

## EFFECTS OF CRUDE EXTRACT OF AGERATUM CONYZOIDES, MORINGA OLEIFERA AND ZANTHOXYLUM ZANTHOXYLOIDES ON SERUM LIPID PROFILE IN ALBINO RATS

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### ABSTRACT

*Ageratum conyzoides, Moringa oleifera and Zanthoxylum zanthoxyloides are among medicinal plants commonly used in African folk medicine as remedies for the treatments of high blood pressure and heart related diseases. This study was carried out to compare the effects of Ageratum conyzoides, Moringa oleifera and Zanthoxylum zanthoxyloides extracts on serum lipid profile in albino rats. Thirty five albino rats were grouped into seven each containing five rats. Control rats (Group 1) received distilled water while test groups (2-7) were administered the extracts at two dose levels (200mg/kg bw and 500mg/kg bw) for 14 days. Results indicated that Moringa oleifera and Zanthoxylum zanthoxyloides extracts caused significant reduction in the concentrations of serum total cholesterol, triacylglycerol and LDL-cholesterol with Moringa oleifera having the most significant effect. There was also a significant increase in HDL-cholesterol concentration in rats administered Zanthoxylum zanthoxyloides compared with the control. Treatment of rats with Ageratum conyzoides had no effects on lipid metabolism as there was no significant changes in lipid profile of rats treated with this extract compared with the control. This result implies that Moringa oleifera and Zanthoxylum zanthoxyloides might be useful in the treatment of hypertension and other cardiovascular diseases arising from hyperlipidemia.*

**Key Words:** Ageratum conyzoides, Moringa oleifera, Zanthoxylum zanthoxyloides, Triglycerides, Cholesterol

### INTRODUCTION

Atherosclerosis, a condition in which an artery wall thickens due to accumulation of fat is the leading cause of death worldwide (Hajjar D P and Nicholson A C, 1995). Finding a cure for this disease has always being an important task for human endeavour. In recent times, there has been a decline in the prevalence of atherosclerosis-related deaths possibly due to effective management of the risk factors that predispose to this disorder (John D B *et al.*, 2008). The major identified risk factors are elevated LDL-cholesterol, reduced HDL-cholesterol, hypertension and non-insulin dependent diabetes mellitus (Treasure C B *et al.*, 1995). Lowering of serum cholesterol, particularly LDL fractions is therefore consider as one of the strategies that can delay the on-set of hyperlipidemic disorders in humans (Olson R E, 1998). Herbal extracts are often used in folk medicine to improve lipid profile and prevent heart diseases. *Ageratum conyzoides* is a common annual herbaceous weed with long history of traditional medicinal use in many countries

especially in the tropical regions. Extracts and metabolites from this plant is widely utilized in traditional medicine as a purgative, analgesic and as a heart tonic (Tandon S K *et al.*, 1994). Herbal preparations from the leaves of *Ageratum conyzoides* has been used in the treatment of high blood pressure, fever, diabetes, pneumonia and numerous infectious diseases (Xuan T D *et al.*, 2004).

*Moringa oleifera* leaves have been used as food and in medicinal preparations for centuries and modern medical research has consider the plant as a valuable remedy for a wide range of ailments (Fahey J W, 2007). Juice from ripe leaves of *Moringa oleifera* contains specific plant pigments with potent antioxidant properties which is also used in treating high blood pressure (Aslam M F *et al.*, 2005).

*Zanthoxylum zanthoxyloides* is widespread in Tropical West Africa occurring in the savannah and rain forest. Its primary use in Nigeria is as chewing stick while it is also use as medicine in the treatment of wide range of disorders including hypertension, stomach-ache, coughs, veneral diseases, leprosy and rheumatism (Adesina S K, 2005; Prempeh A B and Mensah-Attipoe J, 2008). Preparations from the plant have shown strong cytotoxic activity against different tumour cell lines which make it to be considered as potential drug candidates for cancer prevention and treatment (Chou Z T *et al.*, 2011). This study is designed to investigate the *in vivo* effects of these extracts on lipid profile using animal model so as to evaluate their hypolipidemic potential.

## MATERIALS AND METHODS

### Collection of plants and preparation of crude extracts

Fresh leaves of *Ageratum conyzoides* as well as *Zanthoxylum zanthoxyloides* stem-bark were collected at Oke Baale Area, Osogbo, Nigeria. *Moringa oleifera* leaves were gotten from National Centre for Genetic Resources and Biotechnology (NACGRAB), Moor Plantation, Ibadan, Nigeria. The plant materials were air-dried at room temperature for eight weeks after which they were ground into powder. Powdered sample of each plant were dissolved in 6 volumes 80% methanol for 14 days after which the extracts were filtered through a Whatman filter paper (125mm). Crude extracts were obtained by evaporating the ethanol in a water bath at 40°C and stored in a refrigerator at 8°C.

### Treatment of experimental animals

Thirty five (35) albino rats of both sexes (average weight 150g) were used for the study. They were obtained from Department of Physiology, Obafemi Awolowo University, Nigeria and raised at the Animal House, Department of Biochemistry, Osun State University, Osogbo. The rats were grouped into seven each containing 5 rats. Control rats (Group 1) received distilled water while

test groups (2-7) were administered the three extracts at two dose levels (200mg/kg bw and 500mg/kg bw) for 14 days. The rats were fed with rat pellets and water *ad libitum*, kept in well ventilated wooden cages under optimum laboratory conditions and allowed to acclimatize for two weeks before the experiment.

### **Serum preparation and lipid profile analysis**

Rats were sacrificed by cutting through the jugular vein and blood sample collected into sterilized dry centrifuge tube. Blood was allowed to clot and then centrifuged at 3000rpm for 20 minutes to obtain serum. The clear supernatant (serum) was separated from the pellet and transferred into clean plastic test tubes after which it was frozen until required for lipid profile determination.

The enzymatic endpoint method (Zoppi F and Fellini D, 1976) was employed in the analyses of serum total cholesterol. Serum triglycerides was assayed using the GPO-PAP method (Trinder P, 1969) while precipitant method (Wieland H. and Siedel D., 1981) was used in the measurement of HDL cholesterol. LDL cholesterol was estimated using the procedure described by (Friedewald W T *et al.*, 1972). All spectrophotometric measurements were done by the use of Spectrolab UV spectrophotometer (UK).

### **Statistical analysis**

Data were expressed as mean  $\pm$  SD. Student's T test was used to ascertain the level of significance.  $P < 0.05$  in this study indicates a significant difference as compared with control group.

## **RESULTS**

The results of serum lipid profile in rats administered the three extracts is shown in Table 1. *Moringa oleifera* and *Zanthoxylum zanthoxyloides* extracts at 200mg/kg bw and 500mg/kg bw significantly reduced serum total cholesterol, LDL-cholesterol and triglycerides with *Moringa oleifera* having a more pronounced effect. The results also indicate that *Zanthoxylum zanthoxyloides* significantly elevated serum HDL-cholesterol compared to the control while *Ageratum conyzoides* had no significant effect on serum lipid profile in rats.

**Table-1.** Serum lipid profile (mg/dL) in rats administered *Ageratum conyzoides*, *Zanthoxylum zanthoxyloides* and *Moringa oleifera* extracts.

Treatment	Conc.	Total Chol.	HDL-Chol.	LDL-Chol.	Trig.
Control	-	86.54±7.29	51.88±3.75	60.55±6.43	46.14±5.80
<i>Ageratum conyzoides</i>	200mg/kg bw	84.71±5.48	48.66±3.67	58.75±5.38	44.36±3.88
	500mg/kg bw	85.20±5.81	50.74±4.29	58.28±4.32	45.76±6.00
<i>Zanthoxylum zanthoxyloides</i>	200mg/kg bw	63.77±5.34*	62.85±3.60*	50.73±4.44*	35.25±3.86*
	500mg/kg bw	61.56±4.39*	61.62±5.44*	51.44±5.48*	34.66±4.28*
<i>Moringa oleifera</i>	200mg/kg bw	55.86±4.36**	53.90±4.22	42.56±3.68**	32.56±3.23*
	500mg/kg bw	51.44±3.54**	52.44±3.78	41.56±6.11**	34.37±4.28*

Values are Mean ± SD. n= 5. Values in asterisk are significantly different from the control at P<0.05.

## DISCUSSION

*Moringa oleifera* and *Zanthoxylum zanthoxyloides* extracts significantly reduced serum total cholesterol, LDL-cholesterol and triglycerides in the rats. The hypolipidemic effect of these extracts suggest that they might be useful in the prevention of atherosclerosis. According to lipid hypothesis, hypercholesterolemia (higher concentrations of LDL and lower concentrations of functional HDL) as well as high triglyceride level are strongly associated with cardiovascular disease because these promote atheroma development in arteries (Murray R K *et al.*, 2000). It was postulated that ingesting antioxidants and minimizing free radical exposure may reduce LDL contribution to atherosclerosis (Esterbauer H *et al.*, 1991). Abnormally low levels of cholesterol is relatively limited, but some studies suggest a link with depression, cancer and cerebral haemorrhage (Lewington S *et al.*, 2007). The cholesterol lowering ability of *Moringa oleifera* and *Zanthoxylum zanthoxyloides* might be due to the presence of saponins in the plants (Adesina S K, 2005; Hsu R *et al.*, 2006). Saponins prevent excessive intestinal absorption of cholesterol and thus reduce the risk of cardiovascular diseases such as hypertension (Olaleye M T, 2007).

The observed reduction in serum triglyceride by *Moringa oleifera* and *Zanthoxylum zanthoxyloides* extracts indicate protection against coronary heart diseases. It has been shown that lower triglyceride levels reduce the danger of heart diseases up to two to three times (LRCP, 1984). The hypotriglyceridemic effect of the extracts might be due to reduced hepatic triglyceride synthesis (Sivaraj A *et al.*, 2009), decreased fatty acids synthesis (Bopanna K N *et al.*, 1997), enhanced catabolism of LDL (Khanna K *et al.*, 2002) and/or inhibition of acetyl-CoA carboxylase (McCarty

M.F., 2001). Although hypotriglyceridemia is beneficial in atherosclerosis, it may cause some undesirable conditions such as hyperthyroidism (Després J, 2009).

The observed elevation of HDL cholesterol in rats administered *Zanthoxylum zanthoxyloides* indicate its beneficial effect against cardiovascular disease. HDL cholesterol is secreted by the liver and intestinal cells. It has protective effect against cardiovascular disease as it removes excess cholesterol from circulation and carries it back to the liver where it is degraded or converted into bile acids (Rahilly C, 2011). Epidemiological studies have shown that high concentrations of HDL (over 60mg/dL) have protective value against cardiovascular diseases such as ischemic stroke and myocardial infarction (Soudijn W *et al.*, 2007).

## CONCLUSION

The results of this study show that methanolic extracts of *Moringa oleifera* leaf and *Zanthoxylum zanthoxyloides* stem-bark contain medicinal ingredients which exhibited positive effect on lipid metabolism in rats. *Ageratum conyzoides*, at this level of treatment (dosage and duration) does not appear to affect lipid profile in rats. These implies that *Moringa oleifera* leaf and *Zanthoxylum zanthoxyloides* stem bark might be of great importance in the treatment of cardiovascular diseases and other lipid metabolic disorders.

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