



Ameliorative effects of active principles in *Grangronema latifolium* (utazi) on some biochemical and hematological profile of male hyperglycemic, hyperchloremic and polycythemic subjects in Enugu Nigeria.

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ABSTRACT

The ameliorative effects of active principles in *Gangronema latifolium* on some pathological, biochemical and haematological profile of male subjects in Enugu metropolis was investigated. Thirty two (32) male subjects were divided into four (4) groups consisting of eight (8) subjects each. Group A is the control group consisting of apparently 8 healthy subjects, group C is the hyperglycemic subjects (8), group B is the hypercholesteremic subjects (8) while group D is the polycythemic subject (8). They were exposed to the use of the leaf of *G.latifolium* for 28 days, later their blood samples were collected into haemogram bottles and plain tubes for analysis. The result of the analysis before the administration of the leaf when compared to the result after 28 days administration of the extract showed a significant difference in the case of hyperglycemia and hypercholesteremia ($P < 0.05$). The result of group B subjects is $587 \pm 6.8\text{mg/dl}$ before the leaf consumption, but after the leaf consumption, it gave $186.0 \pm 3.7\text{mg/dl}$. In group C, the result before leaf consumption was $438 \pm 37.0\text{mg/dl}$, but after the leaf consumption, the analysis gave 105mg/dl , the value in D subjects before the consumption of leaf was 61.5g/dl , but after the consumption of leaf, the result was $60.4 \pm 2.4\text{g/dl}$ ($P > 0.05$). This decrease in group B and C could be due to interference of active principles contained in *G. latifolium* on the mechanism of utilization of glucose and cholesterol in the body.

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INTRODUCTION

Gangronema latifolium Benth is of the family Ascepiadaceae (Moinuddin, 2022). This tropical rain forest plant is popular for its nutritive and medical value across many African nations. It is commonly used as a vegetable in soups, salad or as a spice in other food preparations. It is an edible rain forest plant native in the south Eastern part of Nigeria.

It is a herbaceous shrub with green leaf, yellow flower and stem that yields exudates when cut. The leaves are simple, opposite or occasionally whorled, very rarely alternate, usually without stipules and the margins are nearly always entire. *Gangromema latifolium* is locally called 'utasi' by the ibibios, Quas and Efiks, 'utazi' by the Igbos, arokeke by the Yorubas, Akan Asante Aborode – aborode and sever asule by the Ghanaians and Senegalase respectively (Akinnuga et al, 2011).

Health and Nutritional Benefits

The leaves of *G.latifolium* are rich in fats, proteins, vitamins, minerals and many essential amino acids collectively contributing to its high nutritional value. The ethanolic root extract contains polyphmol in abundance with alkaloids, glycosides, saphenins, and reducing sugars in moderate amount (Antai, 2009). The plant extract has an antioxidant potential, anti aspatic property, anti-inflammatory, anti oxidant effect, anti-plasmodal activity and anti-sickling potential (Antai, 2009). These supports its use in the local treatment of malign cough and stomach disorders (Sonibare et al, 2008). The sliced leaves can be boiled with lime juice, or infused in water for at least three days to produce liquor, which is taken as a purgative against intestinal worms and for colic and stomach pain. The roots and stems of the plant are used as chewing stick or liquor in sierra leone (Onike, 2010). The methanol and aqueous extract of *Gongronema latifolium* is used in the treatment of diabetes and hypertension though its antidiabetic action is more efficacious in combination with other plant as vernonia amygdala (mfon et al, 2011, Okafor 1981).

The main purpose to embark on this study is to study the abilities of the principle elements encoded in the plant *G.latifolium* that makes it to have negative effects on hyperplycemia, hypercholestremia and polycythemia in male subjects in Enugu metropolis.

MATERIALS AND METHODS

Subjects

About eighty six (86) male subjects in Enugu metropolis were screened for hyperplycemia, hypercholestremia and polycythemia by running blood tests such as serum cholesterol concentration, glucose concentration and haemoglobin concentration.

Selection of subjects:

32 male subjects were selected for the study after the screening tests and placed into four (4) groups for the study. They were adviced to ensure that they make proper use of the leave of *G. latifolium* throughout the period of study that lasted for 28 days.

Thirty two (32) male subjects (25 – 30 years) were selected for the study. They were divided into four groups namely Group A (8) is the control subjects, group B (8) persons) is the hypercholestremic subjects, Group C (8) is the hyperglycemic subjects while group D (8), is the polycythemic subject.

Preparation of leaves of *G. latifolium*:

Fresh leaves of *G. latifolium* were bought in large quantity, washed with saline water, later with clean water and distributed to the subjects for consumption on daily basis for 28 days. About 5g of the leaves were weighed after identification by a taxonomist and given to the subjects for consumption alongside their food.

Toxicity studies:

The LD 50 of the leaves was studied using albino wistar rats and Lorke's method (1983). Albino rats (180-200g) were fasted every night for 12hrs and doses of the extract (10mg/kg) was administered intraperitoearly to the groups of the rats (n=3) and observed 24 – 48 hrs. when no death occurred, subsequent doses (15mg/kg 29mg/kg body weight) were administered to fresh groups of rats (n=3) and observed for another 24 to 48 hrs. The rats that served as control received normal saline only. The LD50 for the extract was calculated by geometric mean of the dose killing none of the three rats in the group and does killing all the animals in the group.

$$LD_{50} = \frac{\sqrt{\text{Dose killing all the animals in the group}}}{\text{X Dose killing none of the animals in the group}}$$

- **Phytochemical Analysis:**

The presence of various principles present in the leaves of *Gangronema latifolium* were determined using the method of Trease and Evans (1983), Harbourne (1996)

- **Determination of some biochemical and haematological indices:**

Blood samples were collected into EDTA sequestrene bottles from the four groups of subjects through their cubital fossa. The haematological and biochemical studies were done within hours of blood sample collection.

The Haemoglobin concentration and biochemical analysis were done as described by Alexander and Griffiths (1993). Glucose concentration was determined using B.G meter and strips.

Statistical Analysis:

The result obtained in the research study were represented as mean and standard deviation (Mean $\pm$ S.D), while student's t-test was used to compare the

result of the control and the test samples. A P-value of less than ($P < 0.05$) or equivalent to ($P = 0.05$) was considered statistically significant.

RESULTS:**Table 1: Phytochemical analysis of *Gongronema latifolium* (utazi) leaves.**

Constituents in <i>E. latifolium</i>	Fats & oils	Saponins	Flavenoids	Glycosides	Tannins	Phenols Terpenoids	Alkaloids	Carbohydrates
Degree of concentration	+	++	+++	+++	+	+	++	-

KEY:

(+++) Present in high concentration
 (++) present in moderate concentration
 (+) present in small concentration
 (-) Negative (absent)

Table 2: Some haematological and biochemical profiles of male subjects on *Gangronema latifolium* leaf for 28 days.

Groups	Hbg/dl $\pm$ S.D	PCV % $\pm$ S.D	Glucose mg/dl $\pm$ S.D	Cholesterol mg/dl $\pm$ S.D	P.Value
Control Group A n = 10	15.3 $\pm$ 0.3	45.9 $\pm$ 0.9	76 $\pm$ 2.5	192 $\pm$ 4.2	
Group B before G. latrifolium	15.1 $\pm$ 0.4	45.3 $\pm$ 1.2	78 $\pm$ 0.5	587 $\pm$ 6.8	
Group B After G.latrifolium	15.0 $\pm$ 0.2	30.0 $\pm$ 0.6	72 $\pm$ 1.5	186 $\pm$ 3.7	P<0.05
Group C before G. latrifolium	15.2 $\pm$ 0.8	45.6 $\pm$ 2.4	438 $\pm$ 37.0	182.0 $\pm$ 1.3	
Group C after G.latrifolium	12.2 $\pm$ 0.7	36.6 $\pm$ 2.1	105 $\pm$ 12	180.0 $\pm$ 1.3	P<0.05
Group D before G. latrifolium	20.5 $\pm$ 1.4	61.5 $\pm$ 3.2	85 $\pm$ 0.8	194.5 $\pm$ 0.8	
Group D after G. latrifolium	20.3 $\pm$ 1.8	60.4 $\pm$ 2.4	83 $\pm$ 0.6	192.3 $\pm$ 0.4	P>0.05

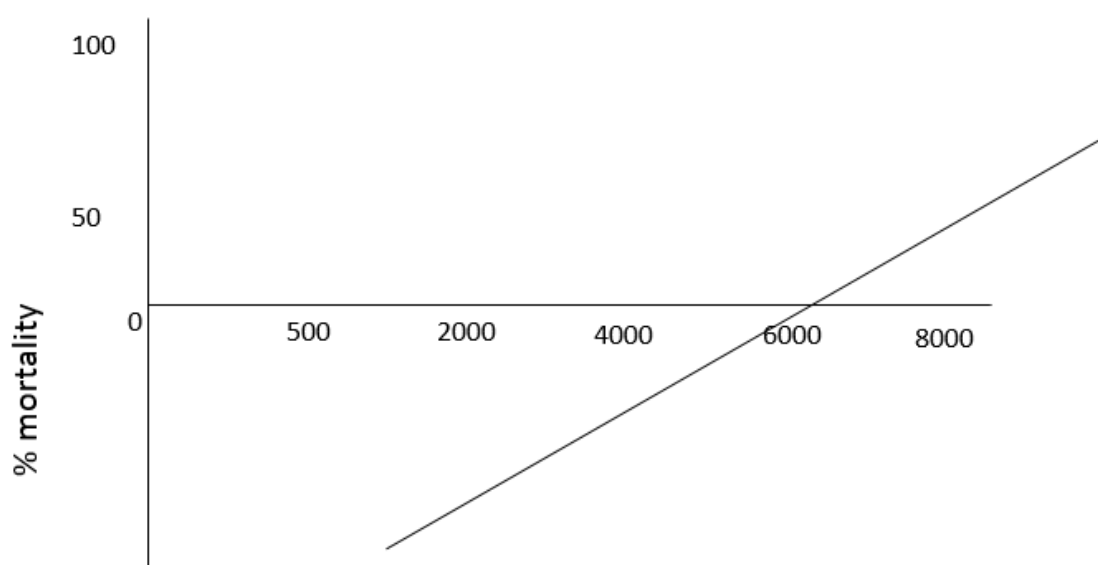


Figure1: The lethality studies (LD₅₀) of *Gangronema latifolium* leave showing the effect of administering graded doses (500 – 8000mg/g l.p in rats against the percentage mortality. (LD₅₀) = 5,500.

DISCUSSION

The ameliorative effects of active principles in *Gangronema latifolium* (utazi) on some biochemical and hematological profile of male subjects in Enugu metropolis has been studied. The ethnomedicinal and nutritional value of *G. latifolium* in the African Communities attracted many phytochemists to investigate the composition of this herb. (Moinuddin, 2002). The plant extract contains a typical plant component. There is a wealth of studies on the distribution and occurrence of major classes of secondary metabolites in different parts of the plant.

Phytochemical investigation was carried out on the fresh leave extract using the methods of Trease and Evans (1983), Harbourne (1983). The constituents found in the fresh leaves are fats and oil (Trace), Tannins, phenols and terpenoids (small concentration), saponins, and alkaloids (present in moderate concentration), Flavonoids and glycosides (present in high concentration) while carbohydrates were absent (Table 1). The active principle(s) present in the leave of the plant suspected of influencing the lowering of cholesterol concentration and glucose concentration is flavenoids and glycosides.

Flavenoids and polyphenol, are plant compounds with multiple ring structures. They are found in a high concentration in *Gangronema latifolium*. They help to give the flowers and the fruit of the plant its colours to attract pollinators. They help to reduce cholesterol concentration. (Table 2). The result from the research study in group C before the intake was 587 ± 6.8 as against $186 \pm 3.7 \text{ mg/dl}$ ($P < 0.05$) after the intake of the leaf of gangronema) this could be through several overlapping molecular pathways. A type of flavenoids like quercetin, apigenin etc increase LDLR protein levels in liver cells Hep G2. This action pulls more LDL-C "bad cholesterol" out of blood. Many also inhibit HMG- Co A reductase, the same enzyme statins target and modulate SREBP-2, which controls cholesterol acid genes (Shabrova, 2011). Also another mechanism is that flavanols activate AMPK/PKB-AKT pathways which suppress lipogenesis genes srepplc, scdhl, Acc. Hesperidin supplementation significantly reduced serum triglycerides and total/LDL cholesterol in a meta-analysis (Khorasani et al, 2023).

The high concentration of glucose in the subjects as seen in table 2 indicating the result from the study in group B before the consumption of lead was $438 \pm 37.0 \text{ mg/dl}$ as against $105 \pm 12 \text{ mg/dl}$ ($P < 0.05$) got after the intake of the leaf of *G. latifolium* for one month was lowered by the mechanism of naringenin inhibiting intestinal α -glucosidase. Flavenoids also block α -amylase hence reducing less glucose from food leading to lowered post meal spike. Also Apigenin improves GLU T4 translocation to take up glucose, and protects pancreatic B-cells. Tangeretin reduces HbA1C, increases insulin/insulin sensitizing factors. Glucosides found in *G. latifolium* is linked to hypoglycemic activity and hence lowered the blood

glucose concentration of hyperglycemic subjects after 28 days of consumption of leaves. The phenols and glycosides plays the roles of antioxidant, anti-inflammatory and antimicrobial properties (Rice-Evans, 1996).

Gangrenema latifolium leaf principles showed no significant effect on polycythemia subjects. The LD₅₀ in rats gave 5,500mg/kg but in human there is no toxic or mortality value for 28 days consumption.

It could be concluded from this study that daily intake of *G. latifolium* leaf by hypercholesteremic and hyperglycemic subjects could be of great assistance to improve their health status since the principles in the leaves ameliorate the condition.

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