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ANTIDIABETIC ACTIVITY OF BARK AND ROOT OF *CAESALPINIA BONDUE*

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ABSTRACT

The different extracts of the roots of *Caesalpinia Bondue* (Family- Fabeaccae) were tested for anti-diabetic activity, by glucose tolerance test in normal rats and alloxan induced diabetic rats. Aqueous ethanol and chloroform extracts had shown significant protection and lowered the blood glucose levels to normal in glucose tolerance test. In alloxan induced diabetic rats the maximum reduction in blood glucose was observed after 3h at a dose level of 250 mg/kg of body weight. The percentage protections by aqueous chloroform and ethanol extracts were 22.28 and 23% respectively. In long term treatment of alloxan induced diabetic rats, the degree of protection was determined by measuring blood glucose, triglycerides, cholesterol and urea levels on 0,3,5,7 and 10th day. Both the extracts showed a significant anti- diabetic activity comparable with that of glibenclamide, standard anti-diabetic drug.

INTRODUCTION: Diabetes is major chronic disease characterized by carbohydrates and protein metabolism affecting more than 10 % of the population all over the world [1, 2]. In diabetic patient, amount of glucose in blood is too high. Hormone insulin is produced in the gland called pancreas; insulin allows glucose be taken from blood and used by body for energy. Increase in thirst, frequent urination, extreme tiredness, and weight loss are the common symptoms in diabetes.

Plant	:	*Caesalpinia Bondue*
Kingdom	:	Plantae
Division	:	Mangoliophyta
Class	:	Mangoliopsida
Order	:	Febales
Family	:	Fabeaccae
Genus	:	*Caesalpinia*
Species	:	*Bondue*

This shrub occurs all over India, grows in shade as well as in open, generally 750 mm to 1800 mm in length [3, 4]. Large straggling branches are armed with hooks and straight hard yellow pickets; leaves bipinnate and large stipules. Leaflet is folloceous with 7 to 38 pinnae pairs and 1, 2 small recovered pickles between them on the underside.

Yellow flower are with dense long predunckle and supra-axivary recemes at the top. Fruits are inflated pods, covered with prickles, with 1, 2 seeds per pod, oblong or globular, hard, and grey with a smooth shiny surface. Plant has traditional value because roots of this plant are normally used on footing stomatic diseases, fever, cough and asthma and leaves are useful on cough, intestinal worm and also used as liver tonic.

In present study, we are using *Caesalpinia Bondue* Linn. plant for diabetic study and its antibacterial activity.

Experimental:

Plant Material: Plant seeds, leaves and bark are collected from plant *C. B* Linn. near Gondhavani region of Shrirampur district, Ahemednagar and identified by Mr. B. D. Warpe, Dept. of Botany, R.B.N.B. College, Shrirampur. The specimen sample is kept in R.B.N.B. college laboratory.

(a) Preparation of extracts: The dried seed powder (500g) was extracted with 80% aqueous ethyl alcohol process for 3 days. The concentrated aqueous ethanol extract (11.3 g) was suspended in water and fractionated with chloroform (4x500 ml) which yielded chloroform extract (7.57g).

(b) Separation of Terpenes and Alkaloids:

(i) Fresh leaves, roots, bark powder is mixed with 40 volume of ethyl alcohol and 10 volume of water, stirred for 1 hour to separate residue and filtrate.

(ii) Add ethyl acetate to the residue and stir for half an hour and filter. Residue contains fibers and filtrate contains fats and waxes.

(iii) To the filtrate, add 50 ml chloroform and separate aqueous and chloroform layers. Chloroform layer contains terpenes while aqueous layer contains alkaloids

Test animals: Male Albino rats (160-200 g) were used in the experiment. Animals maintained under standard environmental conditions, were fed with a standard diet (Hindustan Lever, India). Animals were fasted for 16h before experimentation but were allowed free access to water.

Effect of *Caesalpinia Bondue* extracts on glucose tolerance in rats: Fasted rats were divided into 3 groups of six rats each. Group I served as a control, received distilled water [5, 6, 7]. Group II – III received aqueous ethanol and chloroform extracts respectively at a dose of 250 mg/kg body weight as a fine aqueous suspension orally. The rats of all groups were given glucose (2 g/kg body weight,) 30min after administration of the drug [8, 10, 11]. Blood samples were collected from the tail vein just prior to glucose administration and at 30, 60 min and 90 min after the glucose loading. Serum was separated and blood glucose levels were measured immediately by glucose-oxidiase method [1].

Effect of the *Caesalpinia Bondue* extracts on Alloxan-Induced Diabetic Rats: Male rats (180-200g) were made diabetic by a single i.v. injection of 120mg/kg/ bodyweight of alloxan monohydrate in sterile normal saline. The rats were maintained on 5 % glucose solution for next 24h to prevent hypoglycemia. Five days later blood samples were drawn from tail vein and glucose levels were determined to confirm the development of diabetes (350mg/dl).

The diabetic rats were divided into four groups, each containing six animals. Controls rats (Group I) were given distilled water orally, while *Caesalpinia Bondue* aqueous ethanol, and butanol extracts were given to groups II-III respectively, at a dose of 250 mg/kg, orally. Group IV received glibenclamide at dose of 10 mg/kg. Blood samples were collected from the tail vein just prior to and 1h, 3h and 5h after drug administration. The effect of *Caesalpinia Bondue* extracts was also tested for a prolonged treatment.

The diabetic male Wistar rats (160-180g) were divided into four groups of eight rats each. Group I served as diabetic control received distilled water instead of extracts. The rats of group II-III received aqueous ethanol and butanol extracts respectively at dose of 250 mg/kg body weight, as fine aqueous suspension, orally. Group IV received glibenclamide at dose of 10 mg/kg. The administration of extracts was continued for 10 days, once daily. Blood samples were collected through the tail vein just prior to and on days 1, 3, 5, 7 and 10 after drug administration. The blood glucose, urea, total cholesterol, triglyceride levels were determined for all the samples.

RESULTS: Have shown significant ($P<0.01$) increase in glucose tolerance. The Results are given in **Table 1**. The blood glucose levels were reduced considerably within 60 minutes of the drug administration. The chloroform and aqueous ethanol extracts reduced the glucose levels to normal. Maximum, effect was observed for butanol extract.

In alloxan-induced diabetic rats also, both extracts have shown considerable reduction in blood glucose levels. The results are shown in **table 2**. The reduction

in glucose levels is significant($p<0.01$) in the treated animals at 1h, 3h and 5h after drug administration. The maximum percentage reduction in blood glucose levels was found to be in chloroform extract (22.86%), while aqueous ethanol showed (23%) blood glucose level. Treatment of the diabetic rats with glibenclamide (10 mg/kg) produced (29.77%) fall of blood glucose after 3h treatment.

TABLE 1: EFFECT OF SEED EXTRACT *CAESALPINIA BONDUE* ON ORAL GLUCOSE TOLERANCE IN RAT

Group	Treatment	Fasting	30 min	60 min	90 min
I	Glucose 2gm	72	150	120	100
II	Aqueous ethanol 250 mg + glucose	73	103	94	84
III	Chloroform extract + glucose	74	93	74	54

TABLE 2: EFFECT OF *CAESALPINIA BONDUE* SEED EXTRACTS ON BLOOD GLUCOSE LEVELS (mg/dl) OF ALLOXAN INDUCED DIABETIC RATS

Group	Treatment	0h	1h	3h	5h
1	Diabetic – untreated	290.10± 7.65	285.78± 8.12	276.21± 8.85	280.12 ±7.84
2	Diabetic rats treated with 250 mg/kg of a aqueous ethanol extracts	268.16± 8.59	170.10± 7.17	156.39± 7.22	167.59± 7.81
3	Diabetic rats treated with 250 mg/kg of butanol extracts	296.84± 7.20	144.80± 6.28	102.92±5.50**	122.29 ±5.31
4	Diabetic rats treated with 10 mg/kg of Glibenclamide.	282.08± 7.94	248.33±8.0	168.31±7.40	87.12± 7.37

The prolonged treatment of *Caesalpinia Bondue* extracts on alloxan-induced diabetic rats produced consistent reduction in the blood glucose levels. Both the extracts have shown significant ($p<0.01$) reduction of blood glucose, urea, total cholesterol and triglycerides during the 10 days treatment period. However the butanol extract has shown maximum reduction (144.71 mg/dl on 10th day) and at a faster rate compared to aqueous ethanol extract (223.51 mg/dl)

CONCLUSION: *Caesalpinia Bondue* seed juice is claimed to be useful in diabetes. The aqueous ethanol and chloroform extracts have shown significant reduction in blood glucose levels in both, glucose loaded and alloxan induced diabetic rats. The ethanol extract produced maximum anti-diabetic activity and is higher than the hypoglycemic activity of glibenclamide in the diabetic rats. Therefore it is obvious that the fractionation with ethanol has enriched the active principles. In glucose loaded animals, the drug has reduced the blood glucose to the normal levels. It is possible that the drug may be acting by potentiating the pancreatic secretion or increasing the glucose uptake.

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