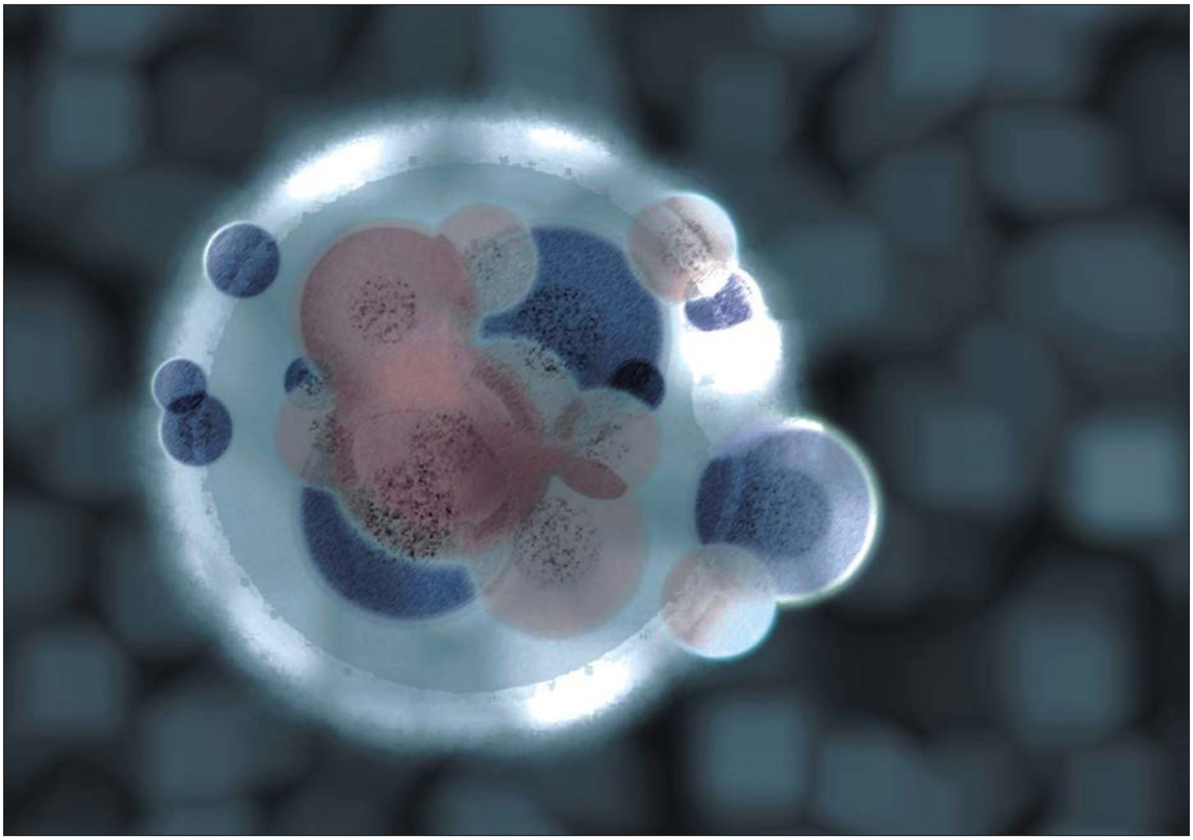

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Histopathological Effect of *Piper guineese* Extract on Wistar Rats

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Abstract: The toxicity of *Piper guineese* extract, known as a spice and seasoning and also used in treatment of different ailment such as malaria was investigated in rats. Twenty four wistar rats were obtained, weighed and divided into four groups of six per group. They were allowed access to rat feed and tap water ad- libitum for two weeks period of acclimatization. Different concentrations of *Piper guineese* extract were administered to three of the experimental groups. 25, 50 and 75 mg/100 g, while the fourth group received 100% tap water and served as control. The study lasted 21 days. The results obtained showed slightly reduced agility, loss of appetite in animals treated with higher concentration of extract. Sections through the kidneys and livers of the sacrificed animals showed alteration of their normal cyto-architecture, some of which were pathological. The result of the present study suggests that *Piper guineese* could be toxic at certain dosage and over prolonged periods.

Key words: *Piper guineese*, extract, histopathologic effect, wistar rats

INTRODUCTION

Naturally existing plants have been found to contain varieties of chemical substances which are of paramount importance to the medical world (Dutta, 2005). Man's survival has been dependent on his curiosity, his desire to examine by trial and error all aspects of his environment and to conclude which materials are medicinal, harmful or of great nutritional value. And as such, different plant parts have been used as popular medicine in several countries-underdeveloped, developing and developed- as an alternative treatment for various diseases (Ampofo and Romand, 1978). Some of these plants that exhibit medicinal properties have been known to help in stabilizing different internal organs in animals, while others have had side effect on the organs due to varying amount of toxic matter present in such plants. (Ataman *et al*., 2006). Toxicity testing in animals is carried out on a new drug to identify potential hazards. It helps in determining the upper limits of administration (Sofowora, 1993; Ataman *et al*., 2006). If the toxic effect of a drug is low then, there is chance of possible introduction of such drug for therapeutic use.

Black pepper (*Piper guineese*) is a flowering plant in the family Piperaceae. The fruit, known as a peppercorn when dried, is a small drupe, five millimeters in diameter, dark red when fully matured, containing a single seed. It is a native to India and long been considered the world's most important spice. It is cultivated for its fruit, which is usually dried and used as a spice and seasoning (Dutta, 2005) and also as preservative (Dorman and Deans, 2000). It is one of the most common spices in the European cuisine and has been known and prized since antiquity for both its flavor and its medicine (McGee, 2004). Black pepper has been used to flavor foods for over 3000 years. The same fruit is also used to produce white pepper and green pepper (Dalby, 2002). Several medicinal value of this has been reported in the works of some authors. Oyedeji *et al*. (2005) worked on the antimicrobial activity of *Piper guineese*, Abile *et al*. (1993) worked on the anticonvulsant effect of *Piper guineese*, Ashorobi and Akintoye (1999) worked on the non sedating anti-convulsant activity of *Piper guineese*. Traditional practitioners also prescribed it in the treatment of convulsion, cold, inflamatory and intestinal disorder; it is also used as a preservative. Asprey and Thornton (1955) investigated effect of *Piper guineese* extract on phrenic nerve hemidiaphragmatic activity. Others include work by Gills (1992). Its extensive usage makes it an important plant to study. In this study the dose related effect of the extract of *Piper guineese* on animal tissues was investigated for toxicity while also keeping the animals on supplementary feeds with feed mash with a view to rationalize the need to freely or cautiously use this plant in effecting remedy to ailments.

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MATERIALS AND METHODS

Twenty four wistar rats of average body weight ranging between 140-160 g obtained from the animal house, Department of Biochemistry, University of Ilorin, were used for the study. The animals were kept for 2 weeks period of acclimatization. Animals were later divided into four groups of six per group. All animals were fed *ad libitum* with mouse chow. Black pepper dried fruits were obtained and used with distilled water in preparing the aqueous extract of *Piper guineese*, following the method described by Ashorobi and Akinoty (1999). Here, 80 g of sun dried fruit were obtained, ground and soaked in 1 L of distilled water for 24 h with mixture shaken at interval of 8 h at room temperature, this was filtered severally using cotton wool to remove larger particles, the resultant solution coloured light brown was poured into a container and refrigerated. 0.31, 0.62 and 0.94 mL of extract (which added up to 25, 50 and 75 mg/100 g respectively) were given daily to animals in groups B, C and D respectively using naso-gastric tubes. The animals in group A severed as the control, receiving only mouse chow and tap water ad libitum. The experiment lasted for 21 days from 15th of August to 5th of September 2005 in the Department of Anatomy University of Ilorin.

Two rats were then sacriiced from each group on the 14th and 21st day of the experiment: the liver and kidney were removed and fixed in 10% formaline to prevent decomposition; afterwards tissues were processed into slides following method described by Idu *et al.* (2002).

RESULTS

Physical characteristic of experimental animals: The activity of animals was classified based on agility. This was observed to be quite normal until the third week of the experiment when the activity of animals in group D became slightly reduced (Table 1). The food intake of animals in group D also slightly reduced in the 3rd week. Percentage increase in weight gradually decreased from control group to group D, the decrease in weight can be attributed to loss of appetite which is indicated by reduction in food intake especially in group D. there was no observable changes in the agility of the other treated animals or in the control group. Animals in all groups gained weight as the experiment progressed, but the percentage increase was progressively less with increase in the concentration of extract administration (Table 2).

Histopathology: From Table 3 it is observed that the kidney showed increase in the number of cells in the glomerular tufts as shown in Fig. 5 and 6. Sections through the liver showed flattening of central vein in Fig. 2, with cell necrosis observed in Fig. 3. Figure 1 and 4 represented control sections through the liver and kidney, respectively.

Table 1: Physical characteristics and food intake observation of experimental rats (n = 6 per group)

Treatments	Agility	Hair loss	Food intake
Group A (Control)	Normal	None	Normal
Group B (25 mg/100 g)	Normal	None	Normal
Group C (50 mg/100 g)	Normal	None	Normal
Group D (75 mg/100 g)	Slightly reduced in 3rd week	None	Slightly reduced in 3rd week

Table 2: Average weight changes in rats following treatment with various doses of black pepper

Treatments	Initial body weight (g)	Final body weight (g)	Increase in weight (%)
Group A (Control)	154.00	175.55	13.99
Group B (25 mg/100 g)	153.42	174.00	13.41
Group C (50 mg/100 g)	153.61	173.00	12.62
Group D (75 mg/100 g)	154.83	171.42	10.71

Table 3: Histological observation of the liver and kidneys sectioned

Treatments	Kidney	Liver
Group A (Control)	Normal	Normal
Group B (25 mg/100 g)	Normal	Normal
Group C (50 mg/100 g)	Hypercellularity	Flattening of central vein
Group D (75 mg/100 g)	Hypercellularity	Necrosis

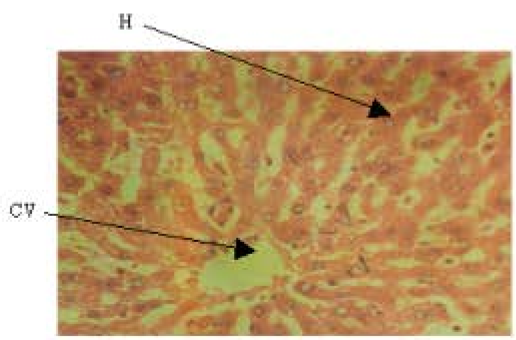

Fig. 1: A section through the untreated adult liver (control). H and Ex400

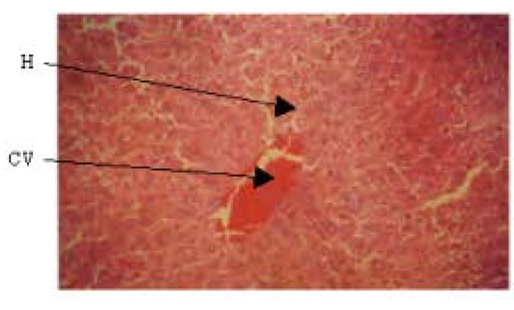

Fig. 2: A section through the treated adult liver (H and Ex400) treated with 50 mg/100 g

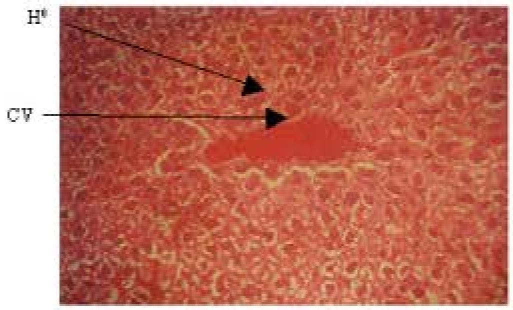

Fig. 3: A section through the treated adult liver (H and Ex400) treated with 75 mg/100 g

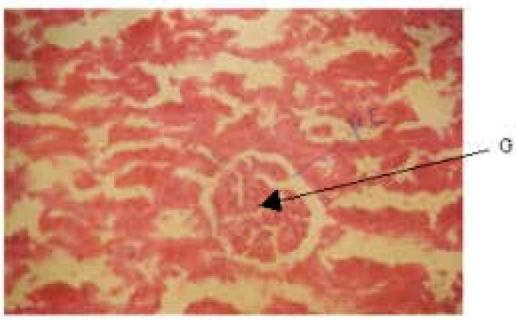

Fig. 4: A section through the untreated adult kidney (control) H and Ex400

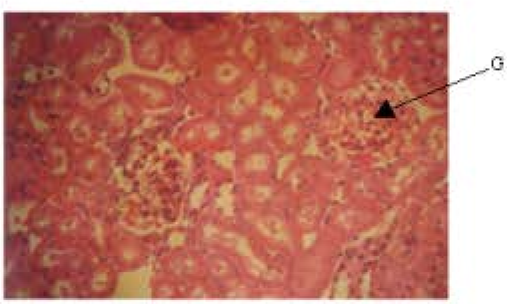

Fig. 5: A section through the treated adult kidney (H and Ex400) treated with 50 mg/100 g

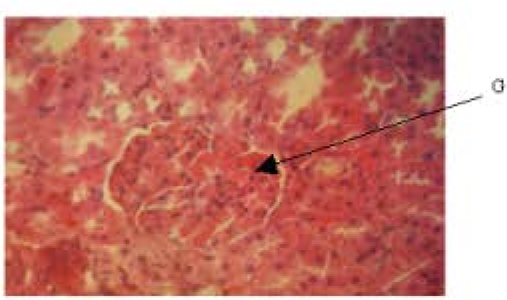

Fig. 6: A section through the treated adult kidney (H and Ex400) treated with 75 mg/100 g

DISCUSSION

During the experiment, sluggishness and loss in weight was noticed in the animals in group D. the sluggishness and loss in weight noticed may be due to reduction in intake of feed. This in turn may be attributed to the concentration of black pepper administered-as the taste may be unpalatable. This observation reemphasizes the opinion that Increased concentration of active compounds in plants extracts are not always beneficial and can even promote adverse biological effects (Ataman *et al*., 2006; Pepato *et al*., 2001). There were no observable changes in the agility of animals in groups B and C and there was weight gain suggesting that concentration of black pepper is tolerable at low dosage. The histopatologic result of various sections revealed some pathologic differences in organs studied. The pathologic changes may be attributed to the chemicals contained in black pepper. It is known to contain several amine alkaloids, sterols and lignans. Lignans are phenolic compounds found mainly in plants and are believed to protect humans from tumors and viruses (Anonymous, 2006). They however also produce side effect such as irritation, scarring and tissue necrosis (Anonymous, 1999) thus may be responsible for flattening of central vein and cell necrosis seen in the liver (Fig. 2, 3) and the hypercellularity of the glomerulus as well as increase in their sizes (Fig. 5, 6) as seen in sections through the kidney. It is observed that pathological lesion was more pronounced in groups administered higher doses of black pepper extracts.

It can be concluded from these results that while black pepper may be useful as a spice and also used in treatment of certain ailment, systemic toxicity is also possible and this is dose dependant. Caution should therefore be exercised in the therapeutic use of this plant.

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