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Hepatoprotective and Antioxidant Activities of Methanol Leaf Extract of *Sphenocentrum jollyanum* on Rifampicin Induced Liver Damage in Wistar Rats

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Ilechukwu Chijioke .C*[1].; Okafor Ngozi .I.[1]

[1]*Department of Biochemistry Chukwuemeka Odumegwu Ojukwu University Uli, Nigeria*

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ABSTRACT

Methanol leaf extract of *Sphenocentrum jollyanum* was investigated for hepatoprotective and antioxidant activities against rifampicin-induced hepatic damage in rats. Thirty male Wistar rats were randomized into 6 groups of 5 rats each. Hepatotoxicity was induced by administering rifampicin (50 mg/kg) orally and methanol leaf extracts (50, 100 and 200 mg/kg) were administered orally to the rats one hour before rifampicin induction. The treatment lasted for 28 days after which the animals were sacrificed and blood and liver were collected for biochemical and histological studies. Result of lethal dose (LD_{50}) of the methanol leaf extract of *Sphenocentrum jollyanum* showed that no death was recorded up to 5000 mg per kg body weight. Administration of methanol leaf extract at 50, 100 and 200 mg/kg showed a significant ($P<0.05$) reduction in ALT, AST, ALP and total bilirubin levels in a dose dependent manner with 50mg/kg having the least therapeutic effect while 200 mg/kg showed highest therapeutic effect. It was observed that the administration of the leaf extract showed a significant ($P<0.05$) increase in total protein and albumin. There was also significant ($P<0.05$) increase in the activity of superoxide dismutase (SOD), catalase and glutathione peroxidase (GPx). However, there was also a significant ($P<0.05$) decrease in malondialdehyde (MDA) level of the methanol leaf extract treated group when compared to the rifampicin-induced untreated group. The changes in the biochemical parameters were supported by histological profile. These results indicated that the methanol leaf extract of *Sphenocentrum jollyanum* possessed hepatoprotective activity against rifampicin-induced liver damage and this effect may be due to its strong antioxidant property.

INTRODUCTION

The liver is the vital organ responsible for metabolism of foreign compounds (drugs and other xenobiotics) and appears to be a sensitive target site for substances that modulate biotransformation[1]. Liver diseases such as hepatitis and necrosis are caused by drugs, toxic chemicals, and excess consumption of alcohol, infections and autoimmune disorders[2]. Drugs are important cause of liver injury and more than 900 drugs, toxins, and herbs have been reported to cause liver injury, and drugs account for 20 – 40% of all instances of sudden hepatic failure[3]. Drug induced hepatic injury/ is the most common reason for withdrawal of many approved drugs[3]. Most of the hepatotoxic substances including drugs damage liver cells by inducing lipid peroxidation and other oxidative stress in the liver[2]. It has been established that oxidative stress is among the major causative factors in the induction of many chronic and degenerative diseases including atherosclerosis, Ischaemic heart disease, ageing, diabetes mellitus, liver diseases, cancer, immunosuppression, neurodegenerative diseases and others[4]. Free radicals which include superoxide, hydroxide radicals and nitric oxide and other reactive species namely hydrogen peroxide, hypochloric acid, and p-meroxynitrate produced during aerobic metabolism in the body can cause oxidative damage to amino acids, lipids, proteins and DNA[5]. Free radicals are generated through metabolism of drugs, environmental chemicals, stress hormones example adrenalin and nor adrenalin[3]. In the body free radicals are derived from two sources namely endogenous sources e.g. nutrient metabolism, ageing process etc. and exogenous sources e.g. tobacco smoking, ionizing radiation, alcohol, drugs, air pollution, organic solvents, pesticides etc[6]. The most effective way to eliminate free radical which causes oxidative stress is with the help of antioxidants[3]. Antioxidant, both exogenous and endogenous, whether synthetic or natural can be effective in preventing free radical formation by scavenging them or promoting their decomposition[7,8]. Herbs and spices are recognized as sources of natural antioxidants that can protect man from oxidative stress and thus play an important role in the chemo-protection of diseases that have their etiology and pathophysiology in reactive oxygen species[9]. Various plants have been used effectively as hepatoprotective agents. *Sphenocentrum jollyanum*is a plant that has wide therapeutic value in traditional medicine. Traditionally the plant is used as remedy for feverish conditions, cough and wound dressing and as an aphrodisiac[10,11]. Studies have shown the leaf possesses significant antipyretic and analgesicactivities[12]. The roots are bright yellow with a sour taste while the ovoid-ellipsoid bright yellow or orange fruits occur in clusters and are edible when ripe[13]. In Nigeria, the roots of *Sphenocentrum jollyanum* are used as chewing

sticks, relief for constipation and as a cure for stomach problem. All morphological parts are prominent ingredients in several recipes for the management of sickle cell disease[13]. The root hair is used with other anti-malaria plants as remedies against fever, body pains and rheumatism while the leaf twigs and fruits have been reportedly used for their aphrodisiac activity[11,14]. It is also claimed that this plant material is effective in the cure of central nervous system (CNS) disease e.g. psychiatric disorders, inflammation and pains[15]. The fruits are claimed to be used in the treatment of fibroids in traditional Nigerian medicine[16]. The plant is used as a wound healing agent in traditional medicine[10]. A decoction of the leaf twigs is used as a wash to stop bleeding of wounds, sores and cuts and ingestion of crushed leaves curbs spitting of blood. In this study, we assessed the hepatoprotective and antioxidant activities of *Sphenocentrum jollyanum* leaf against rifampicin induced hepatotoxicity in rats.

MATERIALS AND METHODS

Plant material

The leaves of *Sphenocentrum jollyanum* Pierre Menispermacae were collected from Agbo-ihegboma forest in Ozubulu, Ekwusigo LGA of Anambra State, Nigeria and identified in the herbarium unit in the Department of Biological Sciences Ahmadu Bello University, Zaria where a voucher specimen number (3290) has been deposited.

Experimental animals

Male Wistar rats (7-8 weeks old) weighing between 150-200 g were used for the experiment. They were allowed to acclimatize to the laboratory conditions for two weeks before the experiment. The rats were kept and maintained in well-ventilated cages under standard laboratory conditions, that is the temperature and relative humidity was maintained at 25^0C and 50%, respectively. Light and dark cycles were maintained at 12h each. They were maintained on grower's mash (Vital Feeds Nigeria Ltd) and provided with water *ad libitum*.

Preparation of plant material

The collected plant leaves were washed with tap water and shade dried at room temperature for two weeks. The dry plants sample was ground into powder using pestle and mortar. The powder obtained was then used to prepare the extracts.

Extraction

About 275 g of the leaf was introduced into a glass jar and soaked in 500 ml methanol (100%). The jars were kept in room with their lids tightly closed and the mixture stirred 3-4 times daily. This type of cold maceration was carried out for 15 days[17]. The resulted dark brown methanol extracts were filtered using Whatman filter paper No 1 and dried using rotary evaporator under reduced pressure at 45^{o}C. The yield, 40 g of leaf extract was stored in a refrigerator at 4^{o}C until it was needed.[17]An aliquot portion of the crude extract was dissolved in distilled water for use on each day of the experiment.

Preliminary phytochemical screening

The extracts thus obtained were subjected to phytochemical analysis following the methods of Lee[18].

Acute toxicity and lethality (LD_{50}) tests

The mean lethal dose (LD_{50}) of the methanol extracts were determined in Wistar rats (weighing 150 g-200 g) using the method described by Lorke[19].

Animal grouping and treatment

Thirty male Wistar albino rats were dived into nine groups of five rats each.

Group 1: Normal control (NC) rats given feed and water only

Group 2: Normal rats that received 50mg/kg body weight rifampicin and not treated (RF).

Group 3: Normal rats treated with 50mg/kg body weight leaf extract of *Sphenocentrum jollyanum* and after 1 hour received 50mg/kg body weight rifampicin (L_{50} + RF).

Group 4: Normal rats treated with 100mg/kg body weight leaf extract of *Sphenocentrum jollyanum* and after 1 hour received 50mg/kg body weight rifampicin (L_{100} + RF).

Group 5: Normal rats treated with200mg/kg body weight leaf extract of *Sphenocentrum jollyanum* and after 1 hour received 50mg/kg body weight rifampicin (L_{200} + RF).

Group 6: Normal rats treated with vitamin E (100mg/kg) and after 1 hour received.

50mg/kg body weight rifampicin (Vit E + RF).

Induction of experimental hepatotoxicity

Rifampicin was prepared in sterile distilled water. Rifampicin-induced liver damage was achieved by administering the rats with 50 mg/kg dose of rifampicin orally through insulin syringe for 28 days using the method as described by Jehangir[20]. Forhepatoprotective studies *Sphenocentrum jollyanum* extracts were administered orally to the rats 1 hour before rifampicin doses according to the method of Pal[21].

Collection and preparation of sera and tissue sample

After 28 days of the experiment the rats were sacrificed under mild chloroform anesthesia, blood was collected in a test tube and centrifuged at 10,000 rpm for 10 mins and the supernatant (serum) was collected for biochemical analysis. The Liver was excised, immediately washed with cold saline. The liver for histopathology was stored in 10% formaldehyde prior to histopathology examination. The tissue was weighed, homogenized using glass pestle and mortar and 10% tissue homogenate was prepared with 0.025 m Tris-HCl buffer. After centrifugation at 10,000 rpm for 10 mins, the resulting supernatant was used for enzyme assays for estimation of antioxidant[22].

Statistical analysis

Data obtained were expressed as mean ± SD. The data were statistically analyzed using analysis of variance (ANOVA) (using SPSS 20.0 for windows Computer Software Package). The difference between the various extracts and animal groups were compared using the Duncan Multiple Range Test. The values of $P<0.05$ were considered as significant[23].

RESULTS

Phytochemical screening

The result of phytochemical screening of methanol leaf extract of *Sphenocentrum jollyanum* revealed the presence of carbohydrates, cardiac glycoside and flavonoids, Saponins and triterpenes in the methanol leaf extract (Table 1).

Table No. 1: Phytochemical screening of the methanol leaf extract of *sphenocentrum jollyanum*

Test	Observation
Carbohydrate	+
Anthraquinone	-
Cardiac glycoside	+
Saponins	+
Flavonoids	+
Tannins	-
Alkaloids	-
Triterpenes	+

+ = Present, - = Not detected

LD_{50} result

Result of lethal dose (LD_{50}) for methanol leaf extract of *Sphenocentrum jollyanum* showed that no death was recorded up to 5000 mg per kg body weight. Therefore, the LD_{50} is greater than 5000 mg/kg body weight (Table 2).

Table No. 2: Lethal dose LD_{50} of methanol leaf extract of *sphenocentrum jollyanum*

Phase	Dose (mg/kg)	Observation
Phase 1	**10**	**No death**
	100	**No death**
	1000	**No death**
Phase 2	**1600**	**No death**
	2900	**No death**
	5000	**No death**

Effect on liver marker enzymes, total protein, albumin and total protein

The effect of methanol leaf extract of *Sphenocentrum jollyanum* on liver marker enzymes showed that there was a significant ($p<0.05$) decrease in the level of serum aspartate aminotransferase (AST), alanine aminotransferase (ALT), alkaline phosphatase and total bilirubin(ALP) of the various doses of the leaf extract treated groups when compared to rifampicin-induced untreated group. The groups treated with various doses of the leaf extract when compared with the group that received only vitamin E showed no significant ($p<0.05$) difference in the level of AST, ALT, ALP and total bilirubin. There was a significant ($p<0.05$) increase in serum level of total protein and albumin in the rats treated with the various doses of the extract compared to the rifampicin-induced untreated group (Table 3 and 4).

Table No. 3: Effect of methanol leaf extract of *Sphenocentrum jollyanum* on serum liver marker enzymes

Groups (n=5)	Serum AST (U/L)	Serum ALT (U/L)	Serum ALP (U/L)
NC	18.80 ± 2.28^{a}	37.60 ± 3.85^{a}	56.20 ± 7.46^{a}
RF	71.20 ± 9.63^{c}	97.20 ± 7.56^{c}	97.20 ± 7.56^{c}
L_{50} + RF	25.00 ± 3.32^{b}	45.00 ± 4.64^{b}	72.20 ± 9.01^{b}
L_{100} + RF	24.40 ± 2.61^{b}	41.80 ± 3.42^{ab}	70.60 ± 6.95^{b}
L_{200} + RF	22.80 ± 3.40^{ab}	41.20 ± 4.32^{ab}	63.00 ± 6.52^{ab}
Vit E + RF	22.40 ± 3.05^{ab}	42.60 ± 3.51^{ab}	61.60 ± 8.38^{ab}

Values are means of five determinations $\pm$ SD. Values with different superscripts down the column are significantly different ($p<0.05$).NC: Normal rats control, RF: Normal rats + Rifampicin (50mg/kg), RF + Vit E: Normal rats + Rifampicin (50mg/kg) + Vitamin E (100mg/kg), RF + L_{50}: Normal rats + Rifampicin (50mg/kg) + leaf extract (50mg/kg), RF + L_{100}: Normal rats + Rifampicin (50mg/kg) + leaf extract (100mg/kg): RF + L_{200}: Normal rats + Rifampicin (50mg/kg) + leaf extract (200mg/kg).

Table No. 4: Effect of methanol leaf extract of *Sphenocentrum jollyanum* on total protein, albumin and total bilirubin

Groups (n=5)	Total protein (g/l)	Albumin (g/l)	Total bilirubin (mg/dl)
NC	76.00 ± 6.20^{c}	40.80 ± 4.10^{b}	0.17 ± 0.08^{a}
RF	48.40 ± 4.30^{a}	28.60 ± 3.70^{a}	0.73 ± 0.15^{c}
L_{50} + RF	61.80 ± 7.40^{b}	35.80 ± 3.80^{b}	0.43 ± 0.12^{b}
L_{200} + RF	62.80 ± 7.70^{b}	36.80 ± 4.70^{b}	0.38 ± 0.20^{b}
L_{200} + RF	70.80 ± 6.10^{bc}	38.20 ±3.80^{b}	0.32 ± 0.50^{b}
Vit E + RF	73.60 ± 8.70^{bc}	39.00 ± 5.70^{c}	0.20 ± 0.05^{a}

Values are means of five determinations ± SD. Values with different superscripts down the column are significantly different ($p<0.05$).NC: Normal rats control, RF: Normal rats + Rifampicin (50mg/kg), RF + Vit E: Normal rats + Rifampicin (50mg/kg) + Vitamin E (100mg/kg), RF + L_{50}: Normal rats + Rifampicin (50mg/kg) + leaf extract (50mg/kg), RF + L_{100}: Normal rats + Rifampicin (50mg/kg) + leaf extract (100mg/kg): RF + L_{200}: Normal rats + Rifampicin (50mg/kg) + leaf extract (200mg/kg).

Effect on serum antioxidants

The effect of administration of methanol leaf extract of *Sphenocentrum jollynaum* on some serum antioxidants showed that there was a significant ($p<0.05$) decrease in serum malondialedhyde (MDA) level and a significant ($p<0.05$) increase in superoxide dismutase (SOD) activity of the various doses of the methanol leaf extract treated group compared to the rifampicin-induced untreated group. However, there was no significant ($p<0.05$) increase in catalase activity of the various doses of methanol leaf extracts treated groups compared to rifampicin-induced untreated group except in the groups that received 200mg/kg weight methanol leaf extract of *S. jollyanum* which showed a significant ($p<0.05$) increase in catalase activity compared to rifampicin-induced untreated group (Table 5).

Table No. 5: Effect of methanol leaf extract of *Sphenocentrum jollyanum* on serum antioxidants

Groups (n=5)	MDA (nmol/mg protein)	SOD (U/ml)	Catalase (Umol/min/mg protein)
NC	1.46 ± 0.54^{a}	1.58 ± 0.56^{b}	49.20 ± 8.32^{b}
RF	2.62 ± 0.41^{b}	0.80 ± 0.25^{a}	38.80 ± 8.38^{a}
L_{50} + RF	1.76 ± 0.54^{a}	1.30 ± 0.48^{b}	39.60 ± 6.39^{ab}
L_{100} + RF	1.70 ± 0.50^{a}	1.36 ± 0.29^{b}	40.20 ± 7.82^{ab}
L_{200} + RF	1.50 ± 0.56^{a}	1.44 ± 0.17^{b}	48.20 ± 8.32^{b}
VitE + RF	1.48 ± 0.62^{a}	1.50 ± 0.38^{b}	48.40 ± 7.13^{b}

Values are means of five determinations $\pm$ SD. Values with different superscripts down the column are significantly different ($p<0.05$). NC: Normal rats control, RF: Normal rats + Rifampicin (50mg/kg): RF+ Vit E: Normal rats + vitamin E + Rifampicin (50mg/kg), RF+ L_{50}: Normal rats + Rifampicin (50mg/kg) + leaf extract (50mg/kg): RF + L_{100}: Normal rats + Rifampicin (50mg/kg) + leaf extract (100mg/kg). RF + L_{200}: Normal rats + Rifampicin (50mg/kg) + leaf extract (200mg/kg). MDA: Malondealdihyde, SOD: Superoxide dismutase, GPX: Glutathione peroxidase.

Effect on liver homogenate antioxidants

The effect of administration of methanol leaf extract of *Sphenocentrum jollyanum* on liver homogenate antioxidants showed that there was no significant($p>0.05$) decrease in level of malondialehyde (MDA) of the various doses of methanol leaf extracts treated groups compared to the rifampicin-induced untreated group. However, there was a significant ($p<0.05$) increase in the activity of liver homogenate antioxidant enzymes-catalase, superoxide dismutase (SOD) and glutathione peroxidase (GPX) of the various doses of methanol leaf extracts treated groups compared to the rifampicin-induced untreated group (Table 6).

Table No. 6: The effect of methanol leaf extract of *Sphenocentrum jollyanum* on liver homogenate antioxidant enzymes

Groups (n=5)	MDA (nmol/mg protein)	SOD (U/ml)	Catalase (Umol/min/mg protein)	GPX (Umol/min/mg protein)
NC	2.13±0.51^{a}	2.63±0.55^{b}	49.67±7.23^{b}	52.00±8.71^{b}
RF	3.20±0.62^{b}	1.17±0.32^{a}	25.67±7.37^{a}	34.00±6.00^{a}
L_{5O}+RF	2.47±0.61^{ab}	2.33±0.47^{b}	38.67±9.60^{ab}	48.67±6.50^{b}
L_{100} +RF	2.33±0.38^{ab}	2.47±0.58^{b}	41.67±8.02^{b}	49.67±9.07^{b}
L_{200} +RF	2.33±0.40^{ab}	2.53±0.50^{b}	42.33±9.07^{b}	50.00±7.54^{b}
VitE +RF	2.20±0.61^{ab}	2.60±0.72^{b}	47.00±9.00^{b}	51.33±6.66^{b}

Values are means of three determinations ± SD. Values with different superscripts down the column are significantly different ($p<0.05$). NC: Normal rat control, RF: Normal rats + Rifampicin, RF + Vit E: normal rats + Rifampicin + Vitamin E. RF + L_{50}: Normal rats + Rifampicin + leaf extract (50mg/kg),: RF + L_{100}: Normal rats + Rifampicin leaf extract (100mg/kg), RF + L_{200}: Normal rats + Rifampicin + leaf extract (200mg/kg). MDA: Malondialdehyde, SOD: Superoxide dismutase, GPX: Glutathione peroxidase.

Plate 1. Histology profile of the liver

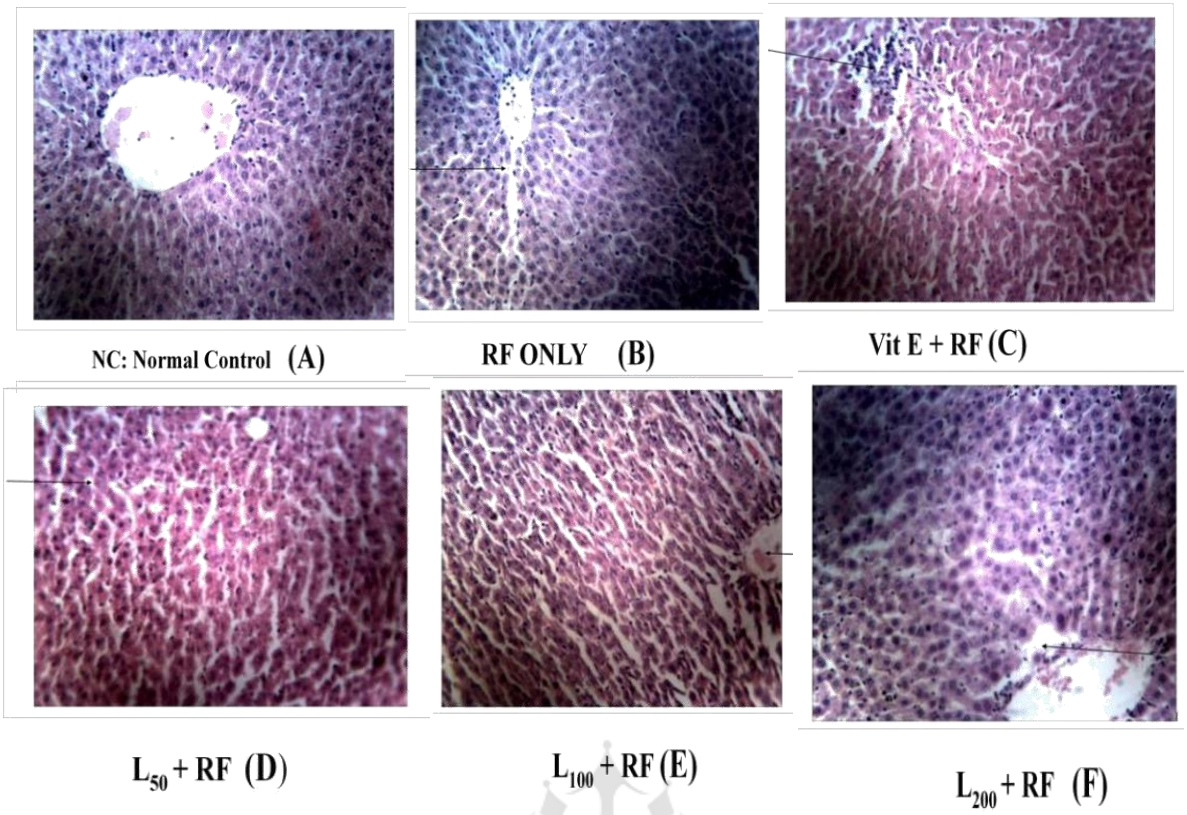

Plate 1 shows the effect of administration of methanol leaf extract of *Sphenocentrum jollyanum* on histological profile of liver of Wistar albino rats. The rifampicin-induced untreated group (B) showed moderate perivascular necrosis whereas the vitamin E treated group (C) and the group treated with various doses of the methanol leaf extract of *Sphenocentrum jollyanum* (D, E, F) showed slight vacoulation, slight lymphocyte hyperplasia and slight vascular congestion.

DISCUSSION

Herbal medicine is based on the promise that plants contain natural substances can promote health and alleviate illness[24]. It is universally accepted that plants generally contain secondary metabolites and some of these secondary metabolites have been shown to be highly biologically active and as well as exhibiting physiological activity[25]. The result of phytochemical screening of methanol leaf extract of *Sphnocentrum jollyanum* showed the presence of carbohydrates, cardiac glycoside and flavonoids, saponins and triterpenes. Rifampicin is used in this study to induce liver damage. Rifampicin induces hepatotoxicity by competing with bilirubin for transport across the liver cell into the bile canaliculi and then

bile. Obstruction of the transport of bilirubin across the liver cells into the bile canaliculi and then bile results in conjugated and unconjugated hyperbilirubinaemia especially in chronic hepatitis induced by rifampicin[26]. There was a significant ($p<0.05$) increase in the level of liver maker enzymes found in the rifampicin group. The rise in levels of ALT is always accompanied by elevation in the level of AST, which play a role in the conversion of amino acid to keto acid. This is in conformity with the work of Jehangir, and Pal[20,21]. During inflammatory condition, there is a leakage of cytoplasmic enzymes into circulation hence AST, ALP and ALP levels increases. Thus, when there is a gross cellular necrosis as in diabetes mellitus, carbon tetrachloride, or paracetamol poisoning, the levels of AST, ALT and ALPwill increase[27]. ALT level is increased in the serum solely due to conditions where cells of the liver have been inflamed or undergo cell death, and is specific for the liver cells[28]. AST is not associated only with the liver but is also present in red cells, cardiac cells, brain cells, kidneys and skeletal muscles, meaning that it is not so specific to the liver but increase in AST up to three fold with concomitant increase in ALT is a sign of liver damage[29]. AST levels can as well be triggered in other conditions such as myocardial infarction apart from hepatocellular damages[28]. However, administration of methanol leaf extracts of *Sphenocentrum jollyanum* and vitamin E prevented significant ($p<0.05$) increases in the level of these enzymes- AST, ALT and ALP in the methanol leaf extracts treated groups. This study showed a significant ($p<0.05$) decrease in levels of total protein and albumin in the rifampicin-induced untreated groups. The decreased levels of total protein and albumin is due to reduction in function of the liver to synthesize these total proteins and albumin and maybe as a result of heaptocellular damage in the induced untreated group[30]. Proteins are main building blocks of tissues in the body, they are needed for growth and repair. Proteins perform both structural and transport functions, Albumin is synthesized by the liver and the main biological functions of albumin is to maintain the water balance in serum and plasma, and to transport and store a wide variety of ligands e.g. fatty acids, calcium, bilirubin and hormones such as thyroxine[31,32]. Hypoalbuminemia is associated with impaired synthesis of albumin in the liver; liver disease; malnutrition or malbabsorption; generalized shock; burns or dermatitis; kidney disease and intestinal disease[31]. The effect of the methanol leaf extract of *Sphenocentrum jollyanum* on serum antioxidants was observed to be dose dependent with 200 mg/kg having highest effect on reducing MDA level and increasing SOD and catalase activity while 50 mg/kg have the least effect in reducing MDA level and increasing SOD and catalase activity. This conforms to the work done by Olorunnisola[33] which stated that the effect *Sphenocentrum jollyanum* on antioxidant activity in CCL_4 induced oxidative stress is

dose dependent. Similar trend was observed from the result of liver organ homogenate antioxidants when methanol leaf extract of *Sphenocentrum jollyanum* was administered on rifampicin-induced hepatotoxic rats. Interactions between the aforementioned antioxidant enzymes (SOD, catalase and GPX) adequately protected the integrity of the liver cells. For instance, superoxide dismutase (SOD) is a sensitive index in hepatocellular damage[34]. SOD scavanges superoxide anion to form hydrogen peroxide and thus diminishing the toxic effect caused by this radical. Catalase on the other hand decomposes hydrogen peroxide and protects the tissues from highly reactive hydrogen radicals[35], while glutathione peroxidase in a redox cycle protect the cell against hydrogen peroxide radicals and maintains membrane protein thiols[21]. The observed reduction in MDA level and increase in the activity of antioxidant enzyme seen in the various doses of the extract treated groups was due to the antioxidants present in the plant extract as can be seen from the result of the phytochemistry and it indicates the protection of structural integrity of hepatic cell membrane or regeneration of damaged liver cells by the antioxidants present in the plant extract. Hence it is likely that the mechanism of hepatoprotection of *S. jollyanum* leaf extract is due to its antioxidant effect. The histopathological findings were in conformity with[21] and[36] which showed that rats administered with rifampicin 50 mg/kg body weight and 100 mg/kg body weight respectively showed hyperplasia, necrosis, portal triaditis, congestion and degeneration of the liver cells. Treatment with methanol leaf extract was able to reduce the effect of rifampicin on the liver to slight lymphocyte hyperplasia and moderate necrosis.

CONCLUSION

This study indicated that methanol leaf extract of *Sphenocentrum jollyanum* have significantly lowered liver marker enzymes AST, ALT and ALP and increased the activity of endogenous antioxidant enymes catalase, SOD and GPX. These suggest that methanol leaf extract of the plant have hepatoprotective and antioxidant activity against rifampicin-induced hepatotoxicity in wistar albino rats.

REFERENCES

1. Gram, T.E. and Gillette J.R. (1971). Bio-tranformation of drugs. *Fundamentals of Biochemical Pharmacology Pergamon Press New York,* 571.
2. Handa, S.S., Sharma, A. and Chakraborty K.K. (1989). Natural products and plants as liver protecting drugs. *Fitoterapia,* 57:307.
3. Nilesh, M. (2010). Drug-induced Hepatotoxicity. *Medscape: Drugs diseases and procedures,* 20:1-7.
4. Sqaudriatto, G.I. and Pelor, W.A. (1998). Free radical. Oxidative chemistry of nitric oxide: The roles of superoxide, peroxynitrite and carbon dioxide. *Biology and medicine,* 25:392–403

5. Gutteridge, J.M.C., (1995). Free radicals in disease processes: A compilation of cause and consequence. *Free radical Research Community*. 19:141.
6. Buyukokuroglu, M.E., Gulcin I., Oktay M., and Kufrevioglu O.I. (2001). In vivo antioxidant properties of dentrolene sodium. *Pharmacological Resource*. 44:491-494.
7. Ito N., Fukishima, S., Hassegawa, A., Slubata M. and Ogiso T., (1983). Carcinogenicity of Butylatedhydroxyanisole in F344 rats. *Journal of National Cancer Institute,* 70:343-347.
8. Tiwari, A. (2001). Imbalance in antioxidant defense and human diseases: multiple approach of natural antioxidant therapy. *Current Science*, 81:1179.
9. Atawodi, S.E., (2005): Antioxidant potential of African Medicinal Plants. *African Journal of Biotechnology* 4 (2): 128-133.
10. Daziel, J.M., (1985). The useful plants of West Africa. *Crown Agents: London*.
11. Iwu, M.M., (1993). Handbook of African Medicinal Plants. *CRC Press Incorporation*, pp239.
12. Nia, R., Paper, D.H., Essien, E.E., Iyadi, R.C., Bassey, A.L., Antai, A.B., Franz, G. (2004). Evaluation of the anti-oxidant and anti-angioganic effects of *Sphenocentrumjollyanum*pierre. *African Journal of Biomedical Research*, 7:129–132
13. Abbiw, D.K. (1990). Useful plants of Ghana. *Intermediate technology publications and Royal Botanic Gardens Kew*, 1:154-157.
14. Burkill, H.M. (1997). The useful plants of West Tropical Africa. *Royal Botanical Gardens* Kew, UK, 2nd edition 4:969.
15. Oke, J.M. and Harmburger, M.O. (2002). Screening of some Nigeria medicinal plants for antioxidant activity using 2,2-Diphenyl-Picryl-hydrazyl radical. *African Journal of Biomedical Research,* 5(1-2):77-79.
16. Egunyomi A., Fasola, T.R. and Oladunjoye, O. (2005). Charring Medicinal Plants: A traditional method of preparing phytomedicines in southwestern Nigerian *Ethnobotany Journal* 3:261–265.
17. Trease, E., (1997). *Pharmacognosy*. W.B. Saunders, 14th edition. Pp. 34-35, 43-44, 276-277, 493.
18. Lee, S.E., Hwang, H.J. and Ha, J.S. (2003). Screening of medicinal plant extracts for Antioxidant activity. *Life Science*, 73:167-179.
19. Lorke, D. (1983). A new approach to practical acute toxicity testing. *Archive of Toxicology*, 53: 275-289.
20. Jehangir, A., Nagi, A.H., Shahzad, M. and Zia, A. (2010). The hepatoprotective effect of Cassia fistula (Amaltas) leaves in isoniazid-rifampicin induced hepatotoxicity in rodents. *Biomedica*.26: 25-29.
21. Pal, R., Kim, V., Arbab, S., Kartar, S., and Satga, V.R. (2006). Effect of Garlic on Isoniazid and rifampicin induced hepatic injury in rats. *World journal of gastroenterology*, 12 (4): 636-639.
22. Culling, C.F., (1974). A Handbook of histopathological and Histochemical Techniques. Butherworth and Co., London, pp. 73:126-159.
23. Duncan, D.B. (1955). Multiple range and multiple F-test. *Biometrics*, 11:1–42.
24. World Health Organization (2008). "Fact Sheet No. 134: Traditional Medicine
25. Zenk, H.M. (1991). Chasing the enzymes of secondary metababolites. Plants cell cultures as a pot of goal. *Phytochemistry*.30 (12):3861-3863.
26. American Thoracic Society (ATS) and Center for Disease Control (CDC), (2001). Fatal and severe injuries associated with rifampicin and pyrazinamide for latent tuberculosis infection, and revisions in the American Thoracic Society/CDC Recommendations. *American Journal of Critical Care Medicine*, 164: 1319-1320.
27. Recknagel, R.O., Glende, E.A., Waller, R.L, and Lowrey, K. (1987). Lipid peroxidation, Biochemistry, measurement, and significance in liver cell injury. *In Plaa G.L and Hewitt W.R. (E.d), Toxicology of the liver, Raven, press New York, USA*, pp. 362-369.
28. Jensen, J.E., Stainberg, S.E., Freese, P. and Marino, E. (2004). Liver Function Test. *Journal of Digestive Disorders*, 6: 1-3.
29. Elizabeth, H.H. (2005). Elevated liver function tests in Type 2 diabetes. *Clinical Diabetes*, 23(3).
30. Assay, N., Kaita, K. Mymin, D., Levy, C., Rosser, B. and Minuk, G., (2000) Fatty infiltration of liver in hyperlipidemic patients. *Digestive diseases and Sciences*, 45 (10): 1929-1934
31. Grant, G.H. (1987). Amino acids and proteins.Fundamentals of Clinical Chemistry, Tiez N.W. 3rd edition. W.B Saunders,328-329.

32. Orhue, N.E.J., Nwanze, E.A.C. and Okafor, A. (2005). Serum Total Protein, Albumin and Globulin Levels In *Trypanosomabrucei*-Infected Rabbits: Effect Of Orally Administered *Scopariadulcis. African Journal of Biotechnology.*4 (10): 1152-1155.
33. Olorunnisola, S.O. (2012) Graeme Bradley and Anthony JideAfolayan. Protective Effect of *T. violacea* Rhizome Extract Against Hypercholesterolemia-Induced Oxidative Stress in Wistar Rats. *Molecules, 17*: 6033-6045
34. Muthu, A.K., Sethupathy, S., Manavalan, R. and Karah, P.K (2006). Antioxidant potential of methnolic extracts of *Dolichosbiflorus Linn.* in high fat diet fed rabbits. *Indian Journal of Pharmacology.* 38: 131-132.
35. Oyedemi, S.O., Bradley G. and Afolayan, A.J., (2010) In-vitro and in-vivo antioxidant activities of aqueous extract of *Strychnoshenningsii*Gilg. African Journal of Pharmacology. 4(2): 70-78.
36. Mohammed, S.T.S., Ram-kanth, S., Azagusundhram, M., Gnanaprakash, K., Angala, P., Thiruvengada, R.V.S. and Guathaman, K. (2011). *Parkistani Journal of Pharmocolgical Science.* 24(2): 129-134.