

Hypoglycaemic Activity of *Globimetulla browni* Extracts in Streptozotocin-induced Diabetic Wistar Rats during Dry Season

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Abstract: *Globimetulla browni* is a specie of African mistletoe (Loranthaceae) and is hemi-parasitic in nature. It was studied for ascribed/folkloric antidiabetic properties. Streptozotocin which is well known for its selective pancreatic β -cell cytotoxicity was used to induce type 1 diabetes in the experimental rat model. Glibenclamide was used as a standard antidiabetic drug in streptozotocin induced diabetes to compare the efficacy of variety of hypoglycaemic agents. The extracts from this specie significantly increased the body weights of the albino rats with the extracts effectively controlling the increase in the glucose levels in the diabetic group of rats which could be attributed to its antihyperglycemic effects. Further, the antihyperglycemic activities of the extracts was associated with an increase in plasma insulin level, suggesting an insulinogenic activity of the plant extract.

Key words: Diabetes, extracts, *Globimetulla browni*, hypoglycaemic, streptozotocin, wistar rats

INTRODUCTION

The objective of the present study was to determine the oral hypoglycaemic effect of this plant in streptozotocin-induced diabetic wistar rats. Mistletoe is capable of growing independently since, like other plants, it is able to produce food by means of photosynthesis, nevertheless it is usually found growing as a parasitic plant. (Becker, 1986) Mistletoes are very important in curative medicine. They are known to be highly potent in curing circulatory problems and also as anticancer agents (Kafaru, 1994). In Nigeria, several herbal preparations from leaves and twigs of mistletoe e.g., *Tapinanthus bengwensis* have become popular for the treatment of variety of disease, such as diabetes and hypertension, which have been reported to be on the increase in the country (Olapade, 1995). The plant is known to grow on various trees in Nigeria. In the Northern part of the country, it is found growing on fruit trees and various woody trees common in the northern vegetation which are not annuals such as the eukalptus family. Diabetics have long been treated orally with several medicinal plants or their extracts, based on folkloric claims (Akhtar and Ali, 1980) Objective of the study; To investigate the Hypoglycaemic activity of *Globimetulla browni* extracts using a diabetogen (Streptozotocin) induced diabetic rats during dry season.

MATERIALS AND METHODS

This research/benchmark was carried out in the Department of Biochemistry, Ahmadu Bello University, Zaria-Nigeria between the months of November-April, 2009.

Plant material: *Globimetulla browni* leaves were collected from the trunk of a Eukalyptus tree in front of Ahmadu Bello University bookshop (Fig. 1) and identified by Mr. U.S Galla of Herbarium in the Department of Biological Sciences, ABU Zaria and given a voucher specimen no 1968.

Experimental animals: Male Wistar albino (n = 30) weighing between 150-200 g each were procured from the Nigerian Institute for Trypanosomiasis and Onchocerciasis Research (NITOR), Kaduna for this research work. The animals were housed at a temperature of 24°C+2°C with humidity of 55+10% and a 12-h light-dark cycle lights at 0600 h. The rats were supplied with a standard Pfizer pellet diet and tap water *ad libitum* (Suba *et al.*, 2004).

Induction of diabetes: Streptozotocin-hyperglycaemic rats (30), were fasted for 18 h. They were made hyperglycemic by intraperitoneal injection of streptozotocin (Sigma USA) dissolved in citrate buffer (pH 4.3) at a dose of 50 mg/kg⁻¹ body weight. After 48h, their plasma glucose levels were estimated. The streptozotocin-hyperglycemic rats (Chattopadya, 1993), having plasma glucose levels above 250 mg% were selected and divided into 5 groups of 6 animals each. One group received glibenclamide (10 mg of drug/kg p.o) and a control group received saline (10 mL of saline/kg body weight). Other groups were administered *Globimetulla browni* extracts at oral doses of 100, 200 and 300 mg of the extracts/kg body weight. This was done during the Dry season (November-April, 2009).

Table 1: Antidiabetic activity of methanol extract of *Globimetulla brownie* leaf extracts

Treatment and dose	Plasma glucose concentration in mg %			
	Time after treatment (h))			
	0	4	8	12
Control 10 mL of water/kg1 body wt	282.50±2.22	270.56±2.05	258.22±2.80	255.73±4.00
100 mg/kg body wt	279.18±2.02	265.73±1.35* (7.19)	266.33±2.35* (6.69)	247.83±3.85** (8.40)
200 mg/kg body wt	275.00±2.57	253.50±4.04* (7.35)	245.83±2.55** (7.48)	240.00±2.70** (13.47)
300 mg/kg/body wt	265.00±2.63	252.66±4.78* (7.36)	250.00±4.75** (11.55)	235.00±4.60** (1.45)
Glibenclamide 10 mg/kg/ body wt	265.00±3.72	252.50±2.65 (10.73)	248.44±4.73** (12.18)	225.64±3.85** (1780)

*:p<0.01; **:p< 0.001 versus control (distilled water); Each value represent s mean ± S.E.M. (n = 6); Figures in the parenthesis show percentage of reduction (Plasma glucose)



Fig. 1: *Globimetulla brownie* (circled) parasitizing on eukalyptus in front of ABu zaria bookshop, voucher no. 1968

Studies on diabetic rats: The test group was allowed access to the dried leaves of *Globimetulla brownie* (varying doses), feed and the control group was given the standard feed only. Both groups had access to water *ad libitum*. After 7 days, the rats were fasted overnight and the fasting blood samples were collected from the lateral tail vein under anaesthesia with diethyl ether. The serum glucose concentrations were determined immediately using the glucose oxidase method (Hugget and Nixon, 1957).

RESULTS AND DISCUSSION

From Table 1, *Globimetulla brownie* showed antidiabetic activity after treating the streptozotocin induced diabetic rats with varying concentrations of the extract (100, 200 and 300 mg/kg body weight). Thus revealing a diabetic therapeutic potential as previously demonstrated (Sheela and August, 1992). The antidiabetic activity observed in the streptozotocin induced diabetic rats from the mistletoe specie (*Globimetulla brownie*) was dose-dependent and time-dependent with the activity increasing with increasing dose and increasing time. The antidiabetic effect was prolonged and sustained for up to 12 h. Maximum activity was observed at 200 mg/kg body weight (p<0.01) at 12 h after oral administration. The

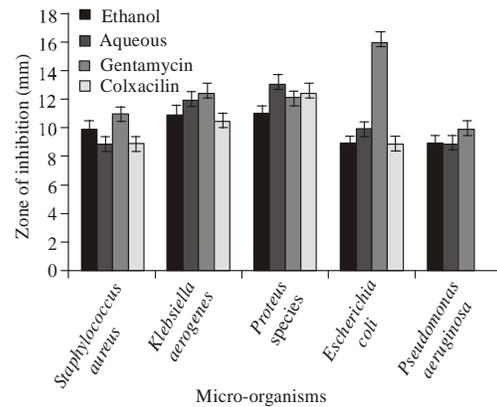


Fig. 2: Antidiabetic activity of *Globimetulla brownie* extracts (dry season) n = 5

antidiabetic effect of the plants when compared to that of the control/standard drug (Glibenclamide) 10 mg/kg was less which is not surprising as crude extracts were used.

Reference is hereby made to Fig. 2 showing the histogram representation of the antidiabetic effect of this plant. From the figure the control value clearly stands as compared to the varying doses (100, 200, 300 and standard drug) (Glibenclamide) which markedly showed a decrease in the plasma glucose concentration within the time dependent exposure to the varying doses.

The results obtained from the present study are very much promising and comparable to Glibenclamide, a standard drug used to treat diabetes mellitus.

CONCLUSION

Globimetulla brownie showed antidiabetic activity after treating streptozotocin induced diabetic rats with varying concentrations of the extracts (100, 200 and 300 mg/kg body weight) during the dry season. Thus revealing a diabetic therapeutic potentials as previously demonstrated (Sheela and August, 1992).

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