

# Histopathological Studies on the Effects of the Ethanolic Extract of the fruits of *Garcinia kola* on Selected Organs of the Dog

## Estudio Histopatológico del Efecto de los Extractos Etanólicos de los Frutos de *Garcinia kola* en Órganos Seleccionados de Perro

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**SUMMARY:** The ethanolic extract of *Garcinia kola* was administered to dogs to investigate the possible effects on selected organs of the dog. Two doses of the extract (500mg/Kg and 1000mg/Kg) were daily administered to the test animals for a period of 6 weeks. A dose related response was observed in the severity of histopathological changes observed in the testes, liver, kidney and small intestine of animals in the test groups. Despite the reported potentially beneficial effects of *Garcinia kola*, its use as a medicinal plant should be with great caution.

**KEY WORDS:** *Garcinia kola*; Dog; Histopathological effects.

## INTRODUCTION

Plants are known to provide a source of inspiration for novel drug compounds and this is sequel to the fact that medicines derived from plants have made large contributions to human health and well being (Iwu *et al.*, 1999). One of such is *Garcinia kola*, a plant in the family *Guttiferae*. The plant, which is found in moist forests grows up to a height of 12 meters (Iwu, 1993). It is referred to as “bitter kola” or “male kola” because of its bitter taste and the perceived aphrodisiac activity respectively (Uko *et al.*, 2001). Traditionally, *G. kola* is regarded as a highly prized item and it is served to visitors in social gatherings as a mark of honour and also in the treatment of headache, cough, colic pains and gonorrhoea (Iwu).

Scientifically, the potentials of *G. kola* as a therapeutic agent have been reported and these include hepato-protective (Iwu *et al.*, 1987; Akintonwa & Essien, 1990; Farombi *et al.*, 2000; Nwankwo *et al.*, 2000), antithrombotic (Olajide, 1999) and antibacterial (Ezeifeke *et al.*, 2004).

However, despite the numerous reports of the potential beneficial therapeutic effects of *G. kola*, there have been some scientific reports adverse effects too. (Bradie & Gill, 1990, Atawodi *et al.*, 1995; Akinloye *et al.*, 2000). This study was designed to investigate the possible adverse effects of prolonged administration of *G. kola* extract on selected organs of the dog.

## MATERIAL AND METHOD

The fruits of *G. kola* were obtained from Oja-Oba market in Ibadan, Oyo State, Nigeria. The fruits were de-coated and subsequently cut into small pieces so as to increase the surface area. The latter process increased the drying rate of the bitter kola that was carried out under the hot sun. The grinding of the dried pieces into fine powder followed this procedure. Using absolute ethanol as the solvent, extraction was carried out by using the Soxhlet extractor as described by Tairu *et al.* (1991).

A total of nine puppies weighing between 5 and 7 kg were used in this study. They were randomized into three groups E1, E2 and C with each group containing three animals. Groups E1 and E2 were the test animals while group C served as the control. The dogs were housed in the experimental canine unit of the Department of Veterinary Medicine, University of Ibadan and were fed on home cooked food three times daily. Clean and fresh water was provided *ad libitum*. Each of the animals in Groups E1 and E2 was daily orally administered with 500 mg and 1000 mg of the semi-solid extract of *G. kola*, respectively per kilogram body weight for a period of 6 weeks. Dogs belonging to group C were daily administered with 2ml of normal saline for the period of the study. Clinical parameters like rectal temperature, respiratory rate, heart rate and pulse rate were recorded daily for each of the animals.

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At the end of 6 weeks, all the animals were euthanised by the intravenous administration of Euthatal®. Tissue samples were thereafter collected from the cerebrum, cerebellum, lymph nodes, lungs, heart, kidneys, adrenal glands, salivary glands, urinary bladder, testicles, small intestine, large intestine, pancreas, liver and spleen. These tissue samples were preserved in 10% neutral buffered formalin and were later processed using standard histopathological techniques.

## RESULTS

There were no clinically obvious signs of ill health in any of the animals used in this study and no deaths were recorded. Clinical parameters recorded were within normal limits.

The livers of groups E1 and E2 dogs showed severe, widespread vacuolar degeneration of hepatocytes. There was multifocal centrilobular hepatocellular necrosis and mononuclear cell aggregations (Fig. 1). There was cellular infiltration including neutrophils, lymphocytes and macrophages, mild periportal fibrosis and Kupffer cell proliferation.

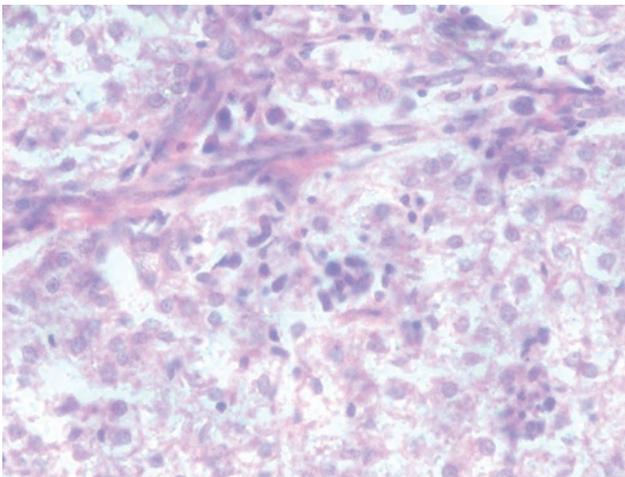


Fig. 1. Severe vacuolar degeneration and necrosis of hepatocytes, mononuclear cell aggregations and mild portal fibrosis in the liver of a dog given 1000mg/kg of the extract of *G. kola* for 6 weeks (H&E; x450)

In the kidneys, there were multiple focal areas of glomerular degeneration and coagulative necrosis of proximal tubules and focal mononuclear cell aggregations (Fig. 2). Also, there were pinkish tubular casts in the cortex and medulla.

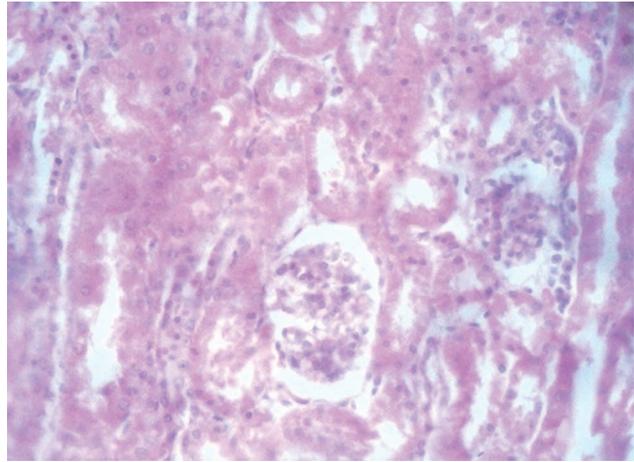


Fig. 2. Glomerular degeneration, tubular necrosis and mild interstitial mononuclear cell infiltration in the kidney of a dog given 500mg/kg of the extract of *G. kola* for 6 weeks (H&E; x450).

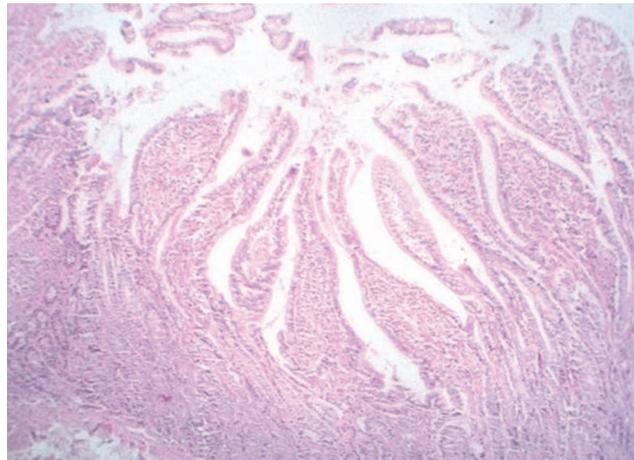


Fig. 3. Moderately severe villous collapse and mild goblet cell hyperplasia in the small intestine of a dog given 500mg/kg of the extract of *G. kola* for 6 weeks (H&E; x300)

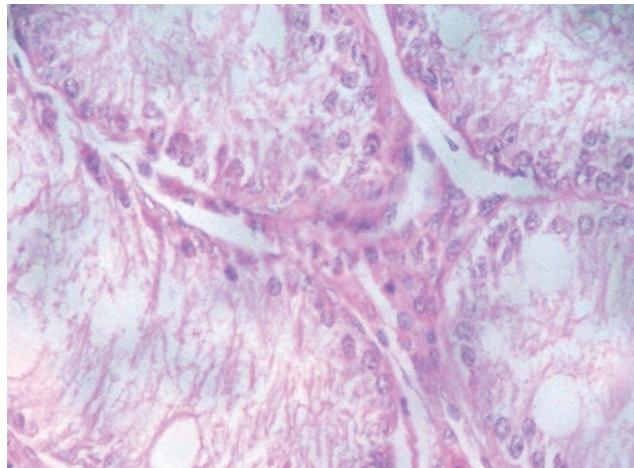


Fig. 4. Severe testicular hypoplasia in a dog given 500mg/kg of the extract of *G. kola* for 6 weeks (Note the complete absence of viable spermatids and spermatozoa in the seminiferous tubules) (H&E; x600)

The small intestine showed mild villous atrophy, villi stunting, goblet cell hyperplasia (Fig. 3) and presence of scattered neutrophils and lymphocytes in the lamina propria and submucosa. These lesions were more severe in the group E2 animals.

In the testes of group E1 animals, about 70% of the seminiferous tubules were hypoplastic with disorganized epithelial cells and no viable spermatids and spermatozoa (Fig. 4). In the group E2 animals, the testes were observed to be severely fibrotic with no viable seminiferous tubules. There were no significant lesions in the other tissues examined for both the experimental and control groups of animals.

## DISCUSSION

The degenerative changes observed in this study on the liver, kidney and small intestine are consistent with earlier reports on the effects of prolonged ingestion of *G. kola* (Virk & Menke, 1986) These lesions observed in the liver might account for earlier findings in which the inhibition of hepatic metabolism of drugs in rats treated with the flavonoid extract of *G. kola* seeds was reported (Bradie & Gill).

Also, the effect on the testes is consistent with earlier findings on the effect of prolonged administration of the

aqueous extract of *G. kola* on rabbit testes (Akinloye *et al.*). Although *G. kola* is traditionally used as an aphrodisiac, the observed effects on histological sections of the testes of dogs in this study, as well as that reported in rabbit testes by Akinloye *et al.*, both suggest a possible anti-fertility action. Braide *et al.*, (2003) reported a marked reduction in the serum testosterone concentration of rats administered the methanolic extract of *G. kola*. This might have been as a result of the direct action of *G. kola* on the testicular tissue.

Uko *et al.* had earlier reported a decrease in body mass gain in rats fed *G. kola* and this; they associated with reduced feed consumption. Although weight gain was not measured in this work, lesions found in the intestines in this work could result in poor feed conversion and ultimately, a decrease in weight gain.

This study has shown that despite the reported potentially beneficial effects of *G. kola*, prolonged administration of the ethanolic extract of *G. kola* could be injurious to some body systems. The histopathological findings observed in the tissues that were sampled were observed to be dose related.

Further work is required to investigate the mechanisms by which *G. kola* exerts its effect on the organs studied and also, carefully weigh the potential effects of *G. kola* as a therapeutic agent against the reported adverse effects.

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**RESUMEN:** Fue administrado a perros extracto etanólico de *Garcinia kola*, para investigar los posibles efectos sobre determinados órganos. Dos dosis del extracto (500mg/Kg y 1000mg/Kg) fueron administradas diariamente a los animales durante un periodo de 6 semanas. Se observó una relación de la dosis con la gravedad en la respuesta de los cambios histopatológicos observados en testículos, hígado, riñón e intestino delgado de los animales. A pesar de los informes sobre efectos potencialmente beneficiosos de *Garcinia kola*, su uso como planta medicinal debe ser con mucha precaución.

**PALABRAS CLAVE:** *Garcinia kola*; Perro; Efectos histopatológicos.

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