

## ***Kigelia africana* Fruits' Extracts anti Hepato-Toxic Effects on Male Wistar Rats Liver Destruction Induced by CCL<sub>4</sub>**

Shama, I.Y. Adam and Marwa, I. Abd Alhameed

Department of Biochemistry and Molecular Biology, Faculty of Science and Technology, El Neelain University, P.O. Box 12702, Khartoum, Sudan

**Abstract:** Substances that have a hepato-protective activity are those that can inhibit oxidation to protect the cells of the body from the damaging effects of oxidation. It can bind to free oxygen radicals preventing these radicals from damaging healthy cells. The present study was planned to investigate the effects of aqueous and methanolic extracts of *Kigelia africana* fruits as hepato protective agent for the liver damage on male Wistar rats. Animals were grouped randomly to seven groups, Group 1 (normal control), Group 2 received CCl<sub>4</sub> on 3<sup>rd</sup> day. Silymarin were given to rats in group 3 for 5 days and CCl<sub>4</sub> induction on 3<sup>rd</sup> day. Groups 4, 5 and 6 received methanol extract (100, 200 and 400 mg/kg/day) respectively and group 7 received aqueous extract (400 mg/kg/day) for 5 days and CCl<sub>4</sub> induction on 3<sup>rd</sup> day. The control had the higher (p<0.05) body weight gain than all groups (CCl<sub>4</sub> control, methanol and aqueous extracts) except silymarin control showed no significant change. The study revealed that, administration of the two extracts (aqueous and methanol) of the plant seeds has a toxic effects which resulted in alterations in Hb, WBCs MCH, MCHC and granulocytes and other hematological parameters, also an alterations in Aspartate Transaminase (AST), Alanine Transaminase (ALT) and Alkaline Phosphatase (ALP) activities and other serological parameters. There were alterations in liver and kidney. No significant lesions were observed in the heart or spleen of the test rats. This study showed that fruits of the plant given to the experimental rats at doses 100, 200 and 400 mg/kg/day orally were toxic but not fatal; the toxicity was characterized by lower body weight gain, alteration in biochemical, hematological and pathological parameters.

**Keywords:** *Eclipta alba*, iridoid, *K. africana*, protocateuic acid, sciatica, vermin side

### **INTRODUCTION**

Medicinal agents came mainly from nature which has been a source of them for thousands of years and an impressive number of modern drugs have been isolated from natural sources (Cragg and Newman, 2001). In counterpart the liver is a glandular organ which is the largest one in the body, it acts like a factory for production of substances that break down fats, produce urea, convert glucose to glycogen, make certain amino acids and many other functions (Moss, 2000).

The hepatic protective substance is a substance that inhibits oxidation to protect body cells from the damaging effects of oxidation. It can bind to free oxygen radicals preventing these radicals from damaging healthy cells (Moss, 2000).

Many wild plants that grow in deserts, mountains and other different environments have been used traditionally to treat various problems.

*Kigelia africana* (Family: Bignoniaceous), is a genus of flowering plants in the family Bignoniaceous. The genus comprises only one species, *K. africana* (Roodt, 1992). It is widely spread in Sub-Saharan

Africa, although rare in some regions (Charlotte and Dorthe, 2005).

The plant contains naphthoquinones which are active against several protozoal species (Bharti *et al.*, 2006). The bark of *K. africana* Lam. (Benth.) as powder is used in traditional medicine for ulcers treatment, or for treatment of pneumonia and malaria.

The methanol extract of *K. africana* revealed marked antipyretic activity based on the pyrogen-induced fever reduction in rabbits. Although the aqueous extract effect was not statistically significant (Owolabi and Omogbai, 2007).

In other hand the ethanolic stem bark extract of the plant can stimulate Central Nervous System in which by this property the plant can be explored for therapeutic advantage (Owolabi *et al.*, 2008). Also the stem bark of *K. africana* revealed that the crude ethanol extract has some activities such as antibacterial and antifungal, the aqueous extract showed no antibacterial or antifungal activity (Omonkhelin *et al.*, 2007), Also ethanol extract showed antibacterial activity against gram positive and gram negative bacteria (Grace *et al.*,

2002), some antioxidant activity (Olaleye and Rocha, 2008) and anti diabetic activity (Nayarko *et al.*, 2005).

The major constituents isolated from the polar extract of the fruit of *K. africana* are verminosides and iridoids and series of polyphenols such as verbascoside. Also *In vitro* assays showed that verminoside had significant anti-inflammatory effects (Patrizia *et al.*, 2008).

The crude stem bark and fruit extracted with dichloromethane showed cytotoxic activity *In vitro* against cultured melanoma and other cancer cell lines (Jackson *et al.*, 2000).

The plant has many medicinal properties because of the presence of many secondary metabolites which include iridoids, flavonoids and naphthoquinones and volatile constituents (Houghton, 2002). The major constituent isolated from the plant is the kigelin which isolated from the root, the stem bark led to the isolation of three known iridoids: specioside, verminoside and minecoside (Gouda *et al.*, 2003).

The present study was therefore planned to investigate the effects of aqueous and methanolic extracts of *K. africana* fruits as an agent that can prevent or heal the damage of hepatocytes or generally liver damage in experimental rats.

## MATERIALS AND METHODS

**The plant:** *K. africana* fruits were collected from Khartoum state, Sudan, in March, 2010. The plant tissues were cleaned, shade-dried and ground.

**Experimental design:** Forty two, 2 months-old male Wistar rats were housed within the premises of Biochemistry and Molecular Biology Dept. Faculty of Science and Technology, El-Neelain University, Khartoum, with feed and water provided *Ad libitum*.

Rats were randomly grouped to seven, each of 6 rats. The first group received distilled water for 5 days and represented normal control. Group 2 (induction control) received carbon tetra chloride (CCl<sub>4</sub>) at dose 3 mL/kg, subcutaneously, 1:1 dilution with olive oil on 3<sup>rd</sup> day.

Group 3 received silymarin (50 mg/kg/day) orally for 5 days and CCl<sub>4</sub> induction on 3<sup>rd</sup> day. Group 4, 5 and 6 received methanol extract (100, 200 and 400 mg/kg/day) orally respectively and group 7 received aqueous extract (400 mg/kg/day) for 5 days and CCl<sub>4</sub> induction on 3<sup>rd</sup> day. On the 6<sup>th</sup> day, the rates were sacrificed, Blood samples were collected at slaughter and analyzed, vital tissues were processed for histopathology.

**Hematological parameters:** Hemoglobin (Hb), Packed Cell Volume (PCV), Red Blood Cells (RBCs), White Blood Cells (WBCs) and differential WBCs counts,

Mean Corpuscular Volume (MCV), Mean Corpuscular Hemoglobin (MCH) and Mean Corpuscular Hemoglobin Concentration (MCHC) were determined by automated hematology analyzer.

**Serobiochemical parameters:** Serum samples were analyzed using automated serology analyzer for the activities of Aspartate Transaminase (AST), Alanine Transaminase (ALT) and Alkaline Phosphatase (ALP) and for concentrations of total protein, albumin, globulin and bilirubin.

**Statistical analysis:** The significance of differences between means was compared at each time point using Duncan's multiple range test after ANOVA for one-way classified data (Snedecor and Cochran, 1989).

## RESULTS

**Growth changes:** Body weight and body weight gain of rats given daily oral doses of *K. africana* fruits methanolic extracts at 100 mg/kg (Group 4), 200 mg/kg (Group 5) and 400 mg/kg (Group 6) and aqueous extract at 400 mg/kg (Group 7) for 5 days are presented in Table 1. The control (Group 1) had the higher (p<0.05) body weight gain than all groups (CCl<sub>4</sub> control, Group 4, 5 and 6) except silymarin control (Group 3) which had no significant change.

**Hematological changes:** The values of Hb, MCH, MCHC, WBCs and granulocytes were higher (p<0.05) in groups 2 and 5, granulocytes were higher (p<0.05) in groups 2, 3, 5, 6 and 7 and lymphocytes were higher (p<0.05) in group 4 than control (Group 1). The values of Hb, RBCs and PCV were lower (p<0.05) in groups 4, 6 and 7, lymphocytes were lower (p<0.05) in groups 2, 5, 6 and 7, WBCs were lower (p<0.05) in groups 4 and 7, granulocytes were lower (p<0.05) in group 4 and

Table 1: Body weight and body weight gain in rats orally given *Kigelia africana* extracts for 5 days

Treatment groups	Parameters	
	Body weight gain (g) 0 day	Body weight gain (g) 6 days
1. Control (normal diet)	93.0±1.2	10.2±1.4*
2. CCl <sub>4</sub> control	92.5±3.4	08.2±1.5*
3. Silymarin control	85.8±2.7	09.3±2.7 <sup>NS</sup>
4. (100 mg/kg/day) methanolic extract	98.8±1.3	05.0±1.4*
5. (200 mg/kg/day) methanolic extract	98.8±1.3	06.2±1.5*
6. (400 mg/kg/day) methanolic extract	82.5±1.1	05.3±1.8*
7. (400 mg/kg/day) aqueous extract	85.0±2.2	08.0±1.5*

Values are expressed as mean±S.E; NS: Not significant; \*: Significant = (p<0.05)

Table 2: Hematological analysis of rats given *Kigelia africana* methanol and aqueous extract orally for 5 days

Parameters	Groups						
	1. Control (normal diet)	2. Control (CCl <sub>4</sub> )	3. Control (silymarin)	4. <i>K. africana</i> (100 mg/kg/day)	5. <i>K. africana</i> (200 mg/kg/day)	6. <i>K. africana</i> (400 mg/kg/day)	7. <i>K. africana</i> (400 mg/kg/day)
6 days							
Hb (g/dL)	16.9±0.5	29.8±0.5*	16.9±1.8 <sup>NS</sup>	12.6±0.5 <sup>NS</sup>	21.4±0.4*	14.3±0.6*	09.7±0.6*
RBCs (X10 <sup>6</sup> mm <sup>3</sup> )	10.4±0.5	09.6±0.6 <sup>NS</sup>	10.9±1.4 <sup>NS</sup>	08.2±0.6*	10.5±0.3 <sup>NS</sup>	08.2±0.6*	06.0±0.5*
PCV (%)	68.3±2.6	60.2±2.2*	69.9±2.6 <sup>NS</sup>	52.7±2.8*	65.4±1.9 <sup>NS</sup>	51.6±2.5*	37.5±2.8*
MCV (m <sup>3</sup> )	65.4±0.7	62.8±0.9 <sup>NS</sup>	64.2±0.5 <sup>NS</sup>	64.0±0.6 <sup>NS</sup>	62.0±0.7 <sup>NS</sup>	63.0±0.7 <sup>NS</sup>	63.5±0.7 <sup>NS</sup>
MCH (pg)	16.2±0.3	32.5±0.4*	15.2±0.6 <sup>NS</sup>	15.5±0.6 <sup>NS</sup>	20.4±0.3*	17.8±0.4 <sup>NS</sup>	16.2±0.7 <sup>NS</sup>
MCHC (%)	24.8±0.3	51.7±0.2*	23.8±0.5 <sup>NS</sup>	24.3±0.4 <sup>NS</sup>	32.7±0.3*	28.2±0.2 <sup>NS</sup>	23.4±0.4 <sup>NS</sup>
WBCs (X10 <sup>3</sup> mm <sup>3</sup> )	10.1±1.6	16.8±1.4*	11.4±1.8 <sup>NS</sup>	07.0±1.8*	25.9±1.5*	10.5±1.5 <sup>NS</sup>	06.9±1.6 <sup>NS</sup>
Granulocytes (%)	40.7±7.6	58.6±7.7*	48.5±7.6*	31.6±7.4*	62.3±7.7*	51.2±7.5*	51.4±7.5*
Lymphocytes (%)	53.9±7.2	32.8±6.9*	49.1±7.1 <sup>NS</sup>	61.9±7.3*	28.6±7.0*	44.9±7.1*	41.6±7.3*

Values are expressed as mean±S.E; NS: Not significant; \*: Significant = (p<0.05)

Table 3: Hematological analysis of rats given *Kigelia africana* methanol and aqueous extract orally for 5 days

Parameters	Groups				
	2. Control (CCl <sub>4</sub> )	4. <i>K. africana</i> (100 mg/kg/day)	5. <i>K. africana</i> (200 mg/kg/day)	6. <i>K. africana</i> (400 mg/kg/day)	7. <i>K. africana</i> (400 mg/kg/day)
6 days					
Hb (g/dL)	29.8±4.2	12.6±4.3*	21.4±4.0*	14.3±4.3*	09.7±4.1*
RBCs (X10 <sup>6</sup> mm <sup>3</sup> )	09.6±0.6	08.2±0.6*	10.5±0.5 <sup>NS</sup>	08.2±0.8*	06.0±0.7*
PCV (%)	60.2±4.2	52.7±4.3*	65.4±4.1 <sup>NS</sup>	51.6±4.4*	37.5±4.3*
MCV (m <sup>3</sup> )	62.8±0.9	64.0±0.8 <sup>NS</sup>	62.0±0.7 <sup>NS</sup>	63.0±0.7 <sup>NS</sup>	63.5±0.7 <sup>NS</sup>
MCH (pg)	32.5±5.8	15.5±5.6*	20.4±5.8*	17.8±5.6*	16.2±5.7*
MCHC (%)	51.7±1.2	24.3±1.3*	32.7±1.3*	28.2±1.2*	23.4±1.0*
WBCs (X10 <sup>3</sup> mm <sup>3</sup> )	16.8±1.2	07.0±1.4*	25.9±1.3*	10.5±1.2*	06.9±1.1*
Granulocytes (%)	58.6±1.9	31.6±1.6*	62.3±1.7 <sup>NS</sup>	51.2±1.7*	51.4±1.8*
Lymphocytes (%)	32.8±3.9	61.9±3.7*	28.6±3.9 <sup>NS</sup>	44.9±3.9*	41.6±3.8*

Values are expressed as mean±S.E; NS: Not significant; \*: Significant = (p<0.05)

Table 4: Hematological analysis of rats given *Kigelia africana* methanol and aqueous extracts orally for 5 days

Parameters	Groups				
	3. Control (silymarin)	4. <i>K. africana</i> (100 mg/kg/day)	5. <i>K. africana</i> (200 mg/kg/day)	6. <i>K. africana</i> (400 mg/kg/day)	7. <i>K. africana</i> (400 mg/kg/day)
6 days					
Hb (g/dL)	16.9±1.8	12.6±1.8*	21.4±1.9*	14.3±1.6*	09.7±1.6*
RBCs (X10 <sup>6</sup> mm <sup>3</sup> )	10.9±1.4	08.2±1.3*	10.5±1.3 <sup>NS</sup>	08.2±1.4*	06.0±1.6*
PCV (%)	69.9±0.6	52.7±0.7*	65.4±0.5 <sup>NS</sup>	51.6±0.6*	37.5±0.7*
MCV (m <sup>3</sup> )	64.2±0.3	64.0±0.4 <sup>NS</sup>	62.0±0.5 <sup>NS</sup>	63.0±0.5 <sup>NS</sup>	63.5±0.3 <sup>NS</sup>
MCH (pg)	15.2±0.6	15.5±0.6 <sup>NS</sup>	20.4±0.8*	17.8±0.6*	16.2±0.7 <sup>NS</sup>
MCHC (%)	23.8±1.0	24.3±0.9 <sup>NS</sup>	32.7±1.3*	28.2±1.2*	23.4±1.0 <sup>NS</sup>
WBCs (X10 <sup>3</sup> mm <sup>3</sup> )	11.4±1.8	07.0±1.8*	25.9±1.5*	10.5±1.5 <sup>NS</sup>	06.9±1.9*
Granulocytes (%)	48.5±0.6	31.6±0.5*	62.3±0.7*	51.2±0.5 <sup>NS</sup>	51.4±0.5 <sup>NS</sup>
Lymphocytes (%)	49.1±1.6	61.9±1.5*	28.6±2.0*	44.9±1.2*	41.6±1.1*

Values are expressed as mean±S.E; NS: Not significant; \*: Significant = (p<0.05)

PCV was lower (p<0.05) in group 2 than normal control (Group 1). These data are represented in Table 2.

In Table 3, the values of Hb, MCH and MCHC, were lower (p<0.05) in groups 4, 5, 6 and 7. RBCs, granulocytes, PCV and WBCs were lower (p<0.05) in groups 4, 6 and 7, lymphocytes were higher (p<0.05) in groups 4, 6 and 7 and WBCs were higher (p<0.05) in group 5 than CCL<sub>4</sub> control.

For Table 4, the values of Hb, MCH, MCHC, WBCs and granulocytes were higher (p<0.05) in group 5, MCH and MCHC were higher (p<0.05) in group 6 and lymphocytes were higher (p<0.05) in group 4 than silymarin control (Group 3). The values of Hb, RBCs and PCV were lower (p<0.05) in groups 4, 6 and 7, value of WBCs was lower (p<0.05) in groups 4 and 7,

granulocytes were lower (p<0.05) in group 4 and lymphocytes were lower (p<0.05) in groups 5, 6 and 7, than silymarin control (Group 3).

**Serobiochemical changes:** Serobiochemical changes for rats given methanolic and aqueous extracts for 5 days are presented in Table 5. The activity of AST and ALP was higher (p<0.05) in groups 4, 5, 6 and 7, AST and ALT were higher (p<0.05) in group 3, AST and ALP was higher (p<0.05) in group 2, concentrations of globulin and bilirubin were higher (p<0.05) in group 4 and the activity of ALT was higher (p<0.05) in groups 4, 5 and 7, than control (Group 1). The concentrations of total protein, albumin, globulin, and bilirubin were lower (p<0.05) in group 7, concentrations of total protein, globulin and albumin and activity of ALT were

Table 5: Serobiochemical analysis of rats given *Kigelia africana* methanol and aqueous extracts orally for 5 days

Parameters	Groups						
	1. Control (normal diet)	2. Control (CCl <sub>4</sub> )	3. Silymarin control	4. <i>K. africana</i> (100 mg/kg/day)	5. <i>K. africana</i> (200 mg/kg/day)	6. <i>K. africana</i> (400 mg/kg/day)	7. <i>K. africana</i> (400 mg/kg/day)
6 days							
AST (iu)	09.9±0.7	25.6±0.6*	20.3±0.7*	28.3±0.7*	29.9±0.8*	24.2±0.6*	29.5±0.6*
ALT (iu)	10.3±0.9	11.7±0.8 <sup>NS</sup>	20.7±0.8*	17.8±0.7*	20.5±0.9*	05.8±0.8*	24.9±0.7*
ALP (iu)	40.7±3.2	93.4±3.8*	30.9±3.3*	63.1±3.4*	67.0±3.3*	83.0±3.2*	69.5±3.1*
Total protein (g/L)	07.7±0.3	06.8±0.3 <sup>NS</sup>	08.2±0.4 <sup>NS</sup>	08.4±0.4 <sup>NS</sup>	06.9±0.5 <sup>NS</sup>	05.2±0.3*	04.9±0.2*
Albumin (g/L)	04.8±0.5	04.4±0.5 <sup>NS</sup>	04.4±0.9 <sup>NS</sup>	03.9±0.4*	04.6±0.7 <sup>NS</sup>	03.0±0.5*	02.6±0.4*
Globulin (g/L)	02.8±0.5	02.4±0.6 <sup>NS</sup>	03.7±0.4 <sup>NS</sup>	04.4±0.5*	02.3±0.7 <sup>NS</sup>	02.1±0.4*	01.0±0.6*
Bilirubin (mg/dL)	02.0±0.7	02.6±0.7 <sup>NS</sup>	01.3±0.7 <sup>NS</sup>	03.3±0.5*	00.2±0.6*	02.5±0.9 <sup>NS</sup>	00.7±0.7*

Values are expressed as mean±S.E; NS: Not significant; \*: Significant = (p<0.05)

Table 6: Serobiochemical analysis of rats given *Kigelia africana* methanol and aqueous extracts orally for 5 days

Parameters	Groups				
	2. Control (CCl <sub>4</sub> )	4. <i>K. africana</i> (100 mg/kg/day)	5. <i>K. africana</i> (200 mg/kg/day)	6. <i>K. africana</i> (400 mg/kg/day)	7. <i>K. africana</i> (400 mg/kg/day)
6 days					
AST (iu)	25.6±0.6	28.3±0.7 <sup>NS</sup>	29.9±0.8 <sup>NS</sup>	24.2±0.6 <sup>NS</sup>	29.5±0.6 <sup>NS</sup>
ALT (iu)	11.7±0.8	17.8±0.7*	20.5±0.9*	05.8±0.8*	24.9±0.7*
ALP (iu)	93.4±3.8	63.1±3.4*	67.0±3.3*	83.0±3.2*	69.5±3.1*
Total protein (g/L)	06.8±0.3	08.4±0.4*	06.9±0.5 <sup>NS</sup>	05.2±0.3*	04.9±0.2*
Albumin (g/L)	04.4±0.5	03.9±0.4 <sup>NS</sup>	04.6±0.7 <sup>NS</sup>	03.0±0.5*	02.6±0.4*
Globulin (g/L)	02.4±0.6	04.4±0.5*	02.3±0.7 <sup>NS</sup>	02.1±0.4 <sup>NS</sup>	01.0±0.6*
Bilirubin (mg/dL)	02.6±0.7	03.3±0.5 <sup>NS</sup>	00.2±0.6*	02.5±0.9 <sup>NS</sup>	00.7±0.7*

Values are expressed as mean±S.E; NS: Not significant; \*: Significant = (p<0.05)

Table 7: Serobiochemical analysis of rats given *Kigelia africana* methanol and aqueous extracts orally for 5 days

Parameters	Groups				
	3. Silymarin control	4. <i>K. africana</i> (100 mg/kg/day)	5. <i>K. africana</i> (200 mg/kg/day)	6. <i>K. africana</i> (400 mg/kg/day)	7. <i>K. africana</i> (400 mg/kg/day)
6 days					
AST (iu)	20.3±0.7	28.3±0.7*	29.9±0.8*	24.2±0.6 <sup>NS</sup>	29.5±0.6*
ALT (iu)	20.7±0.8	17.8±0.7 <sup>NS</sup>	20.5±0.9 <sup>NS</sup>	05.8±0.8*	24.9±0.7 <sup>NS</sup>
ALP (iu)	30.9±3.3	63.1±3.4*	67.0±3.3*	83.0±3.2*	69.5±3.1*
Total protein	08.2±0.4	08.4±0.4 <sup>NS</sup>	06.9±0.5 <sup>NS</sup>	05.2±0.3*	04.9±0.2*
Albumin (g/L)	04.4±0.9	03.9±0.4 <sup>NS</sup>	04.6±0.7 <sup>NS</sup>	03.0±0.5 <sup>NS</sup>	02.6±0.4*
Globulin (g/L)	03.7±0.4	04.4±0.5 <sup>NS</sup>	02.3±0.7*	02.1±0.4*	01.0±0.6*
Bilirubin (mg/dL)	01.3±0.7	03.3±0.5*	00.2±0.6*	02.5±0.9*	00.7±0.7*

Values are expressed as mean±S.E; NS: Not significant; \*: Significant = (p<0.05)

lower (p<0.05) in group 6, activity of ALP was lower (p<0.05) in group 3, The concentrations of bilirubin was lower (p<0.05) in group 5 and concentration of albumin was lower (p<0.05) in group 4, than normal control (Group 1).

In Table 6, the activity of ALT was higher (p<0.05) in groups 4, 5 and 7 and concentration of total protein and globulin was higher (p<0.05) in group 4 than CCL<sub>4</sub> control (Group 2). The activity of ALP and concentrations of total protein, albumin, globulin and bilirubin were lower (p<0.05) in group 7, concentrations of total protein and albumin and activity of ALT and ALP were lower (p<0.05) in group 6, bilirubin and activity of ALP were lower (p<0.05) in group 5 and ALP activity was lower (p<0.05) in group 4 than CCL<sub>4</sub> control (Group 2).

In Table 7, the activity of AST and ALP were higher (p<0.05) in groups 4, 5 and 7, ALP activity also higher (p<0.05) in group 6 and bilirubin was higher (p<0.05) in groups 4 and 6, than control (Group 3). Concentrations of total protein, albumin, globulin and bilirubin were lower (p<0.05) in group 7, concentrations of globulin and bilirubin were lower (p<0.05) in group 5 and concentration of total protein, albumin and globulin and activity of ALT were lower (p<0.05) in group 6, than silymarin control (Group 3).

**Pathological changes:** In group 3, lesions were consistent and included cytoplasmic fatty vacuolation and necrosis of the centrilobular hepatocytes (Fig. 1).

Cytoplasmic fatty vacuolation, hemorrhage and necrosis of the centrilobular hepatocytes (Fig. 2). And

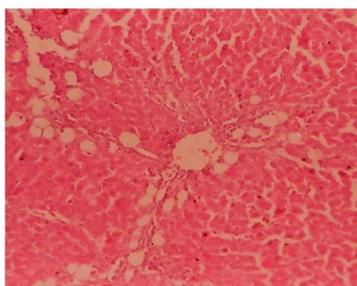


Fig. 1: Liver of rat receiving daily oral doses of aqueous extract 400 mg/kg of *K. africana* for 5 days showing cytoplasmic fatty vacuolation and necrosis of the centrilobular hepatocytes H & E (X100)

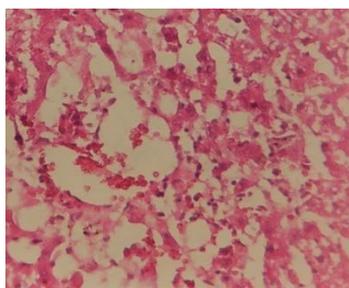


Fig. 2: Liver of rat receiving daily oral doses of methanol extract 400 mg/kg of *K. africana* for 5 days showing cytoplasmic fatty vacuolation, hemorrhage and necrosis of the centrilobular hepatocytes H & E (X200)

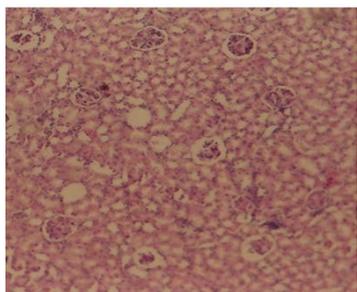


Fig. 3: Kidney of rat receiving daily oral doses of methanol extract 400 mg/kg of *K. africana* for 5 days showing glomerular alteration, dilatation, necrosis, fatty change and packing of the glomerular tubules H & E (X200)

glomerular alteration, dilatation and packing of the glomerular tubules (Fig. 3). No significant lesions were observed in the heart or spleen of the test rats.

## DISCUSSION

The plant *K. africana* have medicinal properties in which make it used in treatment of many diseases and

most commonly used by traditional healers to treat wide range of skin ailments like, fungal infections, boils, psoriasis and eczema. It also has internal application including the treatment in dysentery, ring worm, tapeworm, post-partum hemorrhage, malaria, pneumonia and toothache (Gill, 1992).

Study conducted by Ufodike and Omoregie (2008) evaluating the acute toxicity of water extracts of the barks of plants, *Balanites aegyptiaca* and *Kigelia africana*, to the Nile tilapia, was investigated using static bioassays and continuous aeration. Extract of *B. aegyptiaca* was observed to be more toxic than that of *K. africana*; this study represents evidence to the slight toxicity that rose in the result of our study.

In other hand, as the plant of our study was used here as hepatoprotective agent in which showed negative result for this property but a research conducted by Dhanabal *et al.* (2006) showed that Chloroform extract of leaves of *Polygala arvensis* used for hepatoprotective activity in Wistar albino rats by inducing hepatic injury with D-galactosamine, showed the chloroform extract of the above mentioned plant at an oral dose of 200 and 400 mg/kg exhibited a significant protection effect.

*Silybum marianum* (Asteraceae) was being used as a general medicinal herb and is one of the oldest and thoroughly researched plants in the treatment of liver diseases (Pradhan and Girish, 2006). The alcoholic extract of fresh leaves of the plant *Eclipta alba* exhibited maximum hepatoprotective activity and is the active fraction for hepatoprotective activity of *Eclipta alba* leave (Sniqh *et al.*, 2001). This study although indicated the hepato protective effect of the plant *Silybum marianum* and the plant *K. africana* prescribed locally for treatment of some liver diseases, *K. africana* doesn't show any activity against liver damage.

Both the alcoholic and aqueous extracts of the leaves of *Nyctanthes arbor-tristis* Linn. Showed significant hepatoprotective activity by reducing the elevated levels of biochemical parameters at a dose of 500 mg/kg body weight, this was stated by Hukkeri *et al.* (2006) and a research conducted by Jayasekhar *et al.* (1997) indicated that the ethyl acetate extract of *Acacia catechu*, *katha* exhibited significant hepatoprotective activity in albino Rats induced acute liver damage. Here in our study, the results obtained are against those 2 mentioned studies above in which the biochemical and pathological parameters are altered in away supporting the toxic effect of this plant rather than the hepatoprotective activity.

The results of the present study indicated that the *K. africana* fruits are toxic to wistar rats when given at 100, 200, 400 mg/kg/day orally, The characteristic features of the *K. africana* extracts is the change in

growth rates and the cytoplasmic fatty vaculation and necrosis of the centrilobular hepatocytes in the liver attributed to the increases in the activity of AST and the lower concentration of albumin and decreased activity of ALT resulting from inability of the hepatocytes to synthesize the enzyme and albumin in insufficiency or over excretion in urine in renal dysfunction, Also the concentration of the bilirubin was lower.

Study of *K. africana* suggest that the use of the plant in the treatment of various diseases, as skin ailments, it also has internal application including the treatment in dysentery, post-partum hemorrhage, malaria, pneumonia and diabetes (Gill, 1992).

Olaleye and Rocha (2008) evaluate the possible protective effects of administration (100 mg/kg) of *K. africana* plant especially liver disease and this is probably due to its ability to act as antioxidant.

Acute toxicity studies were performed and produced no mortality in dose up to 200 mg/kg orally. The results gave a scientific basis to the traditional uses of *K. pinnata* particularly involved in inflammation (Carey *et al.*, 2008).

The fruits of *K. africana* given to Wistar rats at dose 100, 200, 400 mg/kg/day orally were toxic but not fatal according to what has been obtained from the result, the toxicity was characterized by lower body weight gain, alteration in biochemical, hematological and pathological parameters.

As the plant is prescribed locally for treatment of some diseases and according to what has been gained from this study as slight toxicity to the animal, the plant may produce side effects which could be threatening to those who take it, so further studies would be of value.

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