Hepatocellular and renal effect of *Gongronema Latifolium* leaf extract on Albino rat following acetylaminophen (Paracetamol) poisoning

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ABSTRACT

Background: *Gongronema latifolium* has been known over the years to serve as cancer preventing agent. The Effect of *Gongronema latifolium* leaf Extract on Renal and Hepatic tissue of Albino Rat following Acetaminophen (paracetamol) Poisoning was analyzed in this study.

Methods: Twenty eight rats were randomly selected and shared into seven groups of four rats per cage and labeled A,B,C,D,E,F, and G. Cages A, B and C served as both baseline (positive control, and negative control) while group D to G serve as treatment groups (they were treated with both leaf extract in order of 6,12,18 and 24mg/kg weight and 250mg/ml of paracetamol with regards to the LD_{50}. The animals were fed with standard pellet and tap water for 28 days. The doses were orally administered for 28 days. On day 28, the rats were weighed, sacrificed by cranial dislocation, and the liver and the kidney were harvested. The liver and kidney were processed, stained for light microscopy.

Results: Histology of the liver and kidney showed few areas of cystically dilated tubules, focal infiltration of inflammatory cells, mild dilation, extensive tubular dilation , hepatic cytoplasmic clearing, periportal inflammation. **Conclusion:** This research therefore demonstrated that *Gongronema latifolium* leaf extract has antioxidative property that enables gradual repair of damaged tissues possible.

***Keywords*:-** *Gongronemlatifolium*, Liver, Kidney, Albino Rat, Acetaminophen

1. INTRODUCTION

Gongronema latifolium (Asclepiadaceae) is a palatable rainforest plant well known to the people of South Eastern, Nigeria, to boost glucose level and also serve as flavor [1]. Ugochukwu et al., 2003[2], indicated that Gongronema latifolium serve as cancer preventing agent. *Gongronema latifolium* leaf extract has been found to improve hemoglobin level [3] and it has been found to possess magnesium (Mg) properties which help to reduce pulse [4]. The leaf extract of *G .latifolium* have also been found to posses antibacterial, antifungal, antiulcer properties [5-9].Acetaminophen also known as paracetamol is a white glasslike substance which is commonly used as pain relieving medication and also mitigate against fever. It is broadly used to treat mild or moderate illnesses such as, migraine, toothache,dysmenorrhoea and as an antipyretic specialist[10]. It can be administered orally or intravenously. High doses of acetaminophen are capable of causing alteration or deleterious effect on the kidney and liver or possibly cause inflammation of the liver.Acetaminophen is one of the most significant medications utilized in the treatment of mild to moderate illnesses[10].Acetaminophen has been the source of healing agents since the inception of time [11].

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Research has shown that a medicinal plant is one whose branch has shown to contain substances that can be used for curative purposes or are precursors for the production of orthodox medicine. In recent times in the developing nations, orthodox drugs are not only costly and insufficient for treatment of diseases but are also full of adulterations and side effects [12]. There is need to develop medicinal remedies using plants derivatives as they are less expensive and safer than the synthetic medicine. Nigerians are known for consuming vegetables in large quantity [13], part of these vegetables serve as food supplement and also help during recovery from illnesses. As one of the oldest companions of man, herb has been a source of shelter, food, wealth and it has also helped in maintaining a moderately low disease rate when it is appropriately utilized as an herbal medicine [14]. Paracetamol is the most used over the counter pain relieving drugs in Nigeria and there is no guide or regulatory policy in place to control and monitor the usage or abuse of this drug. Hence, this research item is to determine the repairing effect of *Gongronema latifolium* leaf extract on the liver and kidney of an albino rat after inducing hepatic and renal damage with paracetamol.

2.0 MATERIAL AND METHODS

2.1 Material

2.1.1 Equipment and Reagents

Binocular microscope with inbuilt lighting system, Olympic photomicroscope, Rotary Microtome, Automatic Tissue Processor, Weigh balance, Dissecting set, cage, Thermometer, Haematoxylin and Eosin, Distilled water, 1% Acid alcohol, Alcohol, Paraffin wax, Tissue cassette, Formalin, soxlet extractor. Standard histopathological reagents were used [15].

2.1.2 Biological Materials

Animals: Twenty eight male ratsweighing between 200-220g were used for this research. They were gotten from veterinary medicine, University of Nigeria Nsukka. The animals were housed in well ventilated cages, at room temperature and 12hrs light and 12hrs dark cycle for the period of the experiment.Plant material: fresh leaves of *Gongronema latifolium* were harvested from a local farm in the court yard of Prof. Achukwu, in UNEC, Enugu State, Nigeria and were identified at the department of Plant Science (Botany), University of Nigeria, Nsukka, Enugu State, Nigeria. They were washed, air dried at room temperature and milled into powder and stored. The solvent extraction was carried out using soxlet extractor with distilled water.

2.2.3 Ethical Consideration

The study was also conducted in compliance with policies outlined in the Guide for the Care and Use of Laboratory Animal [16].

2.2 Methods

Experimental research design was adopted for this research. The animals were stabilized for one week before commencement of this researchand they were given commercial pellet and portable water *ad lithium*. After stabilization, the rats were randomly divided into seven (7) group with four (4) rat in each group: A, B, C, D, E, F G. group A received pelleted rat feed with water and served as baseline control, group B, was administered 250mg/ml of paracetamol and thereafter, Vitamin C- which served as positive control, group C were administered 250mg/ml of para-aminophenol and therefore served as negative control, group D, E, F and G which served as treatment groups received 6mg/kg, 12mg/kg, 18mg/kg and 24mg/kg body weight of the aqueous leaf extract respectively after initial administration of 250 mg/ml para-aminophenol. From the onset of administration of the drugs and extract, the Animalswere observed for responses to stimuli, mortality and behavioural signs. The Animals were treated for 30 consecutive days and thereafter sacrificed via cranial dislocation, the internal organs were exposed bydissection and the organs excised for histopathological examination. The excised tissues were washed in cold saline and fixed in 10% formol saline prior to histopathological examination. The tissues were processed and embedded using paraffin wax and sectioned.Tissue sections were cut (5 micron thick) using the rotary microtome, the sections were stained using Haematoxylin and Eosin staining technique[15].

2.3 Statistical Analysis

Data obtained were analyzed using ANOVA and Duncan post-hoc tests by application of SPSS widows version 20.0 Inc. USA. Obtained differences at $p<0.05$ were considered statistically significant.

3. RESULTS

Table 1: Weight variations in Treated Rats against control

	group I	group II	group III	group IV	group V	Group VI	Group VII
Mean ±SD	220.50±88	218.00±51	218.83±92	221.58±78	220.50±88	220.50±77	220.50±56
P value	0.88	0.89	0.98	0.99	0.98	0.98	

All values is expressed as mean ± standard deviation; P value of ≤ 0.05 is considered statistically significant
There was no significant weight loss or gain in the rats when the controls were compare against the test.

The results gotten after the whole experiments are as displayed on the photomicrographs below:

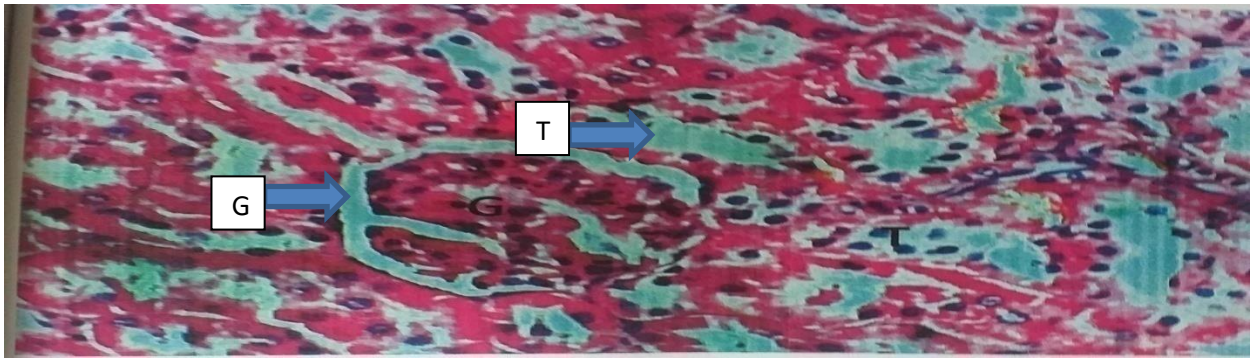

Fig 1 (group A): Section of normal kidney of rat showing normal cortex with normal glomerular(G) and convulated tubules (T). Stain H &E. mag x400

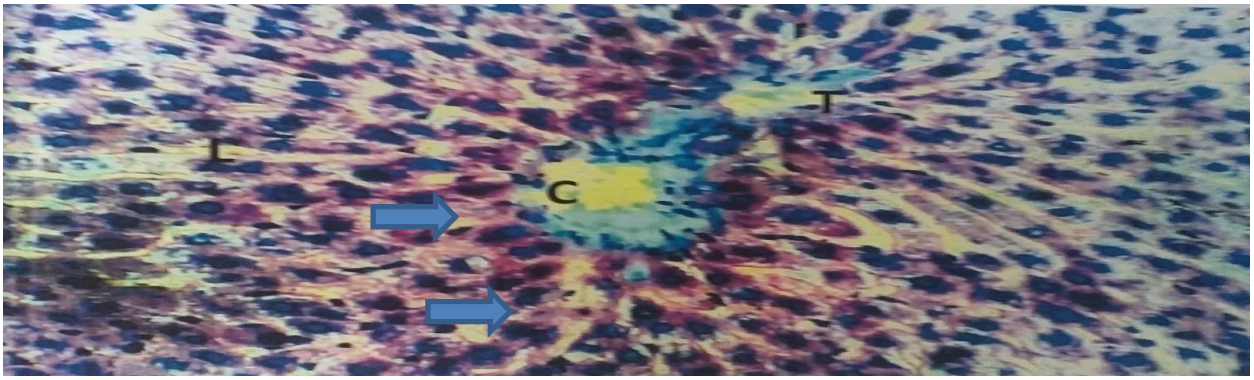

Fig 2 (Group A): Section of normal liver tissue. Note the presence of normal hepatic lobule (L), prominent central canal (C) and normal portal triad(T). Stain H&E. Mag x400

Fig 3(Group B): Liver section of the rat treated with 250mg/ml paracetamol and vitamin C shows few hepatic cytoplasmic clearing and focal intiltration of inflammatory cells (-). Stain H&E. Mag.400

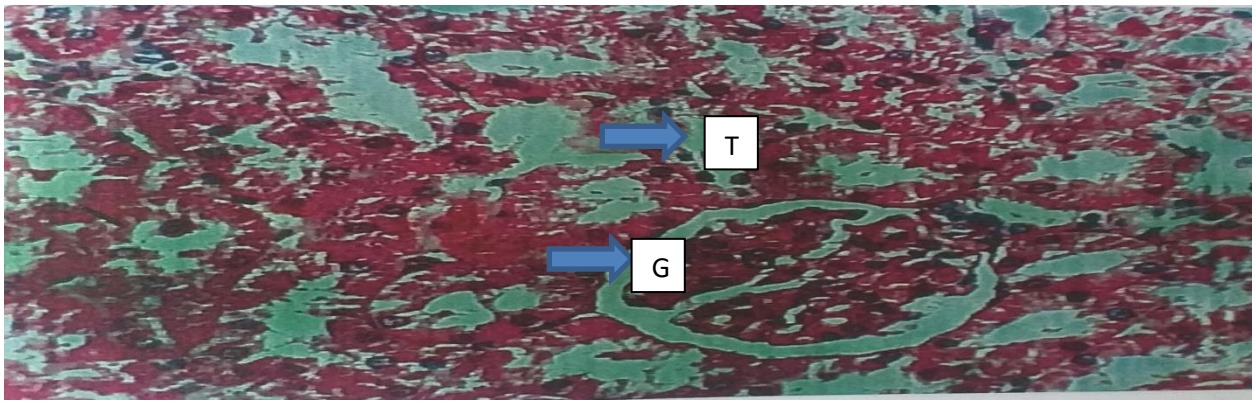

Fig 4. (Group B): Section of rats treated with 250mg/ml paracetamol and vitamin C. Note the presence of normal glomerulus (G) and a few tubular cast (T)

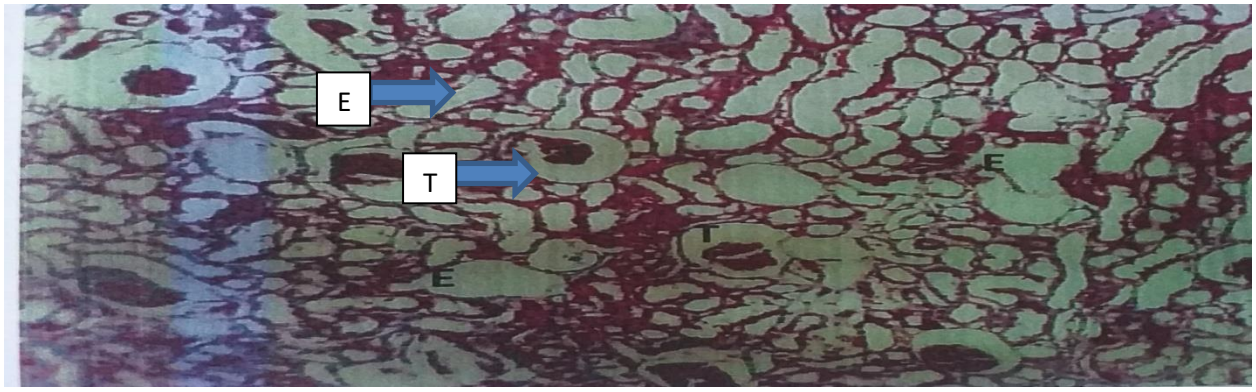

Fig 5.(Group C): Section of kidney of rat treated with 250mg/ml paracetamol demonstrating constricted glomerular turft (T) and eroded tubules (E). Stain H &E. mag x200

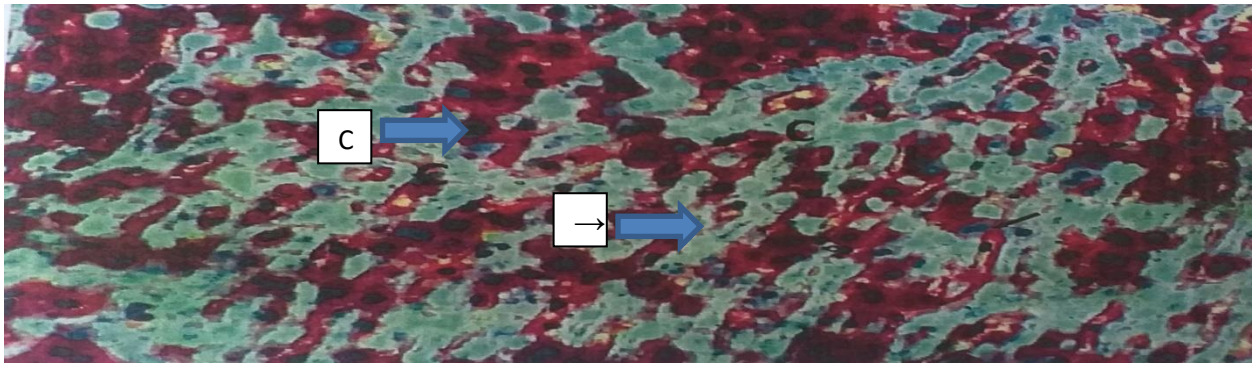

Fig 6.(Group C): Liver section showing an extensive cytoplasmic damage (C) with only few normal hepatic cells (→). Stain H&E. Mag x200.

Fig 7. (Group D). Section of kidney of rat treated with 6mg/kg of aqueous leaf extract follwed by administartion of 250mg/ml paracetamol showing hypoperfusion of the glomeruli (G) and eroded tubules (E). Stain H&E. MAG X200

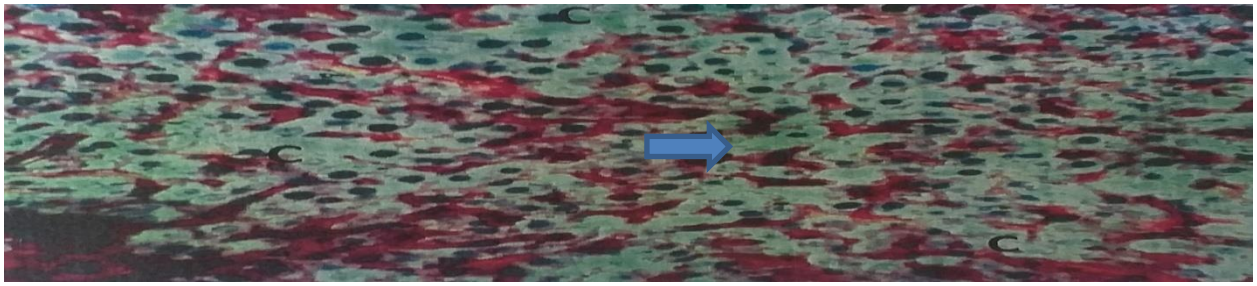

Fig 8. (Group D). Section of Liver of rat treated with 6mg/kg of aqueous leaf extract follwed by administartion of 250mg/ml paracetamol showing an extensive hepatic cytoplasmic clearing. Stain H&E. MAG X200

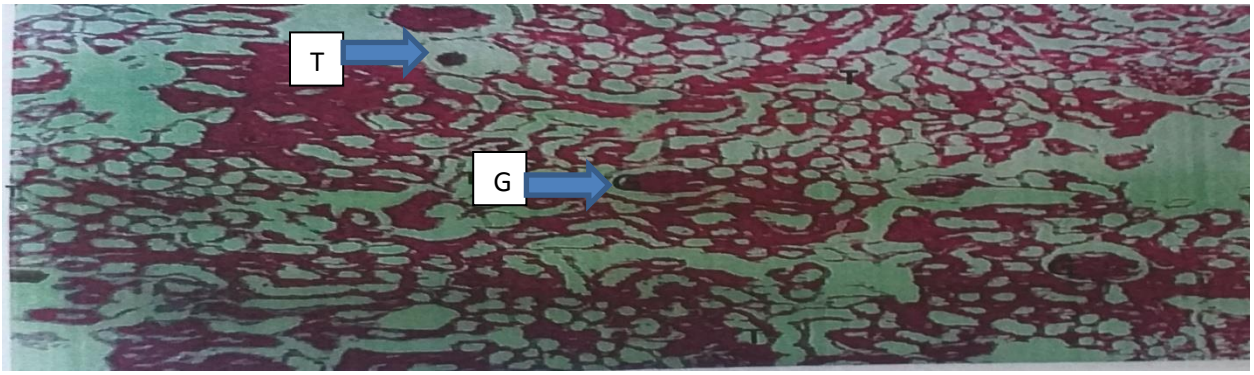

Fig 9. (Group E). Section of kidney of rat treated with 250mg/ml paracetamol and 12mg/kg of Gongronema latifolium showing cystically dilated Tubules (T) with few normalglomeruli (G).Stain H&E. MAG X200

4. DISCUSSION

The aqueous leaf extract of *Gongenema latifolium* was administered to albino rats whose kidneys and liver organs had been altered or injured using high dose of paracetamol 50mg/ml) and induced toxicity of the functionality of kidney and liver tissue.The presence of Tubular Cast, Inflammatory cells, Constricted Glomerular turft and dilated/eroded tubules in the photomicrograph examined has shown that continuous abuse of acetaminophen could affect the functionality of the kidney such as slowing down the process of filtration resulting from constricted glomeruli, or swelling or hotness of the kidney resulting from inflammation. Similarly, in the liver, extensive cytoplasmic damage was also observed in the photomicrographed slide, which could slow down or affect the liver functioning such as detoxification of foreign substances. The extract was found to cause significant changes against the architectural alterations induced by Acetaminophen drugs.The hepatic cytoplasmic clearing and focal intiltration of inflammatory cells, constricted glomerular turft and eroded tubules induced by paracetamol and the reversal effect of *G. latifolium* could have resulted from its ability to produce reactive species (ROS) [17]. The resultant effect of *G. latifolium* on the alterations done by paracetamol usage could have also resulted from its richness in essential amino acids and fatty acids as researched by Eleyinmi, 2007[18]. *Gongronema latifolium* have been found to contain many phytochemcals,

part of which is flavonoids [19] and saponins [20] content have shown to possess electron and hydrogen donating properties, respectively.The reversal properties of aqueous extract of *G. latifolium* have shown to function similarly to vitamin C. This research finding is agrees with previous study by Nwaogu*et al*, 2007, [21] when he revealed in his research work that reactive oxygen specie is responsible for the reversal effect ascorbic acid had on tissue damage. This explains why vitamin C administration is used in the positive control (Group B) following administration of 250mg/ml of paracetamol. This shows that the aqueous leaf extract of *Gongronema latifolium* has antioxidant properties and can exact similar repairing abilityon damage tissues as vitamin C-a known antioxidant.

5. 0 CONCLUSION

The current examination shows that leaf extractof Gongronemalatifolium could serve as potential shade against paracetamol thereby preventing hepatic and renal harmfulness. This further supplements past investigations on G. latifolium and furthermore affirms the case made by traditional healers that all aspects of the plant are therapeutic. It can accordingly, be inferred that this examination has logically advocated the traditional application of G. latifolium in the administration in different human endeavors.

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Conflict of interest

The authors declare no conflict of interest.

Author's contributions

This research item was conceptualized by Nosa T Omorodion, the writing and practical work was collectively carried out by all authors.

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