

Cardiovascular Effect of Aqueous Extract of *Senna Hirsuta* on Albino Rats

Agbafor K. N.

Department of Biochemistry, Ebonyi State University, Abakaliki, Nigeria.

Abstract: The effect of aqueous extract of fresh leaf of *senna hirsuta* on lipid profile was investigated using albino rats. The research was performed using twenty adult male albino rats, the rats were placed into groups A, B, C, D and E with four animals in each group. Groups A, B, C and D were administered orally with 800, 600, 400 and 200mg/kg body weight of aqueous fresh leaf extract of *Senna hirsuta* respectively, the treatment lasted for seven days, while group E acted as the control. The results showed that there was a significant decrease ($p < 0.05$) in body weight, physical activities, feed and water intake in the animals administered with the extract compared with the control. The average concentration of cholesterol, triacylglycerol and low density lipoprotein were found to be significantly lower ($p < 0.05$) in treated animals than the control. The concentration of high density lipoprotein was found to be significantly higher ($p > 0.05$) in the treated animals than the control. These observations suggest that the aqueous extract of fresh leaf of *Senna hirsuta* may be useful in treatment/management of cardiovascular disease.

Keywords: *Senna hirsuta*, lipid profile, cardiovascular effect and medicinal plants.

I. Introduction

Plants have the ability to synthesize wide varieties of chemical compounds that are used to perform important biological functions and defend against attack from predators, many of these plants have beneficial effects on long-term health when consumed by humans and can be used to effectively treat human diseases (Tapsell *et al.*, 2006). Plants are the basis of traditional medicine, hence the history of drug discovery and drug chemistry is bound to plant kingdom. Traditional medicine may be summarized as sum total of all knowledge and practical whether explicable or not used in the diagnosis, prevention and elimination of physical, mental or social imbalance, relying exclusively on practical experience and observation handed down from generation to generation, whether verbally or written (W.H.O., 2010).

Since prehistoric times, plants have been used to attempt cures for diseases, often times these primitive attempts were based on superstition and speculation. In all countries of the world, there exists traditional knowledge to use of plant which could involve one or more part of the plant to heal diseases based on the "Doctrine of signatures" (Okigbo *et al.*, 2008). This superstitious doctrine suggested that all plants possessed some signs, given by the creator, which indicated the use for which they were intended. A plant with heart shaped leaves is believed to be good for heart ailments, the liverleaf with its 3-lobed leaves was good for the liver treatment, many of the common plants used owe their origin to these superstition (Tap sell *et al.*, 2006).

Senna hirsuta commonly known as hairy sickle pod is a medicinal plant of tropical origin. *Senna hirsuta* leaves is believed to be used in treatment of high blood pressure and lowering of cholesterol levels, typhoid, diarrhea and malaria. It belongs to the family of *fabaceae* (Henderson, 2001).

The cardiovascular system is made up of heart, lungs, Arteries and veins and it is under the control of the autonomic nervous system (sympathetic and parasympathetic). It is responsible for transporting oxygen, nutrients, hormones and cellular waste products throughout the body. This system is powered by the heart which pumps over five liters of blood throughout the body every minute (Sherwood, 2011).

Lipid profile or lipid panel is blood test that measures the fats in the body, it serves as an initial broad medical screening tool for cholesterol, triglycerides, High-density Lipoprotein (HDL), low Density lipoprotein and very low density lipoprotein, which are use to access the risk of cardiovascular diseases (Sidhu and Naugler, 2012).

II. Aim And Objectives

The aim of this research was to evaluate the cardiovascular effect of leaf extract of *Senna hirsuta* on albino rats using lipid profile as an index.

III. Materials And Methods

COLLECTION OF FRESH LEAVES

Fresh leaves of *Senna hirsuta* was collected from Ezza-ofu in Izzi local Government Area of Ebonyi State, Nigeria.

COLLECTION OF ALBINO RATS

Twenty adult male albino rats of mean body weights between 80 and 150g was obtained from the Veterinary Medicine Department University of Nigeria, Nsukka (UNN) and transported inside a steel cage to Ebonyi State University, Presco Abakaliki. The animals were acclimatized for seven days under standard environmental condition and fed with a regular livestock feed

PREPARATION OF PLANT EXTRACT OF *Senna hirsuta*

Fresh leaves of *Senna hirsuta* was washed, 140g of the leaf was ground using mortar and pestle to get a paste. The paste was soaked in 200ml of distilled water and allowed to stand for 30mins. It was filtered using muslin cloth, the extract was evaporated using rotor evaporator to obtain gel like substance. The gel like substance was further re-dissolved in 100ml of distilled water. The extract yielded 380ml and was stored in a clean air tight container in cool dry place.

ANIMAL HANDLING AND ADMINISTRATION OF EXTRACT

The rats were divided into five groups (A, B, C, D and E) each made up of four rats. They were treated with graded concentrations of (800, 600, 400 and 200mg/kg) of aqueous *Senna hirsuta* extract from group A to D, while group E was not treated with the extract, it was fed with livestock feed and water.

COLLECTION OF BLOOD FROM ANIMALS

After seven days of administration the animals were allowed to fast over night for 24hours. Subsequently, blood samples were collected by cardiac puncture under mild anesthesia using chloroform.

PREPARATION OF SERUM

The blood sample were collected into a sterile anticoagulant free specimen bottle which was centrifuged at 3000 rpm for 15 minutes to obtain the serum.

MEASUREMENT OF LIPID PROFILE

Total cholesterol was determined using the methods described by Allain *et al.*, (1974).

Triglyceride was determined using the methods described by Annoni *et al.*, (1982).

HDL cholesterol was determined using the methods described by (Perry *et al.*, 1979).

LDL Cholesterol was determined using the methods described by (Perry *et al.*, 1979).

STATISTICAL ANALYSIS

Data was determined by the use of ANOVA method and $P < 0.05$ were regarded as significant. The group data are expressed as mean \pm SD.

IV. Results

Table 1: Percentage yield of the extract

Plants part	Weight of plant before (g)	Volume of extract (ml)	Volume of distilled H ₂ O (ml)	Weight of the extraction residue (g)	Percentage yield of the extract
Leaves	140	380	100	4.96	23.7

PHYSICAL OBSERVATION

There was decrease in the physical activity of the rats, also there was decrease in the rate of fed and water intake.

Changes in body weight of the Animals

The change in body weight of the rat after seven days of administration is shown in table 2, the animals in groups A, B, C and D showed insignificant decrease in body weight while those in E (control) showed increase in body weight

Table 2: Changes in body weight of the animals

DOA	Group A	Group B	Group C	Group D	Group E
1	81.02±1.50	82.16±5.01	95.02±6.12	117.11±5.69	105.13±2.36
2	79.10±1.42	77.21±4.70	91.16±5.21	115.03±4.77	112.16±3.34
3	78.11±1.31	76.31±4.09	87.10±4.53	113.12±3.85	115.34±4.56
4	77.19±1.22	75.11±3.56	85.25±4.16	112.22±2.93	177.32±5.03.
5	76.20±1.13	74.12±3.21	83.02±3.41	111.01±2.50	125.30±5.77
6	75.02±1.00	73.05±2.03	82.11±2.52	99.35±1.20	145.11±6.01
7	73.27±1.00	72.25±1.43	81.12±1.31	95.05±0.96	157.20±7.08.

Values = Mean±Standard deviation

*DOA = Day of Administration

Table 3: Lipid profile of the rats

Group	Cholesterol (mg/dl)	Triacylglyceride (mg/dl)	HDL (mg/dl)	LDL (mg/dl)
A	238.45±5.50	109.95±9.57	25.21±5.49	240.25±9.43
B	216.95±8.38	104.99±8.92	29.06±9.61	224.25±6.57
C	186.26±7.18	81.92±7.03	47.03±5.97	215.97±3.30
D	150.57±8.10	68.66±6.24	52.32±7.19	188.71±2.60
E	252.72±9.91	136.11±8.37	20.06±4.29	244.64±8.83

Mean ± standard deviation n = 5

Table 3 mean level of total cholesterol, triacylglycerides, LDL and HDL

The table above shows that there was a general decrease in the average concentration of the lipid profile levels of treated animals compared to the control group.

Legend

Group A = 800mg/kg of *senna hirsuta*

Group B = 600mg/kg of *senna hirsuta*

Group C = 400mg/kg of *senna hirsuta*

Group D = 200mg/kg of *senna hirsuta*

Group E = Control

V. Discussion

Extraction of aqueous solution of fresh leaf of *Senna hirsuta* yielded 23.7% (table 1), the low percentage yield suggest that not all the plant part was extracted from the beaker, some of the chemical components of fresh leaves of *Senna hirsuta* were soluble in water and this correlated to the work carried out by (Hayouni *et al.*, 2007).

The decrease in physical activities (low food and water intake of the animals treated with extract of *Senna hirsuta* with respect to that of control group is not know with certainty at this stage of the research but suggested it is because of metabolic upset in the albino rats treated with aqueous extract (Evans, 2000).

The reason behind decrease in average body weight of treated albino rat compared with the control E (table 2) is still not fully understood. It may be related to decrease in feed and water intake caused by the introduction of the extract into the plant. The average concentration of total cholesterol, triacylglycerol, high density lipoprotein and low density lipoprotein were found to be significantly lower ($P < 0.05$) in animals treated with the extract than the control group. However the average concentration of high density lipoprotein was found to be higher in animals treated with the leaf extract than the control. These observation was found to be dose dependent (table 3) it suggests that extract appear to elicit higher effect at higher dose, however, the actual dose that could elicit higher effects has not been established (Efukudo, 2003). These observations also suggest that the use of *Senna hirsuta* in the management/treatment of cardiovascular disease such as coronary heart disease and arteriosclerosis may be due to its ability to reduce blood lipid level which agrees with the work of (Pamela *et al.*, 2008).

VI. Conclusion

From the results obtained in this research, *Senna hirsuta* leaf extract could be a potential drug used in the treatment of cardiovascular diseases in rats. However, more investigations are required to establish the actual mechanism underlying this observation.

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