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HISTOLOGICAL EFFECTS OF AQUEOUS CASSIA OCCIDENTALIS ON THE LIVER AND KIDNEY IN ADULT WISTAR RATS

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ABSTRACT

Cassia occidentalis is a plant found mostly in the southern, middle belt and northern parts of Nigeria. It is a herb that belongs to the family of plants called leguminosae. It is commonly known as "coffee senna" and used widely for the cure of many ailments. In this research, the histological effects of cassia occidentalis extract on the liver and kidney of wistar rats as well as its effect on the organs weights were carefully studied. The rats (n=24) with an average weight of 150g were randomly placed into 4 groups. Each group consisted of six (6) rats. Group one served as the control group while groups 2, 3 and 4 were given 100mg, 200mg, and 300mg of cassia occidentalis extract respectively for 29 days. The rats were fed with growers mash and given water liberally. On the thirtieth day, the rats were sacrificed and the kidneys and livers were carefully harvested, weighed and fixed in 10% formal saline for histological examination. Weight measurement showed non-significant increase in organ weight in the treated groups compared to control animals. Histological examination revealed some changes in the livers and kidneys of treated rats. The changes are vascular congestion and dilatation and infiltrates of mild chronic inflammatory cells leading to an activation of the immune cells of the liver. The results from this research showed that cassia occidentalis extract had a hepatoprotective function. Conclusively from this research, the consumption of cassia occidentalis could have a possible positive effect on the liver and kidney.

KEYWORDS-*Cassia occidentalis, Wistar rats, histology.*

INTRODUCTION

Plants have formed the medicinal basis of health care throughout the world from the earliest days of humanity and are still widely used, (Ahmad et al 2006). In most African countries for instance, up to 90%of the population relies exclusively on plants as a source of medicine. (Hostetteman et al, 2000). In other parts of the world, the use of herbs in treatment of different ailments is still widely practised. Herbs or medicinal plants are plants containing inherent active ingredients used to cure disease or relieve pain. (Okigbo et al, 2008). Many plants have been indentified for different medicinal use. Aloe vera for example has been used for the healing of burns and wounds (maethaisong et al, 2007). Artichoke for reduction of cholesterol levels (Gehart 1998). Rubus occidentalis for preventing oral cancer etc. The plant under study in this research is Cassia occidentalis, commonly known as coffee senna. It is a small erect herb that can grow up to 2m tall and found abundantly in in rainforest and tropical areas of the world. It belongs to the family leguminosae. It is botanically classified as both cassia occidentalis and senna occidentalis (Egharevba et al, 2010). Cassia occidentalis has a rich history in natural medicine and the parts of the plant used include roots, leaves and seeds. Its seeds found in long seed pods are sometimes roasted and made into coffee-like beverages. The leaves have ethnomedical importance. Paste of the leaf is externally applied on healing wounds, sores, itch, skin diseases, bone fracture, ringworm and throat infection. Other uses of this plant

includes diuretics, laxative, anti-bacteria, anti-inflammatory, anti- fungal etc. Phytochemical analysis of cassia occidentalis shows that it contains tannins, saponins, carbohydrates, gums, mucilages, anthroquinones, glycosides, flavonoids, alkaloids. (Yadav et al,2009).This work assessed the histological effects of the plant extract on the liver and kidney of wistar rats as well as its effect on the organs weights. The liver is the organ of biotransformation while the kidney is the major organ of excretion of metabolic materials. Positive/negative effects of ingested substances on these two organs are very possible, since they directly function in transformation and excretion. Plant extracts taken as medicine are mostly ingested orally, so they must be worked upon by the liver and excreted through the kidney.

MATERIALS AND METHODS

The sample size was made up of 24 male adult wistar rats. They were acclimatized for four weeks and cassia occidentalis extract was administered to them for another four weeks. The rats were divided into four groups. Each group consisted of six rats selected at random. Group 1 served as control while Groups 2, 3 and 4 received 100mg, 200mg and 300mg of the extract respectively. They were fed with growers mash and given water liberally. The rats were kept in a cage at the animal centre, college of health sciences, Delta State University, Abraka.

Preparation of Aqueous Extract of Cassia Occidentalis

Cassia occidentalis leaves were collected from the bush in Benin and indentified at the herbarium in the Department of Pharmacognosy, Faculty of Pharmacy, University of Benin. The plants were sundried for 7days and were taken to the oven to finally and totally remove the moisture content. After drying, the leaves were grounded into a powdery form. The powdered extract was soaked in distilled water for 48 hours at room temperature. The mixture was filtered into a conical flask with filter. The filtrate was dried at temperature of 30˚C for 10 hours to get a gel-like extract. The extract was prepared at the department of Pharmacognosy, Faculty of Pharmacy, University of Benin. The required concentration was then prepared at the pharmacology laboratory of Delta State University. The extract was prepared by weighing the required dose for each group using electronic scale. Each dose was kept in a dispensable bottle and distilled water was added.

Tissues Preparation For Microscopy

After sacrificing the rats, the livers and kidneys were harvested and weighed using an electronic scale. The tissues were then fixed in 10% formol saline for 48 hours. They were then dehydrated, cleared, embedded in wax and sectioned. After sectioning, the tissues were stained in haematoxylin and eosin. The micrograph was then captured with a digital microscopic eyepiece.

RESULTS

TABLE: 1 SHOWING MEAN LIVER WEIGHT

	n	Mean
CONTROL	6	4.67±0.187
GROUP 1	6	5.73±0.765
GROUP 2	6	6.13±0.355

GROUP 3	6	5.30±0.509

Mean ± S.D (Standard Deviation) N=24
(P<0.05)

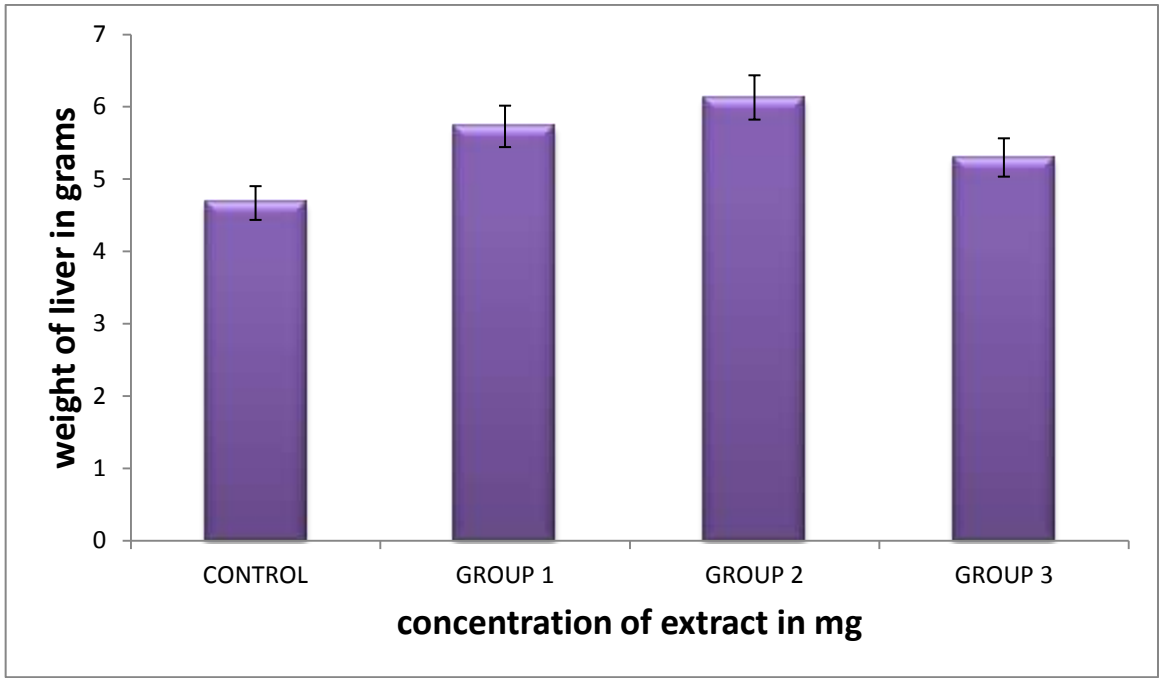
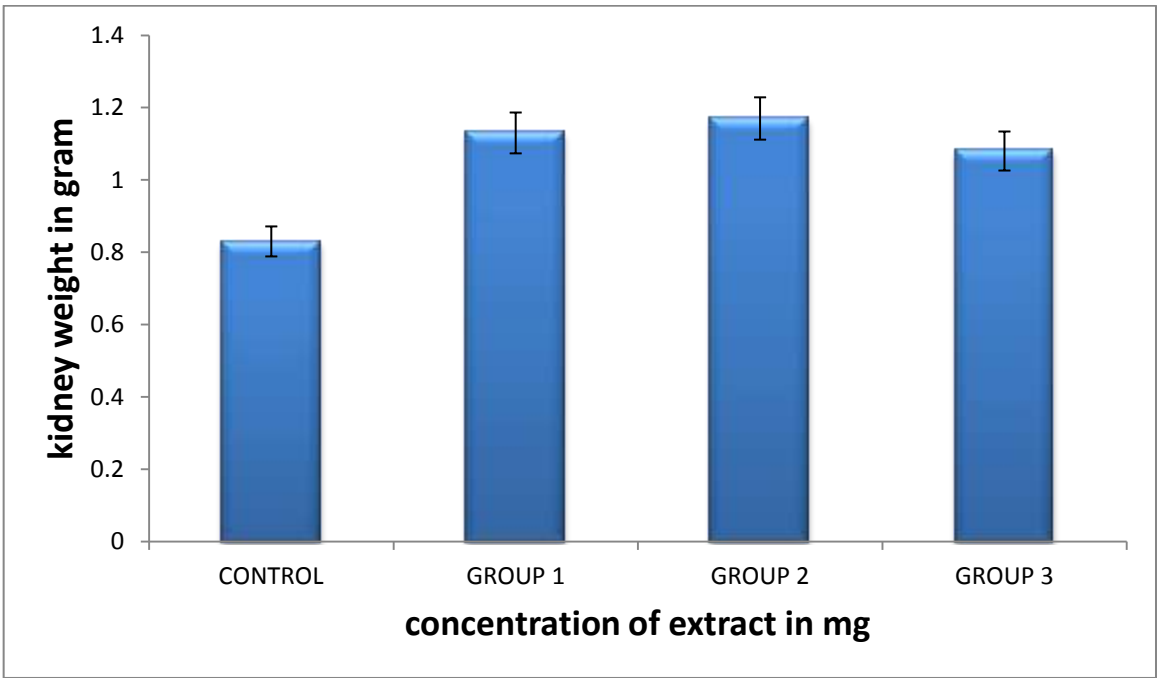


TABLE: 2 SHOWING MEAN KIDNEY WEIGHT

	n	Mean
CONTROL	6	0.830±0.140
GROUP 1	6	1.133±0.196
GROUP 2	6	1.167±0.516
GROUP 3	6	1.080±0.083

Mean ± SD (Standard Deviation) N=24



HISTOPATHOLOGICAL EXAMINATION OF THE LIVER

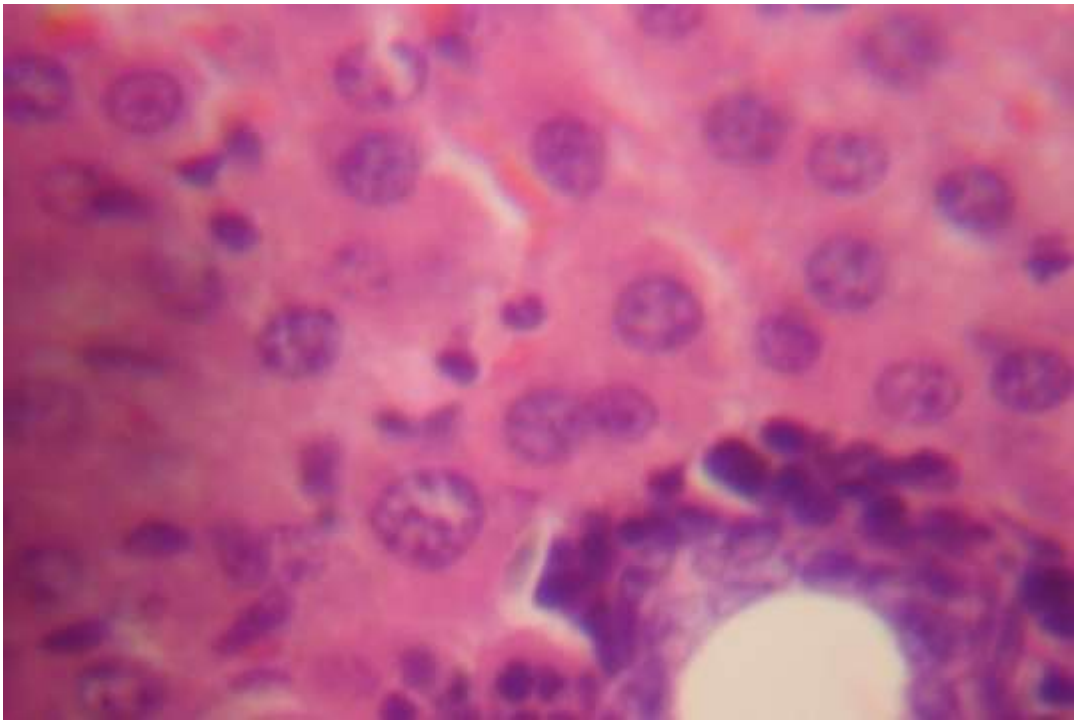


Fig 3: Control: Normal Rat Liver showing bile duct, hepatocytes and sinusoids (H&E x 40)

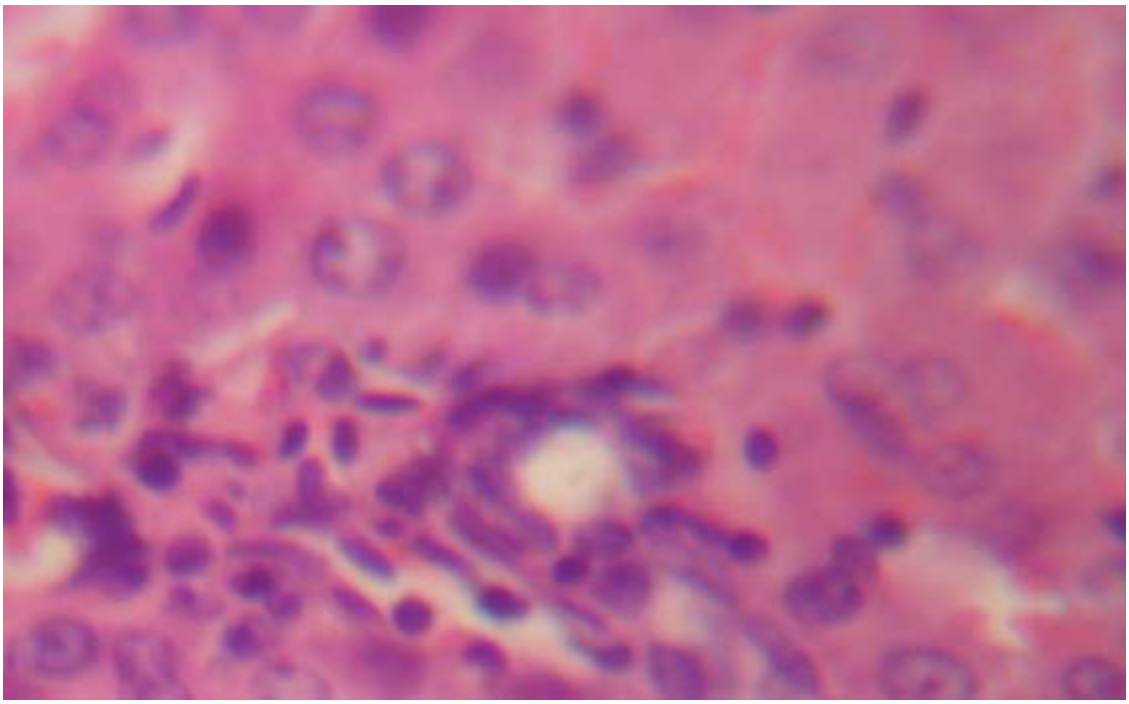


Fig 4: Rat Liver treated with 100mg/kg Cassia occidentalis for 29 days showing mild vascular congestion A, mild periportal infiltrates of chronic inflammatory cells B (H&E x 40

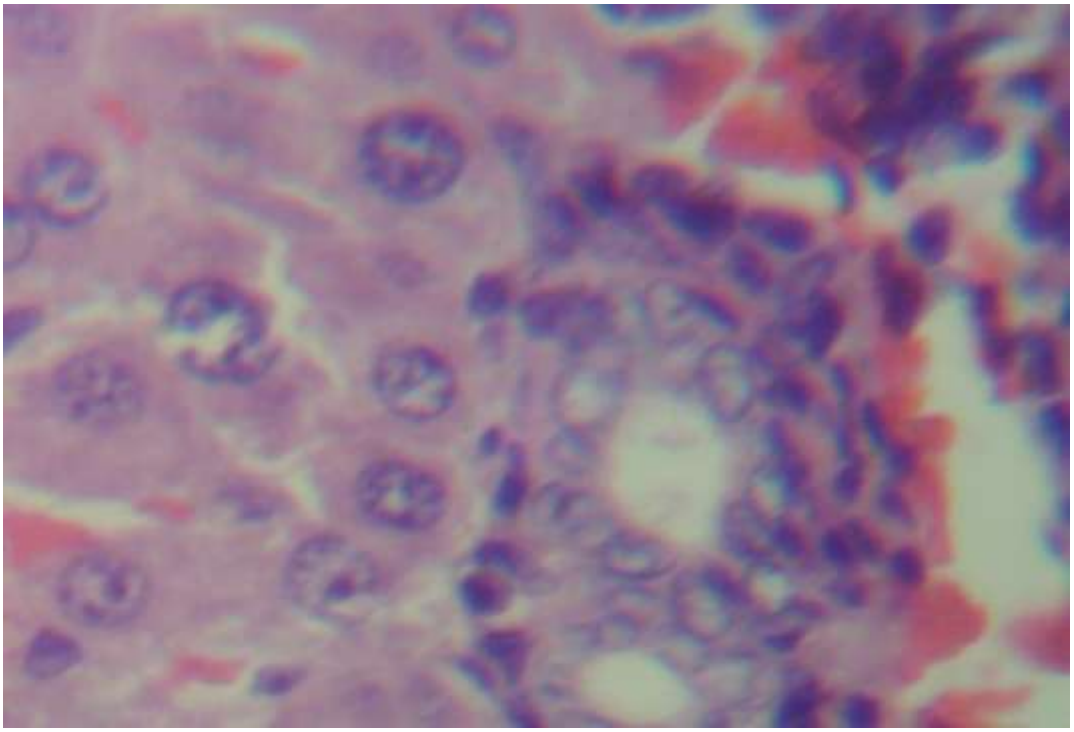


Fig 5: Rat Liver treated with 200mg/kg Cassia occidentalis for 29 days showing mild vascular congestion and mild periportal infiltrates of chronic inflammatory cells (H&E x 40)

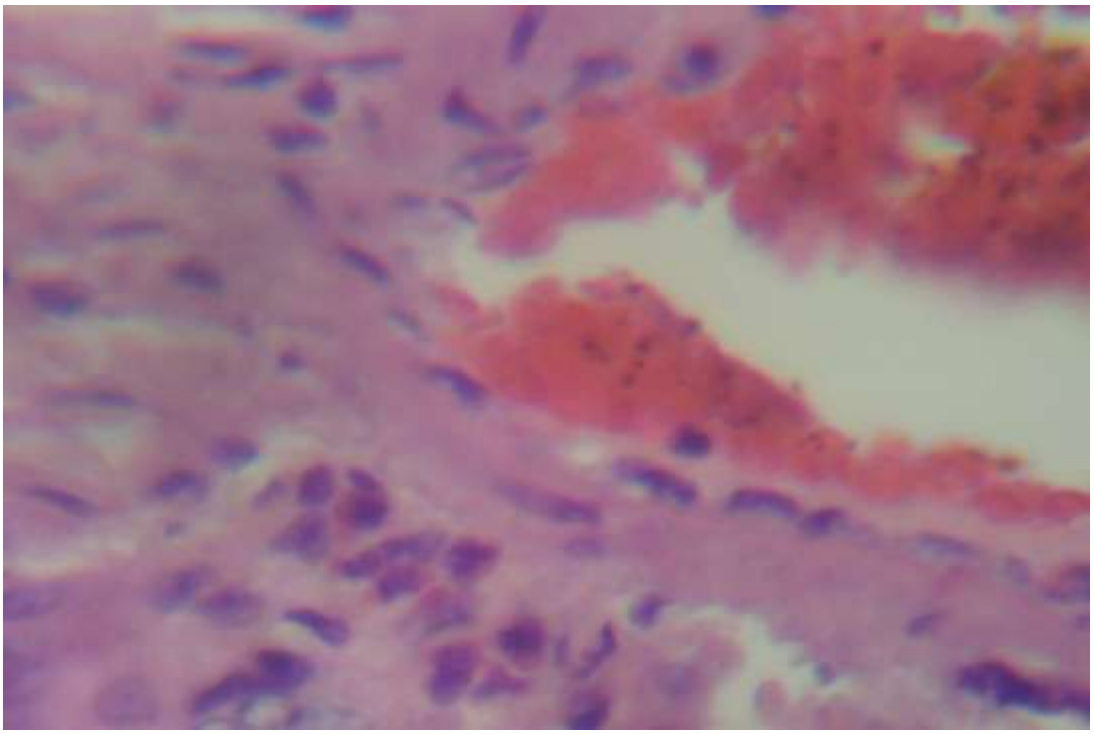


Fig 6: Rat Liver treated with 300mg/kg Cassia occidentalis for 29 days showing mild vascular congestion and dilatation, and mild periportal infiltrates of chronic inflammatory cells (H&E x 40)

HISTOPATHOLOGICAL EXAMINATION OF THE KIDNEY

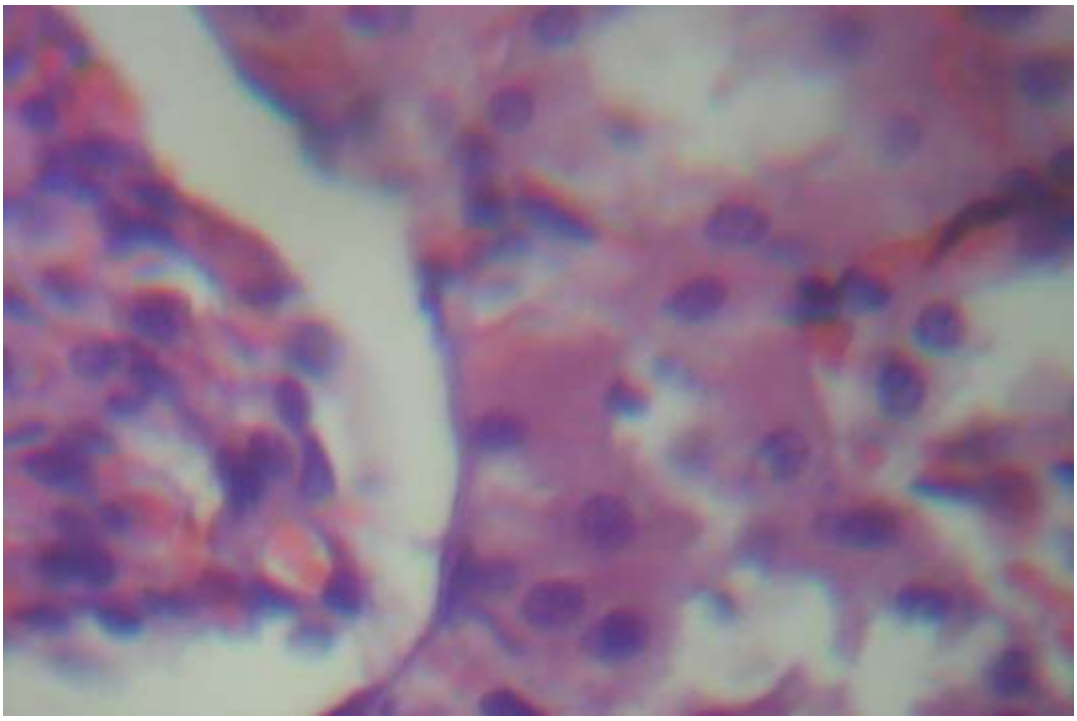


Fig 7: Control: Normal Rat Kidney showing cortical glomerulus, tubules, separated by interstitial space (H&E x 40)

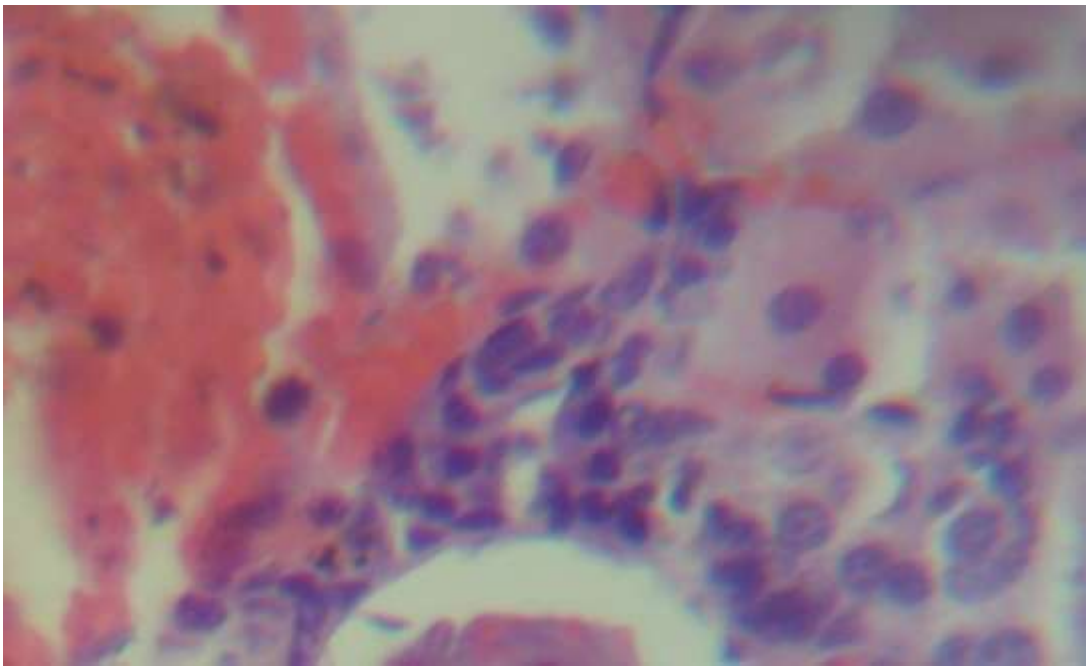


Fig 8: Rat Kidney treated with 100mg/kg Cassia occidentalis for 29 days showing moderate vascular congestion and dilatation A and mild interstitial infiltrates of chronic inflammatory cells B (H&E x 40)

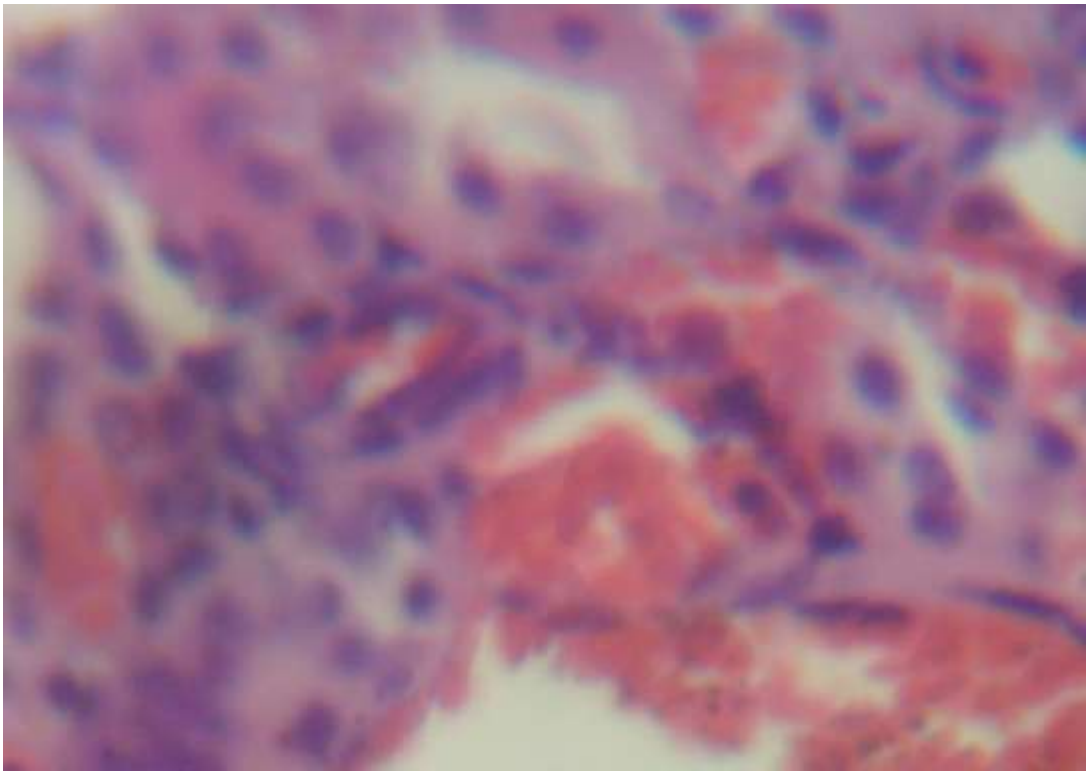


Fig 9: Rat Kidney treated with 200mg/kg Cassia occidentalis for 29 days showing moderate vascular congestion and dilatation and mild interstitial infiltrates of chronic inflammatory cells (H&E x 40)

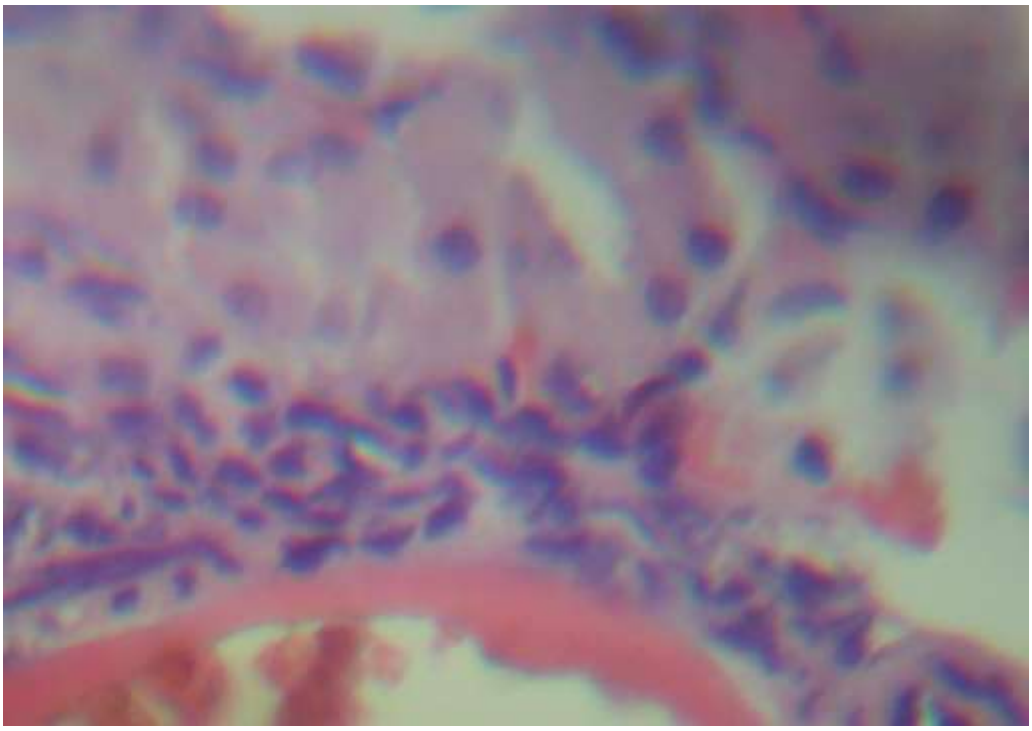


Fig 10: Rat Kidney treated with 300mg/kg Cassia occidentalis for 29 days Fig showing moderate vascular congestion and dilatation and mild interstitial infiltrates of chronic inflammatory cells (H&E x 40)

DISCUSSION

Cassia Occidentalis is used widely because of its much medicinal importance. It is used locally in curing many ailments which includes anti-inflammatory, anti-bacterial, diuretics and throat infection. "The roots, leaves, flowers and seeds are used in preparation of various compounds like senna syrup, senna tea, senna tincture and the plant has laxative and purgative effects (Muyibi et al ;2000). The results from this research showed the effects of the plant extract on the histology of the liver and kidney as well as its effect on the organ weights.

ORGAN WEIGHT

In both the liver and kidney, there was an increase an increase in organ weight that was not significant ($p>0.05$) in the treated groups. The increase in the organ weights suggests a nutritive ability of the plant.

HISTOPATHOLOGY

Histological examination of the liver and kidney revealed some changes in both organs of the treated groups.

LIVER

The livers of group 1(control group) showed normal histological arrangement but the livers of the treated groups showed presence of vascular congestion and dilatation and cluster of mild chronic inflammatory cells. There was also an activation of the kupffer cells.

KIDNEY

In the kidney also the changes observed in the treated groups are vascular congestion and mild infiltrates of chronic inflammatory cells. These changes observed in the livers and kidneys are protective responses. The extract is rich in flavonoids which are powerful anti-oxidants. The anti-oxidant effects could be immunomodulatory accounting for the activation of the immune system of the liver. The inflammatory cells are in response to activation of the immune system such as mobilization of kupfer cells and macrophages. This actions elicited by cassia occidentalis tend to confer a hepatoprotective function. These findings are in agreement with the work of Jafri et al, (2008) who noted a hepatoprotective effect of cassia ocidentalis on the liver and its ability to repair, protect and normalize the liver.

The results from this research is in contrast to the findings of Muyibi et al (2000) who reported tubular necrosis and fatty damage in the kidney and liver respectively noticed in rats on administration of cassia occidentalis. The result also disagrees with the work of Nuhu and Aliyu (2008), who noted slight toxicity in livers of rats treated with cassia occidentalis. This difference in results may be due to the different part of the plants used since the concentration of the phytochemical components of the plants differs in different parts of the plants.

CONCLUSION

Conclusively, from this research the consumption of cassia occidentalis could have a possible positive effect on the kidney and liver, hence could be considered safe for consumption however consumers should be guided in its usage. It is therefore recommended that a functional assessment of the tissues worked on be carried out to corroborate the histological findings. Also more work should be carried to determine the active beneficial components in this plant as well as the toxic components.

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