to be active only in normal and moderately alloxan diabetic rabbits and not in severely alloxan diabetic rabbits. As bengalenoside is also found to be effective only in normal and moderately diabetic animals its action may be dependent on insulin production or insulin protection. In alloxan diabetic animals, the secretion of insulin is poor and a fall in blood sugar can occur only on giving a hypoglycaemic agent which will act by itself or by helping in some way the action of poorly available endogenous insulin. The formation of insulin tannin complexes which are biologically active has been reported earlier (9). Bengalenoside showing the properties of a condensed tannin (4) may be exhibiting its hypoglycaemic action through some kind of complex formation with endogenous insulin and thus protecting it from degradation by insulinase.

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