Available online at www.scholarsresearchlibrary.com

Scholars Research Library

Scholars Research Library

Annals of Biological Research, 2013, 4 (2):288-291
(http://scholarsresearchlibrary.com/archive.html)

Annals of Biological Research
Scholars Research Library
ISSN 0976-1233
CODEN (USA): ABRNBW

Serum and tissue lipid profile in wistar rats administered leaf extract *of Ficus exasperata*

***Oyewole O. I.[1], Adanlawo I. G.[2] and Arise R. O.[3]**

[1]Department of Biochemistry, Osun State University, Osogbo Nigeria
[2]Department of Biochemistry, Ekiti State University, Ado Ekiti, Nigeria
[3]Department of Biochemistry, University of Ilorin, Nigeria

ABSTRACT

Leaf extract of Ficus exasperata has been reported to have beneficial effect in lowering of blood pressure and treatment of hypertensive patients. The present study was conducted to determine the in vivo effect of Ficus exasperata leaf extract on tissues and serum lipids in experimental rats. Twenty male Wistar rats were randomly divided into four groups and administered different doses of the extract for 14 days while control group received distilled water. Lipid profile in the serum, liver, kidney and heart of the experimental animals were measured and compared with the control. Ficus exasperata caused significant ($p<0.0$) reduction in serum total cholesterol and LDL cholesterol in a dose dependent manner in rats while serum HDL cholesterol was significantly elevated. Serum triglyceride level was not significantly affected. There was also a significant increase in the levels of total cholesterol and triglyceride in the liver while lipid profile in the heart and Kidney were unaffected. This result suggests a positive alterations in lipid metabolism and storage in rats which corroborate the efficacy of Ficus exasperata leaf extract in the management of atherosclerosis caused by lipid abnormalities.

Keywords: *Ficus exasperata*, lipid profile, atherosclerosis, hypercholesterolemia, hypocholesterolemia

---

INTRODUCTION

Death and morbidity arising from coronary hearts diseases with subsequent cardiovascular manifestations is on the increase worldwide [1]. Clinical studies have shown that elevated HDL cholesterol as well as reduction in total cholesterol and LDL-cholesterol using diet or drugs decreases the incidence of coronary heart disease [2,3]. Herbal remedies are becoming indispensable and constituting an integral part of primary health care systems in some nations in recent times. Some herbs have been reported to cause changes in blood lipids and positive cardiovascular effects in experimental animals [4,5].

Ficus exasperata belongs to the family Moraceae with more than 800 species occurring in the warmer part of the world and is widely spread in the secondary rain forest of West Africa. The plant is commonly known as sand paper tree and has been used as remedy for the treatment of many disorders in African traditional medicine [6]. In Nigeria, the leaf extract is taken to lower blood pressure and for the treatment of heart diseases [7]. The activities of the leaf extract against some pathogenic organisms have been extensively investigated [8]. Despite its many uses in traditional medicine, leaf and stem extracts of *Ficus exasperata* taken in high doses was found to interfere negatively with the filtration function of the kidneys [7].

The present work was undertaken to investigate the effects of *Ficus exasperata* on lipid profile in the serum and some tissues of rats so as to further understand its mechanism of action in hypertension and heart diseases.

MATERIALS AND METHODS

Preparation of leaf extract

Leaf samples of *Ficus exasperata* were collected in Osogbo, Nigeria, air-dried at room temperature and ground into powder using an electric blender. The powdered leaf materials was cold-macerated with 6 volumes of 80% methanol for 14days. Crude extract was obtained by filtration followed by evaporation of the solvent in a rotatory evaporator.

Experimental animals

Twenty healthy male albino rats (*Rattus novergicus)* average weight 150g were obtained from the Central Animal House, Osun State University, Osogbo. The animals were housed in wooden cages and had free access to rat pellets and water. They were randomly divided into 4 groups of 5 rats each, maintained under laboratory conditions (temperature 24-28°C, relative humidity 60-70% and 12 h light-dark cycle). Rats were allowed to acclimatize to laboratory conditions for two weeks before administration of extract. Rats in group 1 served as control and were administered water in place of the plant extract. The rats in group 2, 3 and 4 were administered 100, 200 and 500mg/kg bw respectively daily for 14 days using an oral intubator. Permission was granted by the Research Ethics Committee of Osun State University, Osogbo before embarking on the animal studies.

Preparation of serum and tissue homogenates

The rats were sacrificed by cervical dislocation. Blood samples were collected by occular punctures into plain bottles. Serum was prepared by aspiration of the clear yellowish liquid after clotting and centrifuged for 10 minutes at 3000g in an MSC (Essex, UK) bench centrifuge. The clear supernatant was used for the estimation of serum lipids. The animals were quickly dissected and the heart, liver and kidneys removed and rinsed with cold 0.9% sodium chloride. The tissues were then homogenized in ice-cold 0.25M of sucrose solution using a Teflon homogenizer.

Serum lipid profile determination

Measurements of total cholesterol and LDL-cholesterol in serum and tissue homogenate were carried out according to standard procedures earlier described [9] and [10] respectively. Triglycerides concentration was determined based on the method of Trinder [11] while the procedure of Wieland and Siede [12] was employed in the determination of HDL-cholesterol.

Statistical analysis

Results obtained were presented as mean±SD. Variation within a set of data was analyzed by one-way analysis of variance (ANOVA) using the Graph Pad Prism Software (GPPS). Values of $p<0.05$ were taken as statistically significant.

RESULTS

Effect of administration of methanolic extract of *Ficus exasperata* on serum and tissue cholesterol of albino rat is shown in Table 1. The result shows that *Ficus exasperata* caused significant reduction in serum cholesterol compared with the control while it was significantly elevated in the liver with no significant change in the kidney and the heart.

Table 1: Effect of *Ficus exasperata* on total cholesterol concentration (mg/dL) in serum and tissues of rats.

Group (Treatment)	Serum	Liver	Kidney	Heart
Group 1 (Control)	73.23±6.03^a	42.02±3.50^a	54.74±6.13^a	65.21±7.75^a
Group 2 (100mg/kg bw)	56.18±5.52^b	58.17±4.28^b	55.91±4.99^a	63.19±5.24^a
Group 3 (200mg/kg bw)	54.18 ±7.53^b	56.98±5.01^b	52.68±6.13^a	64.24±5.69^a
Group 4 (500mg/kg bw)	55.07±6.32^b	57.12±4.22^b	56.33±5.97^a	62.64±4.72^a

Values are Mean±SD of 5 determinations. Values with different alphabetical superscript along a column are significantly different at P<0.05.

Table 2: Effect of *Ficus exasperata* on HDL cholesterol concentration (mg/dL) in serum and tissues of rats.

Group (Treatment)	Serum	Liver	Kidney	Heart
Group 1 (Control)	47.16±4.32^a	23.52±3.23^a	26.28±2.32^a	31.84±3.25^a
Group 2 (100mg/kg bw)	57.66±3.94^b	26.25±2.18^a	27.91±2.42^a	30.38±3.22^a
Group 3 (200mg/kg bw)	58.81 ±1.68^b	25.26±3.62^a	30.15±2.64^a	29.44 ±2.20^a
Group 4 (500mg/kg bw)	57.93 ±2.45^b	24.38±2.49^a	28.52±3.20^a	29.01 ±3.76^a

Values are Mean±SD of 5 determinations. Values with different alphabetical superscript along a column are significantly different at P<0.05.

Table 2 shows the concentration of HDL-cholesterol in the serum and tissues of the experimental rats. There was significant elevation in HDL levels in the serum of test groups compared with the control while HDL levels were not

affected in the tissues. Results in Table 3 show that the extract caused significant reduction in serum LDL cholesterol without affecting its concentration in the tissues. It can be observed in Table 4 that the extract caused significant elevation in liver triglyceride while its level was not significantly affected in the serum, kidney and the heart compared with the control.

Table 3: Effect of *Ficus exasperata* on LDL cholesterol concentration (mg/dL) in serum and tissues of rats.

Group (Treatment)	Serum	Liver	Kidney	Heart
Group 1 (Control)	49.19±2.79[a]	32.41±3.27[a]	39.46±6.88[a]	44.01±3.91[a]
Group 2 (100mg/kg bw)	36.33±5.52[b]	28.73±1.82[a]	42.62±4.71[a]	45.07±4.17[a]
Group 3 (200mg/kg bw)	34.83±5.79[b]	27.72±3.35[a]	40.06±4.37[a]	43.58±6.70[a]
Group 4 (500mg/kg bw)	38.12±1.83[b]	29.46±5.90[a]	43.09±3.39[a]	42.70±4.71[a]

Values are Mean±SD of 5 determinations. Values with different alphabetical superscript along a column are significantly different at P<0.05.

Table 4: Effect of *Ficus exasperata* on triglyceride concentration (mg/dL) in serum and tissues of rats

Group (Treatment)	Serum	Liver	Kidney	Heart
Group 1 (Control)	42.50±3.21[a]	38.54±2.98[a]	46.55±4.65[a]	54.22±4.01[a]
Group 2 (100mg/kg bw)	45.24±4.27[a]	48.62±2.43[b]	42.54±4.32[a]	56.24±3.87[a]
Group 3 (200mg/kg bw)	44.65±4.87[a]	47.68±3.67[b]	44.33±3.68[a]	53.54±4.23[a]
Group 4 (500mg/kg bw)	41.24±3.35[a]	49.44±4.15[b]	43.29±3.61[a]	55.48±3.65[a]

Values are Mean±SD of 5 determinations. Values with different alphabetical superscript along a column are significantly different at P<0.05.

DISCUSSION

Results obtained in this study indicates that the extract caused significant reduction in serum cholesterol and LDL-cholesterol with increased level of serum HDL-cholesterol. The serum cholesterol lowering effect of *Ficus exasperata* may be attributed to its ability to increase the excretion of cholesterol. Certain drugs/herbs has been reported to cause enhanced excretion of acidic and neutral steroids [13,14]. These results suggest that *Ficus exasperata* can be used as antiatherogenic agent for the management of atherosclerosis in man [15]. An increase of 1% serum cholesterol is reported to have resulted in a 3% increase in coronary heart disease [16]. Equally a reduction in LDL-cholesterol by 2 mg/dl can result in 1% reduction in the risk for coronary artery disease [5]. The significant reduction in serum LDL by *Ficus exasperata* may be due to suppression of LDL oxidation [6].

Our results show significant elevation of cholesterol and triglyceride in the liver of experimental rats compared to the control. Cholesterol and triglyceride are synthesized in the liver, this result demonstrate the ability of *Ficus exasperata* to influence liver metabolism towards increased synthesis of lipids. The high levels of liver triglyceride may be due to a number of factors such as the increased availability of fatty acids for esterification [17], reduced catabolism of LDL, inhibition of tissues lipases, activation of acetyl-CoA carboxylase [18] and production of triglycerides precursors such acetyl-CoA and glycerol phosphate [19].

The elevation of cholesterol in the liver might suggest that the leaf extract contain ingredients capable of enhancing the activities of hepatic lipogenic and cholesterogenic enzymes, such as malic enzyme, fatty acid synthase, glucose 6-phosphate dehydrogenase and HMG-CoA reductase [16] which are all required for cholesterol synthesis.

CONCLUSION

Results obtained in this study indicates that leaf extract of *Ficus exasperata* possess phytochemicals with positive effects on lipid profile in rats. This validates its traditional uses in the management of cardiovascular diseases arising from dyslipidaemia.

REFERENCES

[1] R Ross, *New England Journal of Medicine*, **1999**, 340, 115-126.
[2] CB Treasure, JL Klein, WS Weintraub, *New England Journal of Medicine*, **1995**, 332, 481-487.
[3] A Cignarella, M Nastasi, E Cavalli, L Puglisi, *Thromb. Res*., **1998**, 84 (5), 311-322.
[4] ID Effraim, HA Salami, TS Osewa, *Afr. J. Biomed. Res.*, **2000**, 175-179.
[5] K Khanna, F Rizvi, R Chander, *Journal of Ethnopharmacology*, **2002**, 82, 19-22.
[6] AA Hassan, R Mawardi, AS Mohammed, MA Abdul, *Pertanika Journal of Science and Technology*, **2002**, 11, 73-81.
[7] II Ijeh, AI Ukweni, *J. Med. Plant Res*., **2007**, 1, 27-29.
[8] AA Buniyamin, KI Eric, CA Fabian, *Acta Poloniae Pharmaceutica-Drug Research*, **2007**, 64, 543-546.
[9] F Zoppi, D Fellini, *Clin. Chem*., **1976**, 22, 690-691.

[10] WT Friedwald, RI Levy, DS Fredrickson, *Clin. Chem.*, **1972**, 18, 499-502.
[11] P Trinder, *Ann. Clin. Biochem.*, **1969**, 6, 24-27.
[12] H Wieland, D Siedel, *Artzl. Lab.*, **1981**, 27, 141-144.
[13] FV Udoh, *Fitoterapia*, **1998**, 69 (2), 141-146.
[14] ML Nurminen, R Krpela, H Vapattalo, *Ann. Med.*, **1998**, 30 (2), 1433-1440.
[15] FC Zhan, PJ Casey, *Annual Rev. Biochem.*, **1996,** 65, 241-246.
[16] GL Vega, MF Weiner, AM Lipton, *Arch Neurol.*, **2003,** 60, 510-515.
[17] KH Bopanna, J Kannan, S Gadgil, ER Balaraman, SP Rathore, *Indian Journal of Pharmacology*, **1997,** 29, 162-167.
[18] MF McCarty, *Medical Hypotheses*, **2001,** 56, 314-317.
[19] JE Campillo, MD Torres, E Dominguez, A Romero, C Perez, *Diabetologia* **1994,** 37(1), 213.