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The Effect of Ethanolic Root Extract of Gongronema Latifolium on Total Plasma Protein, Albumin and Globulin Concentration

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Abstract*: Gongronema latifolium* (Utazi), *a tropical plant native to Nigeria, is traditionally used for both culinary and medicinal purposes. This study examined the effects of its ethanolic root extract on plasma protein, albumin, and globulin levels in Wistar rats. Twelve rats (140–160 g, both sexes) were randomly divided into control and test groups (n=6 each). The control group received standard feed, while the test group received 200 mg/kg body weight of the extract orally for 21 days, alongside standard feed. All animals had free access to water. Blood samples collected post-treatment were analyzed for total plasma protein and albumin using Biuret and Bromocresol green methods, respectively. Globulin was calculated by subtracting albumin from total protein. Results showed a significant increase (P<0.01) in total plasma protein and globulin in the test group, with no change in albumin levels. These findings suggest that* G. latifolium *root extract may elevate certain plasma proteins without affecting albumin.*

Keywords: Gongronema latifolium, plasma protein, albumin, globulin, ethanolic extract, Wistar rats.

INTRODUCTION

Plants have been used for both culinary and medicinal purposes long before it was recorded in history (1). Researchers have found out that people in different parts of the world tend to use the same or similar plants for the same or similar purposes (2). Also, the world health organization has estimated that 80% of people worldwide rely on herbal medicine for some part of their primary health care (3) Herbs when used correctly can help in the treatment of a variety of ailments and in some cases may have fewer side effects than some conventional medications. Gongronema latifolium is a tropical rainforest plant that belongs to the family of asclepidaceae (4). It is primarily used as a spice, vegetable and in traditional folk medicine mainly in a south-south and south-eastern Nigeria (5). It is commonly called “Utasi” by the Efiks and “Utazi' by the Igbos and “Madumaro” by the Yoruba speaking tribes of Nigeria.

Gongronema latifolium has been found to possess many medicinal and nutritional values. It contains a very high percentage of oil, protein, Saponin and pregnanes etc (6). Medicinally, it is used in south -south and south eastern Nigeria for the management of diabetes, controlling weight gain in lactating women as and Baddy, 2002). It is also used in the treatment of various ailments such as Malaria, cough, stomach disorders like Ulcer, cancer and hypertension (6). In Sierra Leone, a decoction or cold infusion of the pounded stem is used for the treatment of colic and intestinal symptoms/problems usually associated with worms. (7). In Ghana, the boiled fronts are used as laxative (8). The plant is rich in vitamins, minerals and proteins (9). It is also used for soup meal preparation such as Okra, melon soup. It enhances the taste of the soup meals.

It is very delicious. It is also used in sauce preparation, which can be eaten with yam, cocoyam, and plantain. The leaves are also used raw in salads, (Abacha) local delicacy of the south eastern people. They are also used to enhance the flavour of meat, fresh fish and pepper soups (10).

Since Gongronema latifolium plants, both seeds, stem and leaves are used in various ways, there is need to investigate the effect of its ethanolic extract on total plasma protein, Albumin and Globulin concentration using wistar Rats.

Statement of problem

Due to the present economic difficulties, many people who cannot afford orthodox medicine have resorted to traditional medicine which is comparatively inexpensive, generally always available especially' for people in locations where orthodox medicine is not easily accessible and generally safe without or with minimum side effects. This in addition to interest in returning to natural or organic remedies has led to an increase in herbal medicine use.

There is also dearth of information on some of the wild plants on their both nutritional and medicinal values (Gongronema latifolium) root on parameters like plasma proteins. Again, in most cases people who consume this plant root/leaves/seeds to not even know if the health is improving is improving or causing harm to their system. Also due to scanty research some people are not even aware that the roots of Gongronema latifolium could have important medicinal or nutritional value. For these reasons, it becomes necessary to investigate the effect of Gongronema latifolium roots on plasma proteins, Albumin and Globulin concentration. This is because they important role in human body and levels of plasma protein are often evaluated in the laboratory to get information about a clients/patients' general health issues which he/she may be experiencing.

General objective

The general objective of this research is to investigate the effect of Ethanolic Root Extract of Gongronema latifolium on plasma proteins, Albumin and Globulin concentration using wistar Rats.

The specific objectives include;

1) Determine the effect of ethanolic extract on plasma protein concentration of Wistar Rats.
2) Determine the effect of ethanolic extract on Albumin concentration,
3) Investigate the effect of ethanolic extract on Globulin concentration.

4) Prepare ethanolic extract of Gongronema latifolium

Statistical Analysis

The results obtained from the research work would be subjected to unpaired t-test by William (1998) and would be considered significant at P value of $P<0.01$.

Significance of study

This research would add to the body of knowledge on the effects of this herb as well as elucidate possible effects of this root on plasma protein, Albumin and Globulin levels. It promotes wider use of this plant root and at would act as a broader program aimed at educating people about the effects (Whether beneficial or harmful of Gongronema latifolium roots on the body especially plasma proteins. It would also encourage increase in cultivation in home gardens and consumption. This could in turn serve as a revenue generating venture for households, thereby ensuring household food security. This would serve as an eye opener to Nutritionists, Dieticians, Food scientists, Agricultural extension officers and home economics professionals who will disseminate the information of the, usefulness of the root of these plants.

This result of this research would complement the efforts of orthodox machine for those who cannot afford it, to resort to this as an alternative. This research would also encourage policy makers on the importance of protecting some wild plants that nutrient dense, that are going extinct. There should be collaboration between the zoologists, nutritionists, home economist and pharmacologists, in other to produce drugs that are more organic than the chemical ones that have a lot of side effects.

MATERIALS AND METHODS

The materials used for the study include Gongronema latifolium roots, weighing balance, blender, filter paper, burette, oven, desiccator, dissecting set, heparinized sample tubes, stirrer spectrophotometer, beaker, feeding tube, 1ml and 5ml syringes, needles and knife. Other materials that were also used were gloves, medicated antiseptic soap and cages. The chemicals and reagents that were used in the study include ethanol, tenwen-20, Biuret reagent, albumin reagent and chloroform. The experimental animals were albino rats of wistar strain.

Method

The wooden cages were used to house the albino wistar rats. Ventilation was provided through the top of the cages which were made of wired nets. Feed was provided in troughs to minimize spillage and water was provided in tilted plastic contains with nozzles. The cases were placed close to the window to provide ventilation but in such a way that direct sunlight illumination of the animals was prevented and the cages were cleared daily.

Fresh roots of Gongronema latifolium were obtained from Adiabo in Odukpani Local Government Area of Cross River State. The roots were washed with water to remove soil particles and dirty that were attached to it and dried under shade. They were then chopped into pieces with a sharp knife and dried under the sun. When they were properly dried, they were ground into fine power using a blender. 200g power of. Gongronema latifolium was

weighed out and suspended in 700m! of ethanol and soaked overnight. The suspension was then filtered with Whatman filter paper and the filtrate gotten was evaporated to complete dryness at a temperature of 300C in an oven to yield a brown gummy paste. This brown gummy paste was the crude extract 3.78g of the crude extract gotten from the treatment of the sample was dissolved in 17.64mls of 20 (a chemical which is harmless to the experiment) to give a stock concentration of 0.21glml or 0.03g/0.14ml of extract.

A total of 12 albino wistar rats were used for this experiment. The rats were of both sexes and weighed 140-160g. They were obtained from animal house, pharmacology department, university of Calabar and housed in the animal house of the Department of physiology at room temperature. Two groups of rats were randomly selected with each group containing six rats. One group served as control and the other as test experimental group. The experimental/test group was allowed to acclimatize for a period of one week during which they were both allowed free access to palletized grower feed and water. After the period of acclimatization, 0.03g of Gongronema latifolium root extract was administered daily to each of the rats in the test group for a period of 21 days in accordance with the standard which is 200mg/kg body weight (5), The control group was still allowed free access to feed and water only.

After 21 days of feeding experiment, each rat was anaesthetized in chloroform vapor in a desiccator and immediately dissected using surgical forecasts and scissors. Blood samples were collected by cardiac puncture using sterile syringe and needle into heparinized sample tubes 'for total plasma protein, albumin and globulin analysis the same day.

Total plasma protein concentration was determined by using the direct Biuret method described by Lawrence, (6). It was calculated using the formula and the values expressed in g/dl.

$$Total\ plasma\ protein\ concentration\ (g/dl) = \frac{Absorbance\ of\ sample}{Absorbance\ of\ standard} \times 6$$

Albumin concentration was determined using Bromocresol green methodology and calculated using.

$$Albumin\ concentration\ (g/dl) = \frac{Absorbance\ of\ sample}{Absorbance\ of\ standard} \times 3$$

Globulin concentration was determined directly from the results of the experiments to determine total protein and albumin concentration. This is because total protein is made up of albumin, globulin, fibrinogen and other proteins e.g. enzymes, and hormones.

$$\text{Globulin} = \text{Total protein} - \text{Albumin}$$

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Statistical analysis

The results obtained at the end of the experiment were analyzed using unpaired students t-test by William (1998) and was considered significant at a P-value of $P<0.01$ using the SPSS version 15.0 software.

RESULTS AND DISCUSSION

The results of the study are as follows:
Figure 1 showed that comparison of total protein concentrations between the control and the test group (treated with root extract). The mean values were 5.53 ± 0.15 for control and 7.62 ± 0.67 for the test group (treated with root extract). Total plasma protein concentration of the test group (treated with root extract) was significantly higher ($P<0.01$) compared to control.

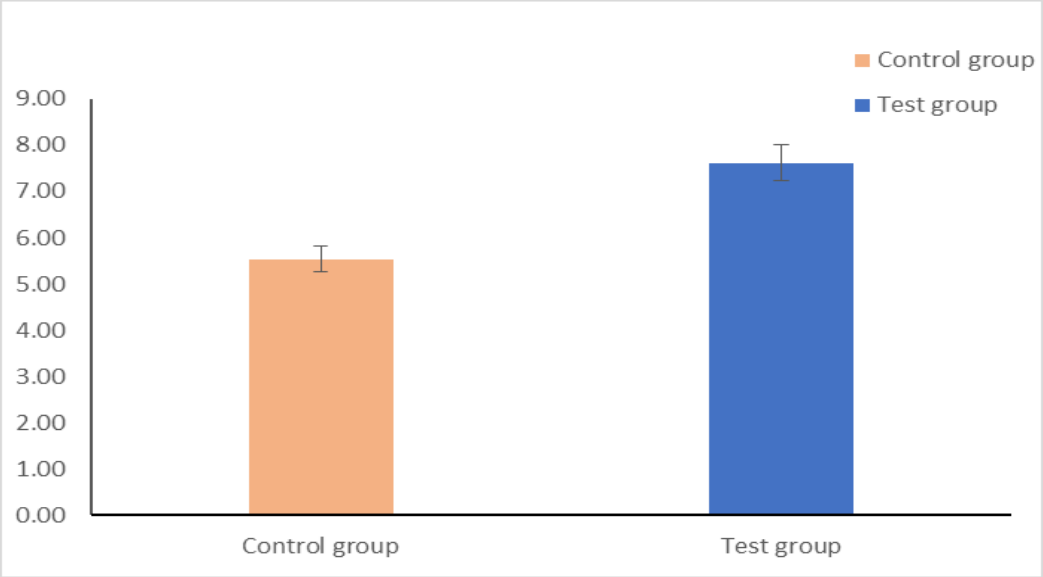

Figure 1. Comparison of total protein concentrations between the control and root extract treated group. Values are mean ± standard error of means.

Figure 2 showed the comparison of albumin concentrations between the control and the test (treated with extract). The mean values were 2.53±0.03 for control and 2.64±0.08 for the test group (treated with root extract). There was no significant difference between the albumin concentration of test group although it had a higher mean (2.64) values than the control group (2.55).

Hence there was no significant difference on albumin concentration.

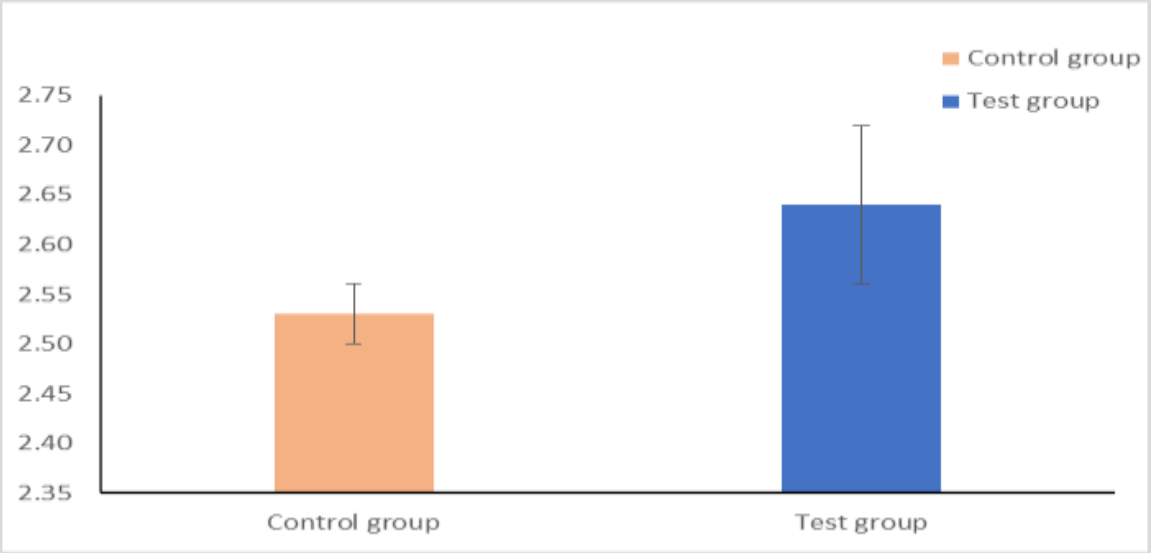

Figure 2 Comparison of albumin concentrations between the control group and root extract treated group. Values are mean ± standard error of means.

Figure 3 showed the comparison of globulin concentration between the control and the test group (treated with root extract). The mean values were 2.98±0.14 for the control and 4.98±0.60 for the test group (treated with root extract). The Globulin concentration of the test group (treated with root extract) was significantly higher ($p<0.01$) •compared to the control.

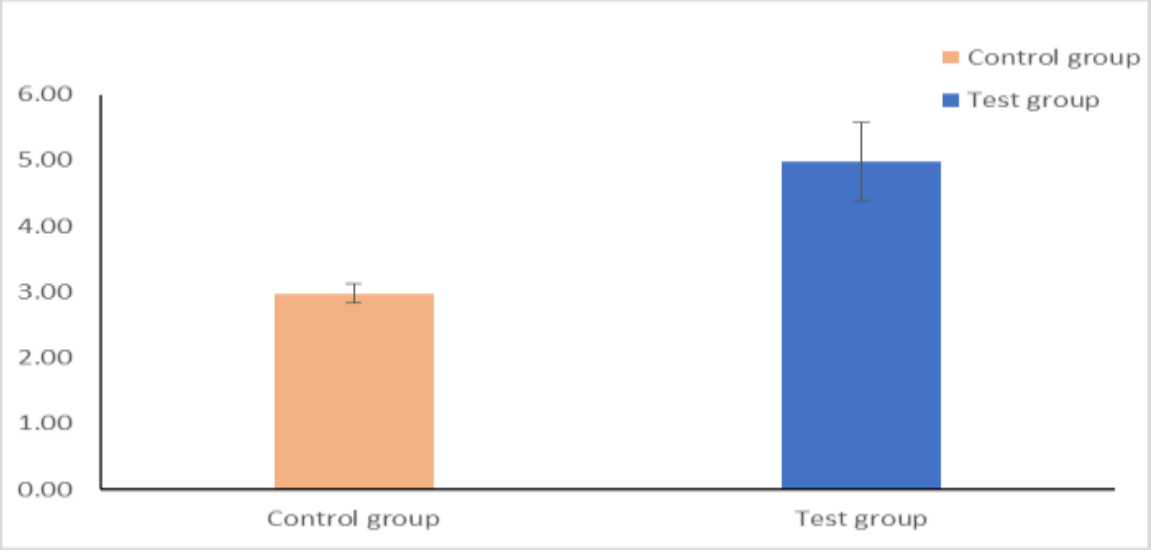

Figure 3. Comparison of globulin concentrations between the control and root extract treated group. Values are mean ± standard error of means.

The results obtained showed that total plasma protein and globulin concentrations were significantly increased, whereas there was no significant effect on albumin concentration. This indicates that Gongronema latifolium roots contain an agent protein and globulin contractions significantly but with no significant effect on albumin concentrations. This effect on albumin contraction is similar to that reported for RBC count, Packed cell volume (PCV), mean corpuscular volume (MCV) and mean corpuscular haemoglobin (11). The increase in total plasma protein levels appears to be as a result of the increase in globulin concentration. Gongronema latifolium roots have been reported to contain polyphenols, reducing sugars, glycosides and alkaloids as its main phytochemical constituent (11). Reducing sugars have been reported to be capable of increasing globulin especially gamma globulin concentration (12). They have also been reported to participate actively in glycolysis; a process which leads to biosynthesis of plasma proteins except for Albumin (13). Therefore, the increase in globulin appeared to have occurred as a result of the presence of reducing sugars in the extract. However, the exact mechanism through which it exerts the effect is not revealed in this study but possible reason could be that the reducing sugars participates in glycolysis.

All plasma proteins except albumin is reformed through the process of glycosylation. They are the major class of glycoproteins and the most readily accessible. Albumin is not a glycoprotein hence it is not formed through the process of glycosylation. It therefore appears not to be affected by the reducing sugars. This probably explains the statistical insignificant difference in the mean values of albumin when compared with the control group.

CONCLUSION

The effect of ethanolic root extract of Gongronema latifolium (Utazi) on total plasma protein, albumin and globulin concentration in albino rats of wistar was studied to determine the effect of ethanolic extract on plasma protein, Globulin and Albumin and prepare ethanolic extract. The results obtained from the study showed that there was an increase in total plasma protein and Globulin concentration without a significant change in albumin concentrations.

RECOMMENDATIONS

Since the results obtained using wistar rats is applicable to man, Gongronema latifolium root intake may be beneficial in correcting conditions of hypoproteinaemia. However prolonged usage of this extract in normal conditions should be discouraged to avoid conditions of hyperproteinaemia or hyperglobulinaemia.

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