



## HYPOLIPIDAEMIC EFFECTS OF RED SORREL (*HIBISCUS SAPDARIFA* AND *HIBISCUS CANNABINUS*) LEAVE EXTRACTON EXPERIMENTAL RABBITS

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### ABSTRACT

The hypolipidaemic effects of red sorrel (*H. sapdarifa* and *H. cannabinus*) has been studied in experimental rabbits. Four groups of two (2) rabbits each used. Group I received 0.2g/kg body weight of *H. sapdarifa* orally, group II received 0.2g/kg body weight of *H. cannabinus* orally. Group III received mixture of *H. sapdarifa* and *H. cannabinus* extracts (ratio 1:1 v/v) orally and the fourth group (IV) received water and serve as control. These rabbits were sacrificed 24hrs after last treatment. Serum triglyceride, total cholesterol, HDL and LDL cholesterol were assayed by standard procedure. *H. Sapdarifa* treated rabbits had lowers serum triglyceride, total cholesterol, HDL and LDL cholesterol levels. The *H. cannabinus* treated rabbits also show decreased level of these parameters, but less than the *H. sapdarifa* group. *H. sapdarifa* and *H. cannabinus* mixture group had higher levels of the parameter, but less than the control group. Effects of *H. sapdarifa* and *H. cannabinus* separately was significantly ( $p < 0.05$ ). The result shows that *H. sapdarifa* and *H. cannabinus* have apparent hypolipidaemic effects on rabbits.

**Keywords:** *Hibiscus sapdarifa*, *Hibiscus cannabinus*, triglyceride, total cholesterol, HDL and LDL cholesterol.

### INTRODUCTION

If tissues lack a key enzyme for lipid breakdown, lipids accumulate leading to lipemia (i.e presence of excessive amount of lipid in the blood). Hyperlipidemia refers to increased levels of lipids (fats) in the blood, including cholesterol and triglycerides. Although hyperlipidemia does not cause symptoms, it can significantly increase your risk of developing cardiovascular disease, including disease of blood vessels supplying the heart (coronary artery disease), brain (cerebrovascular disease), and limbs (peripheral vascular disease). These conditions can in turn lead to chest pain, heart attacks, strokes, and other problems. Because of these risks, treatment is often recommended for people with hyperlipidemia (NCEP, 2002).

Hyperlipidemia has a lot of relationship with hypertension. Usually only the total cholesterol concentration is of interests, but occasionally separate estimation of the free and esterified forms is of value in detecting hypercholesterolemia. Triglyceride, LDL or LDL complex are among the lipids whose high concentration in the serum in relation to cholesterol can lead to hypertension. Atherosclerosis is thought to begin with

trapping of cholesterol rich lipoproteins within the intima of arterial vessels. Death of the foam cells result in the accumulation of a cellular lipids that can stimulates fibrosis. The resulting atherosclerosis plaque narrows the blood vessel and serves as the site of thrombus formation, which precipitate myocardial infarction (Ross, 1986).

*Hibiscus sapdarifa* is an erect, mostly branched, annual shrub. Stem reddish in colour and up to 3.5 m tall, with a deep penetrating taproot. Leaves variously colored, dark green to red; leaves alternate, glabrous, long-petiolate, palmately divided into 3-7 lobes, with serrate margins. Flowers large, short-peduncled, red to yellow with dark center. The accrescent large and fleshy sepals become enlarged and succulent, making excellent jelly. Capsules ovoid, beaked and hairy 5 cm long, 5.3 cm wide. Several cultivars are known, the best known are: 'Victor', 'Rico' and 'Archer'. Of the botanical varieties: var. *sapdarifa*, has red or pale yellow inflated edible calyces, but poor fiber; var. *altissima* is grown for its fiber, but has inedible calyces. There is a green form known as the white sorrel, with greenish-white fruits (Orwa *et al.*, 2009).

The roselle is useful in arteriosclerosis. Reported to be antiseptic, aphrodisiac, astringent, cholagogue, demulcent, digestive, diuretic, emollient, purgative, refrigerant, resolvent, sedative, stomachic, and tonic, roselle is a folk remedy for abscesses, bilious conditions, cancer, cough, debility, dyspepsia, dysuria, fever, hangover, heart ailments, hypertension, neurosis, scurvy, and strangury. The drink made by placing the calyx in water, is said to be a folk remedy for cancer. Medicinally, leaves are emollient, and are much used in Guinea as a diuretic, refrigerant and sedative; fruits are antiscorbutic; leaves, seeds, and ripe calyces are antiscorbutic. In Myanmar, the seeds are used for debility and the leaves as emollient. Taiwanese regard the seed as diuretic, laxative and tonic. In Philippines the bitter root is used as an aperitive and tonic. Angolans use the mucilaginous leaves as an emollient and as a soothing cough remedy. Central Africans poultice the leaves on abscesses. Ingestion of the plant extract reportedly decreases the rate of absorption of alcohol. (Orwa *et al.*, 2009).

*Hibiscus cannabinus* (Malvaceae) is an annual or perennial herbaceous bush and has several forms with varying colors of flowers. It is native to China and grown widely as an ornamental plant throughout India. The flowers are considered emollient, and an infusion of the petals is used as a demulcent. Its decoction is given in bronchial catarrh in India. Previous studies show that the plant possesses anticongestive, antidiarrhetic and antiphlogistic activities). The leaves and flowers have been found to be effective in the treatment of heart disorders. (Kasture *et al.*, 2002).

This study was carried out to assess the hypolipidaemic effects of *H. sapdarifa* and *H. Cannabinus* extracts on experimental rabbits.

## MATERIALS AND METHODS

### Preparation of leave extracts and concentration determination:

Dry calyces of *H. Sapdarifa* and *H. cannabinus* were bought from sabon Gari Market Kano State. The calyces were grinded into powder using mortar and pistle and sieved in the laboratory. Powdered calyces 5.0g of *H. sapdarifa* was soaked in distilled water 200ml and allowed to stand overnight

before administration to the experimental rabbits. *H. cannabinus* undergo similar procedure.

Concentration in g/ml =  $\frac{5\text{g of } H. \text{sapdarifa}}{H. \text{cannabinus}}$

200ml

=  $\frac{5}{200\text{gml}} = 2.5\%w/v$

= 0.025g/ml

### Treatment of Rabbits

Dosage for both *H. sapdarifa* and *H. cannabinus* were 0.20g/kg body weight. Administration was orally and lasted for a period of one week using 10ml syringe. The animals were kept at biochemistry animal's house after purchase from Sabon Gari Market, Kano State for the research. The rabbits were fed with layer's mash, spinach vegetable and drinking water. The feeding was three times daily. Analysis began 3 days after purchased to prevent any abnormality (e.g) sickness. Eight experimental rabbits were used for the research. Six out of the eight rabbits were used as test while two served as the control. The six rabbits were divided into 3 groups each having two rabbits. Group 1.a and b = were fed with *H. Sapdarifa* extract

Group 2 a and b = were fed with *H. cannabinus* extract

Group 3 a and b = were fed with mixture of the extracts above

Group 4 a and b = were not fed with any extract.

### Analysis of serum triglyceride, total cholesterol, HDL and LDL cholesterol

Method of Bagniski and Zak (1960) was employed for triglyceride determination. Serum triglycerides are extracted with isopropanol in the presence of alumina absorbent mixture that removes plasma lipids monoglycerides, glucose, bilirubin, and other substance. Triglyceride is saponified to glycerol and soap of fatty acid. The glycerol is oxidized to formaldehyde by means of periodate. The formaldehyde is determined by the Hamtzech condensation of formaldehyde with  $\text{NH}_3$  and acetyl acetone. The resulting diacetyl dihydrolutidine is yellow and is also fluorescent when activated with light at 400nm, determined calorimetrically.

Method of Zlatkis *et al.*, (1953) was employed for serum total cholesterol. Cholesterol extracted forms a red coloration with a mixture of ferric chloride acetic acids and sulphuric acid, measurement is at 580nm using colorimeter.

Method of Greget *et al.*, (2010) was employed in determining serum HDL- cholesterol. Very low density lipoprotein (VLVL) and low density lipoprotein (LDL) are precipitated in serum by phosphotungstic acid and magnesium chloride. HDL- cholesterol can be estimated from the supernatant. The HDL- cholesterol was determined in a clear supernatant according to the method of Zlatkiset *et al.*, (1953).

Indirect method of friedewald *et al.*, (1973) was used to determined serum LDL- cholesterol. The concentration of LDL- cholesterol is difficult to measure directly, but it may be calculated from the measurement of total and HDL - cholesterol and triglycerides in serum / plasma as follows: LDL - cholesterol = Total cholesterol - (HDL+VLVL)

#### STATISTICAL ANALYSIS

The data are shown as mean  $\pm$ S.E and statistical significance was evaluated by one way analysis of variance (student t-test).

#### RESULTS AND DISCUSSION

The results of serum triglyceride, total cholesterol, HDL cholesterol and LDL cholesterol in control rabbits and those administered 0.2g/kg of *H. sapdarifa*, *H. cannabinus* and mixture of both extracts are shown in table 1, treatment lasted for a week.

Group I rabbits were treated with *H. Sapdarifa* and had serum triglyceride, total cholesterol HDL and LDL cholesterol levels of 105.26 $\pm$  0.00mg/dl 150 $\pm$ 14.14mg/dl, 83.33 $\pm$  0.00mg/dl and 45.62 $\pm$  0.59 mg/dl respectively with control values of 268.16 $\pm$  00mg/dl, 270 $\pm$  14.14mg/dl and 186.12  $\pm$  14.14mg/dl respectively. Thus showing a significant (P<0.05) hypodermic effects of H sapdarifa. Gosain *et al* (2010) got similar result (i.e administration of HSEE (200 mg/kg and 300 mg/kg) together with continuous cholesterol feeding for four weeks showed significant reduction in serum cholesterol level by 18.5% and 22%, respectively (p < 0.05); serum triglyceride level by 15.6% and 20.6%, respectively (p < 0.05); serum LDL level by 24% and 30%, respectively (p < 0.05), and serum VLDL level by 15.5% and 20.5%, respectively (p < 0.05), as compared to cholesterol feed group.

Table 1: Lipid profile level after *H. Sapdarifa* and *H. cannabinus* administration to rabbits for one week.

| Group | Extract administered<br>0.2g/Kg bd wt                  | Serum Triglyceride<br>mg/dl | Serum total cholesterol<br>mg/dl | Serum HDL cholesterol<br>mg/dl | Serum LDL cholesterol<br>mg/dl |
|-------|--|-----------------------------|----------------------------------|--------------------------------|--------------------------------|
| One   | <i>H. Sapdarifa</i>                                    | 105.26 $\pm$ 0.00*          | 150 $\pm$ 14.14*                 | 83.33 $\pm$ 0.00*              | 45.62 $\pm$ 0.59*              |
| Two   | <i>H. Cannabinus</i>                                   | 157.90 $\pm$ 0.00*          | 190 $\pm$ 14.14*                 | 62.50 $\pm$ 0.00*              | 95.92 $\pm$ 0.59*              |
| Three | Mixture of <i>H Sapdarifa</i> and <i>H. cannabinus</i> | 184.22 $\pm$ 37.22          | 240 $\pm$ 0.00                   | 52.09 $\pm$ 14.73              | 151.60 $\pm$ 7.45              |
| Four  | Control (H <sub>2</sub> O)                             | 268.16 $\pm$ 0.00           | 270 $\pm$ 14.14                  | 31.25 $\pm$ 14.74              | 176.12 $\pm$ 14.14             |

Values are presented as mean $\pm$ SEM; values in the same column bearing the script are significantly higher compared to the control at p<0.05

Group II rabbits were treated with *H. cannabinus* and had serum triglycerides, total cholesterol, HDL and cholesterol levels of 157.90 $\pm$  0.00mg/dl, 190 $\pm$  14.14 mg/dl, 62.50 $\pm$  0.00mg/dl, and 95.92 $\pm$  0.59 mg/dl respectively as compared with control values showing a significant (P<0.05) hypolipidaemic effects of *H. cannabinus*. The work is in accordance to research curled from

*International Journal of Advances in Pharmacy Medicine and Bio allied Sciences*(Ethanollic leaves extract of Hibiscus cannabinus and atorvastatin were found to lower the serum cholesterol, triglyceride, VLDL, LDL levels and increase the HDL leaves as compared to the corresponding high fed cholesterol diet group.

The hypolipidaemic activity of Hibiscus cannabinus can be ascribed to its inhibitory effect on the liver HMG CoA reductase activity). LDL cholesterol levels of 184.22±37.22mg/dl, 240±0.00mg/dl 52.09±14.73mg/dl and 151.60±7.45mg/dl respectively as compared with control values in group four. The hypolipidaemic effect of *H. sapdarifawas* in serum total cholesterol,

significant ( $p < 0.05$ ) after *H. sapdarifa* drink consumption for a period of two weeks. The work is also in consistence with research work of Onyeneke (1999) which indicates a significant decrease in triglyceride and total cholesterol in hypertensive and normotensive rats upon administration of calyxes' infusion of *H. sapdarifa*.

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