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**PHYTOCHEMICAL SCREENING AND HYPOGLYCEMIC ACTIVITY OF
METHANOLIC STEM EXTRACT OF *Costu afer* IN RATS**

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ABSTRACT

The screening of *costus afar* for the presence of plant products and the effects of methanol stem extract on fasting blood glucose of normal rats was investigated. The adult's albino rats were given graded doses (200-800mg/kg) of the methanol stem extract of the plant and standard hypoglycemic drug of glibenclamide or the combination of them in presence or absence of oral glucose feeding. Fasting blood glucose was monitored for six hours after administration of drugs substance. The result of phytochemical screening showed that there were relative amounts of alkaloids, falconoid, tannins phenols, glycosides and trepanoid. The plant also showed significant hypoglycemic effect ($P < 0.005$) when compared to standard drug. Therefore its potential blood glucose increases in glucose fed rats. Also the combination of plant extract and the standard drug caused significant reduction in fasting blood sugar of both glucose loaded and un-loaded rats.

**Keywords: *Costus afar*, Methanol Stem Extract, Glibenclamide, Phytochemical,
Hypoglycemic**

INTRODUCTION

The plant *Costs afar kern*, is of costaceae family that is widely spread in the forest region of tropical Africa [1] they are tall perennial herb with leafy stems. The plant is about ten feet in high with white and yellow flowers. They have succulent terminal inflorescence pink tip. There are about one

hundred and forty species of stout perennial rhizomatous herbs of the plant found in the tropics of both hemispheres [2]. This plant had been reported in the treatment of many ailments of which diabetes is one? Diabetes mellitus is a chronic metabolic disorder characterized by hyperglycemia, which is

expressed as abnormal glucose value in relative to insulin deficiency, resistance or both. Diabetes developed as a result of body pancreas not producing enough insulin to metabolized glucose or the failure of body insulin to act on receptor cells in the blood [3]. The onset of this decrease in adulthood had been reported to respond to several remedial measures such as, the use of drugs like glibenclamid, biguanides or herbs extract from either the leaves or stem [3].

This research work is therefore aimed at assessing the phytochemical parameters and hypoglycemic activities of methanolic stem extract of the plant *Costus Afer* on rats as a possible way of checking diabetes mellitus in living organisms.

MATERIALS AND METHODS

Forty seven albino rats (*Rattus norvegicus*) of 180 grammes average weight were obtained from animal house, department of physiology, university of Nigeria Nsukka, Nigeria. The plant *Costus afer ker* was collected from the side of a river known as Oganaji river in Anyigba, Nigeria. The plant was identified by Prof. Agwu of the department of biological sciences, Kogi State University, Anyigba Nigeria. All the reagents used for the analysis are of analytical grade obtained from BDH chemical limited England and Rjedel-de Heam AG Seelze Hann over.

Stem Extract and Phytochemical Screening

The collected plant (*Costus afer ker*) was washed and sun dried at room temperature. The stems were cut into bits and heat dried in the common oven. The dried stems were mechanically grinded. 400grams of the grounded stems was taken and soaked in two (2) liters of methanol solution for 48 hrs at room temperature. The residue was removed by filtration and the filtrate was concentrated under reduced pressure by a rotary evaporator at 40°C. The resulting extract was then stored in refrigerator to prevent fermentation.

The small portion of the extract was used for the photochemical analysis by the application of the procedure of [4] to determine the presence of alkaloids, flavonoids, tannins, saponins, glycosides, phenol and terpenoids.

Experimental Design

All the albino rats were kept in the animal house of Biochemistry department of Kogi State University, Anyigba Nigeria for two weeks, so that they can be adapted to the environment. The rats were then fasted for 12 hours and divided into ten groups with the first nine groups containing five rats each while the tenth group contains two rats that will serve as control.

Treatment

Experimental animal were treated as follows:

Group 1 - Normal Control (distilled water only)

Group 2 - Glibenclamide (GB) 5mg/kg body weight

Group 3 - Stem extract (SE) 200mg/kg body weight

Group 4 - SE 400mg/kg body weight

Group 5 - SE 800 mg/kg body weight

Group 6 - SE 200mg/kg + Glucose 2g/kg body weight

Group 7 - SE 400mg/kg + Glucose 2g/kg body weight

Group 8 - SE 800mg/kg Glucose 2g/kg body weight

Group 9 - SE 400mg/kg + GB 2.5mg/kg body weight

Group 10 - SE 400 mg/kg + GB 2.5mg/kg + Glucose 2g/kg body weight

Treatments were administered as single dose by gavage and the glucose level was checked at every six hours. Glucose was given to animals after an hour of stem extract administration by oral method.

Hypoglycemic studies in rats: in normal rats, the study was carried out by tail bleeding them and their fasting blood glucose estimated by an automatic one touch glucometer.

The initial blood glucose level was compared to change in glucose level over six hours post administration of drugs. On glucose fed rats after the administration of a dose of dissolved glucose of 2g/kg body weight, an hour after, the drug was administered.

The blood glucose level was observed for five hours. Both GB and SE were administered and studied for the determination of useful complementarities of the two regimens.

RESULTS

The results of physiochemical screening showed that the plant extract consist of high amount of trepanoid, moderate amounts of alkaloids, flavonoids, phenols and trace amount of tannins, saponins and glycosides (**Table 1**).

Oral intake of the methanolic stem extract of the plant showed a dose dependent hypoglycemic effect as shown in **Figure 1**. At 200mg/kg and 800mg/kg indicate significant hypoglycemic effect in fasted normal rats by 34% and 59% respectively. Oral administration of 5mg/kg glibenclamide also showed significant decrease ($P < 0.05$) in fasting blood glucose compared to 200mg/kg SE but much less than 800mg/kg SE.

In contras is the rapid increase ($P > 0.05$) in fasting blood glucose observed when glucose was administered with the stem extract as indicated in **Figure 2**. Studies on complementarily of GB and SE showed positive results. **Figure 3** showed co-administration of 400mg/kg SE and 2.5 mg/kg GB that caused 56.6% and 36.8% reduction in fasting blood sugar over 6 hours in the absence and presence of oral glucose administrations respectively

DISCUSSION

Medicinal plant is long used in the treatment of diabetes mellitus. We therefore investigate the photochemical parameters of

stem of *costus afer* and also studied the effects of its methanol extract of the stem on fasting blood glucose of rats. While photochemical analysis showed major constitutions of the extract as terpenoid, flavonoid, phenols, alkaloids, glycosides and tannins, over 100 plant extracts and their active principles which includes flavonoids are known to be use for the treatment of diabetes [5-7]. More so that tannin — containing drug demonstrated ant diabetic activity [8-10]. In addition several phenolic compound and flavonoid possess marked anti-diabetic activity [11]. It is very likely that the insulin like activity of this compound is inherent in the plant that is responsible for its hypoglycemic actions. Bioactive agent possibly mobilizes glucose in their store form, while decreasing the blood glucose level. On the contrast methanol stem extracts of *costu afer* stimulate a rapid increase in blood glucose level. It may be possible also that the glucose and the bioactive parameter in the material may be competing for the same binding sites, there by inhibiting glucose uptake from the blood. Positive result from this experiment using both plant extract and glibenclamide, points at the possibility of using both treatments in diabetes mellitus without the fear of drug to drug interaction.

One can boldly conclude that the study has shown that *costus afer* contain anti-diabetic agent that require further characterization.

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Table 1: Phytochemical Constituents of Stem Extract of *Costus afer*

Compounds	Presence
Alkaloids	++
Flavonoids	++
Tannins	+
Saponin	+
Glycosides	+
Phenol	++
Terpenoids	+++

NOTE: +++ Appreciable Amount; ++ Moderate Amount; + Trace Amount

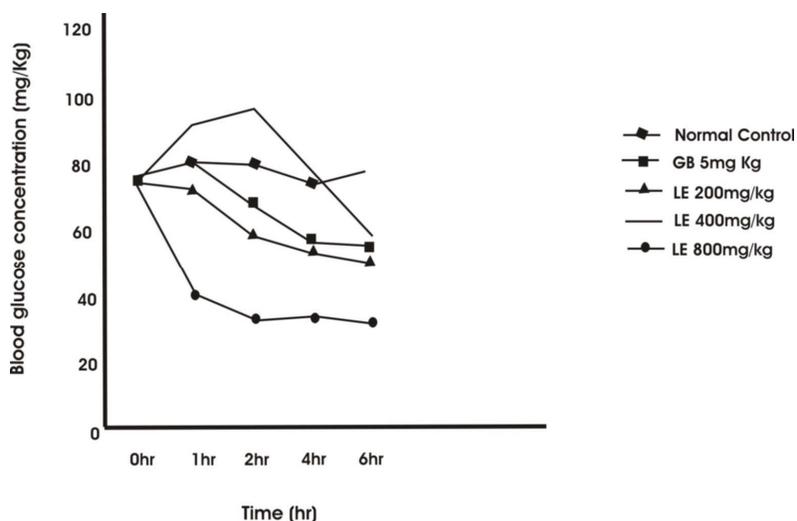


Figure 1: Effect of Varied Doses of Methanolic Stem Extract of *Costus afer* on the Fasting Blood Sugar of Normoglycaemic Rats

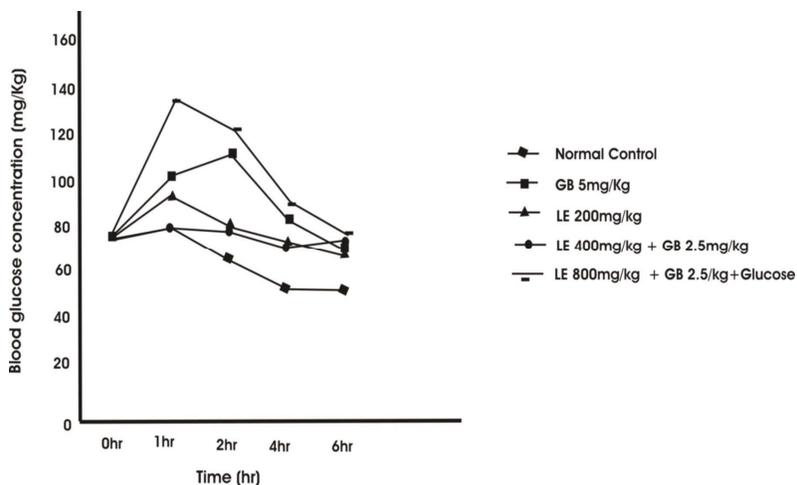


Figure 2: Effect of Varied Doses of Methanolic Stem Extract of *costus afer* on Oral Glucose Tolerance of Normal Rat

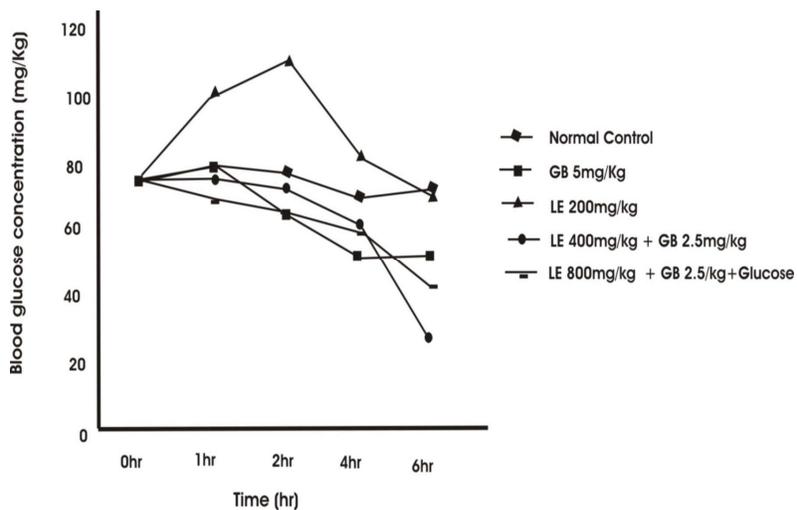


Figure 3: Effect of Co-Administration of Methanolic Stem Extract of *costus afer* and Glibenclamide on Glucose Tolerance of Normal Rats