BINGHAM JOURNAL OF MEDICINE

RESEARCH ARTICLE

Hypoglycaemic Effect of *Gongronema latifolium* in Alloxan-diabetic Rabbits

Effet hypoglycémiant du Gongronema Latifolium chez les Lapins Diabétiques à l'Alloxane

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ABSTRACT

BACKGROUND: ***Gongronema latifolium* is an edible and a medicinal plant. The plant has been reported to possess several useful effects in man.**

OBJECTIVE: **To determine the blood glucose lowering effect of *Gongronema latifolium* in diabetes mellitus.**

METHODS: **Diabetes mellitus was induced in male rabbits by intravenous injection of alloxan. The alloxan induced diabetic rats were then given a *Gongronema latifolium* extract or metformin. Blood glucose was subsequently monitored for 24 hours.**

RESULTS: **The *G.latifolium* extracts showed a significant hypoglycaemic effect on both normal and diabetic rabbits. Blood glucose levels were either as low or lower after the administration of *G latifolium* than metformin.**

CONCLUSION: **The results of these study confirm that *G. latifolium* extract lowers blood glucose. This suggests that it has a possible use as a dietary adjunct in the management of diabetes mellitus. BJM 2020; 2(1): 19–21.**

Keywords: **Alloxan-induced diabetes; antihyperglcaemic effect; blood glucose; diabetes mellitus; *Gongronema latifolium*,; metformin; *Orcytolagus cuniculus*.**

ABSTRAIT

CONTEXTE: Gongronema latifolium est une plante comestible et médicinale. Il a été rapporté que la plante possède plusieurs effets utiles chez l'homme. Objectif: Déterminer l'effet hypoglycémiant de Gongronema latifolium dans le diabète sucré.

MÉTHODES: Le diabète sucré a été induit chez des lapins mâles par injection intraveineuse d'alloxan. Les rats diabétiques induits par l'alloxane ont ensuite reçu un extrait de Gongronema latifolium ou de la metformine. La glycémie a ensuite été surveillée pendant 24 heures.

RÉSULTATS: Les extraits de G.latifolium ont montré un effet hypoglycémiant significatif sur les lapins normaux et diabétiques. Les taux de glucose sanguin étaient aussi bas ou plus bas après l'administration de G. latifolium que la metformine.

CONCLUSION: Les résultats de cette étude confirment que l'extrait de G. latifolium abaisse la glycémie. Cela suggère qu'il a une utilisation possible comme complément alimentaire dans la gestion du diabète sucré. **BJM 2020; 2(1): 19–21.**

Mots clés: Diabète induit par les alloxanes: effet antihyperglcémique; glucose sanguin; diabète sucré: Gongronema latifolium; metformine; Orcytolagus cuniculus.

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Abbreviations: GFT, G. Latifolium-treated; **MFT,** Metformin treated.

INTRODUCTION

Diabetes mellitus (DM) is characterized by disturbances of carbohydrate, fat and protein metabolism. It results from defects in insulin secretion, or insulin action or both.[1] *Gongronema latifonium* known by various names in West Africa such as "arokeke" in Yoruba and "utazi" in Igbo in Nigeria, while "aborode, akam, nsurogya" in Ghana *G.latifonium* is widespread in tropical Africa and occurs from Senegal to Chad and south to DR Congo.[2] Gongrenoma latifolium is an edible rainforest plant. It has been widely used as a folklore medicine, a spice and vegetable for maintaining blood glucose level.[3–4] *G. latifolium* leaves possess antioxidant activity as shown by increased superoxide dismutase and glutathione peroxidase activities and a decrease in melon aldehyde level. It also significantly decreases triglyceride levels and normalizes cholesterol concentration.[5] Treatment of diabetic patients with antioxidants may be of advantage in attenuating diabetic complications as it has been postulated that supplementation with dietary antioxidant compounds may offer some protection against these complications.[6–7]

Medicinal plants have long been used in the treatment of diabetes mellitus. Many of such plants have been shown to have hypoglycaemic effect either individually or in combinations.[8–9] This study aimed to determine the blood glucose lowering effect of *Gongronema latifolium* in normoglycemic and alloxan-induced diabetic rabbits.

MATERIALS AND METHODS

Plant Material and Extract

Gongronema latifolium leaves were purchased from Bukuru market in Jos in Plateau State of Nigeria. The fresh leaves were air dried at room temperature and ground into powder using a mortar and a pestle. An amount of 200 g of the powder was dissolved in distilled water and left for 24 hours after which it was filtered and evaporated to dryness to yield an extract used for the studies.

Animals: Adult healthy male rabbits (*Orcytolagus cuniculus*) of 1.50–1.75 kg body weights were acclimatized under standard conditions of temperature, humidity and light. The rabbits were kept under observation for a week in an animal house at the National Veterinary Research Institute Vom Jos Nigeria before use. They were provided with free access to a balanced rabbit's diet. They were fed with standard pelleted feed and vegetables under a strict schedule (6.00, 14.00 and 20.00 hours). Overnight fasted animals were divided randomly into four groups (4 animals per group).

Diabetes Induction: Animals were made diabetic by a single dose of intravenous injection of alloxan monohydrate (150mg/kg, b.w) dissolved in 0.1m sodium citrate buffer pH 4.5. The control group received a similar volume of the vehicle (citrate buffer, 1mg/kg).

Administration of Drugs: The experimental animals were administered drugs as follows:

- Fasted-normal groups and fasted-treated groups – Aqueous extract of *G. latifolium* (300mg/kg, b.w).
- Fasted-reference control group – Metformin (500 mg/kg b.w).
- Fasted-untreated control (normal) group – Lactose (500 mg/kg b.w) as gelatin capsule 12h for three consecutive days orally.

Subsequent administration of alloxan monohydrate intravenously to control and other groups was carried out according to Zaman and Rehman.[14]

Laboratory Analysis: Blood samples from test animals were collected through venous puncture into sterile plain tubes before and after 1, 2, 4, 8, and 24 hours following alloxan injection. The blood samples were centrifuged at 600 rpm for 10 min and the collected serum used for the estimation of glucose with Diagnostic Randox UK Kit.

Statistical Analysis: Average values are expressed as means ± SD. Mean values were compared for statistical significance by one-way ANOVA test. Differences are considered significant at $p<0.05$.

RESULTS

The alloxan injection successfully induced hyperglycaemia in the affected animals, producing effect by the fourth hour after injection.

The effects of Gongronema *latifolium* extract (GLE) and metformin (MT) on blood glucose in the diabetic rats are shown in Table 2.

Table 2 shows the effect of GLE on blood glucose in the diabetic rats. Blood glucose concentrations were significantly lower in the GLE-treated group than in the controls. Comparing GLE and MFT groups, the table shows that GLE more significantly lowered serum glucose than metformin.

Table 3 compares the effects of metformin and *Gongronema latifolium* extract on blood glucose in the diabetic rats. Blood glucose levels were significantly lower in both metformin treated and *G. atifolium* treated rats than in controls. At all-time points after initiating treated, GLE was more effective in lowering serum glucose than in untreated diabetic rats.

DISCUSSION

Gongronema latifolium showed a clear glucose lowering effect in the diabetic rats. This finding is in keeping

Table 1: Effect of Alloxan on Blood Glucose Levels in Rabbits*

Time (h)	Mean±SD Serum Glucose (mmol/l)		P value
	Alloxan –	Alloxan +	
0	4.62 ± 0.69	4.69 ± 0.23	>0.05
1	4.56 ± 0.23	5.70 ± 0.20	<0.05
2	4.65 ± 0.20	7.58 ± 0.23	<0.05
4	4.46 ± 0.23	9.52 ± 0.28	<0.05
8	4.57 ± 0.25	10.49 ± 0.20	<0.05
24	4.46 ± 0.23	10.16 ± 0.18	<0.05

**Four animals in each group*

Table 2: Effect of Alloxan on Blood Glucose Levels in Rabbits

Time (h)	Mean±SD Serum Glucose (mmol/l)			
	Untreated	MFT	GFT	P (MfTv GFT)
0	4.69 ± 0.23	4.69 ± 0.23	4.56 ± 0.23	>0.05
1	5.70 ± 0.20	4.04 ± 0.69	4.04±0.69	<0.05
2	7.58 ± 0.03	4.03 ± 0.46	4.03 ± 0.46	<0.05
4	9.52 ± 0.28	4.46 ± 0.23	4.03±0.46	<0.05
8	10.49 ± 0.20	10.49 ± 0.20	4.80 ± 0.20	<0.05
24	10.16 ± 0.18	4.80 ± 0.20	4.80±0.20	<0.05

GFT, G. Latifolium-treated; MFT, Metformin treated

Table 3: Comparison of Effect on Metformin and *G. Latifolium* Extract on Blood Glucose of Diabetic Rats

Time	Mean (SD) Serum Glucose (mmol/L)			
	Untreated (N=4)	MFT (N=4)	GF-(N=4)	P Value
0	4.69 ± 0.23	4.56 ± 0.23	4.56±0.23	>0.05
1	5.70 ± 0.20	4.04 ± 0.69	4.04±0.69	<0.05
2	7.58 ± 0.03	4.03 ± 0.46	4.03±0.46	<0.05
4	9.52 ± 0.28	4.46 ± 0.23	4.46±0.23	<0.05
8	10.49 ± 0.20	4.67 ± 0.24	4.67±0.24	<0.05
24	10.16 ± 0.18	4.80 ± 0.20		<0.05

the reports of others. Interestingly, GLE appears to be more effective in lowering blood glucose than metformin in the short-term. It should be noted however that metformin is not a fast acting agent and therefore GLE should also be compared with other anti-hyperglycaemic agents

The extract may be a useful adjunct to the treatment of diabetic mellitus. Our findings are preliminary and would need to be conformed in humans.

CONCLUSION

The blood glucose lowering effect exhibited by the extract of *Gongronema latifolium* suggests its potential anti-hyperglycaemic property in the management of diabetes mellitus. The study therefore confirms that *G. latifolium* causes a reduction in blood glucose, and as such could be used as a dietary adjunct for maintaining body blood glucose level. We therefore recommend that the treatment of type 2 diabetes mellitus be centred on reduction of blood glucose levels using dietary means among other measures.

Conflict of Interest

None.

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