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Effect of *Saccharum barberi* extract on lipid profile level in albino wistar rats

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ABSTRACT

The effect of Saccharum barberi extract on lipid profile level was investigated in albino wistar rats. Forty albino wistar rats of male sex were randomly assigned into four study groups of ten animals each to give in all four study groups of male wistar rats respectively. Graded doses of the alcoholic extracts 100mg/kg, 200mg/kg and 300mg/kg body weight in normal saline were administered to the treatment groups II, III and IV via orogastric tube; the control group I received placebo (normal saline) for 21 days. At the end of 21 days experimental period, the animals Albino wistar rats were fasted overnight and weighed. The animals were anaesthetized in chloroform vapor and dissected and blood collected from the jugular vein using sterilized syringe and needle. Data generated showed that at 200mg/kg and 300mg/kg dose regimen, the impact of the extract on serum lipid profile showed a significant decrease in total cholesterol, low density lipoprotein and triacylglycerols, with an attendant increase in high density lipoprotein in Albino wistar rats, thereby reducing atherosclerosis risk.

Keywords: *Saccharum barberi* extract, Cholesterol, Triacylglycerol, Low Density lipoprotein, High Density Lipoprotein, Very Low Density Lipoprotein.

INTRODUCTION

Plants are known to contain a lot of bioactive agents, which account for their medicinal values, over two hundred and fifty (250) of such compounds had been isolated and studied. Some are used for medicinal purpose while others are incorporated in food (food additives), in order to exert or play their medicinal roles [1]. In the present day, many synthetic analog have also been successfully produced. Several substances derived from plants by man, had been used as potent drugs in treating diverse diseases.

Ephedra plants had been used in the treatment of asthma and other respiratory diseases, with the active ingredient been an ephedrine. Powdered leaf of foxglove had been used for cardiac stimulant since 1715 [2]. The Neem plant had been successful used in the treatment of malaria, antipyretic, analgesic and some inflammatory diseases [3]; [4].

Recent scientific investigation by world health organization (WHO) show that more than a billion people rely on herbal medicine to treat ailments and over twenty-one thousand (21,000) plants has been reported to posses medicinal uses including the species *Saccharum barberi* [5]. A survey of medicinal plants reveals that fifty percentage (50%) of treatment are for women ailments, twenty percentage (20%) for veneral diseases, seven and half percentage (7.5%) for bites and fifteen percentage (15%) for bone setting [6].

MATERIALS AND METHODS

Preparation of Plant Extract

Fresh stems of *Saccharum barberi* were obtained from Magongo in Ogori/Magongo L.G.A. of Kogi State and Abejukolo in Omala L.G.A. of Kogi State respectively. The plant was identified by Late Mr. Patrick Ekwonoh of Botany Department of Kogi State University, Anyigba, while voucher specimens of this plant were retained in the herbarium unit of the department.

The stems of the *Saccharum barberi* were washed thoroughly with water to remove the debris. The sharp knife was used to peel off the hard bark and then chopped into smaller pieces. The chopped pieces of the *Saccharum barberi* were sun dried for two weeks in front of Biochemistry Laboratory in the month of October, 2010 with relative humidity of 60%. The dried *Saccharum barberi* stems were pounded using a mortar and pestle, into small bits and further crushed into powdery form. Moreover, 350g of the powdered *Saccharum barberi* stem was weighed and macerated into 250ml of 80% ethanol in a stopped flask. The content was vigorously shaken and left to stand for 72 hours to allow the solvent interact with plant material. The mixture was passed through muslin cloth to separate the filtrate from plant residue. The filtrate was concentrated in a rotary evaporator to obtain a 20g crude extract which represent a 5.7% yield. The extract obtained was used for phytochemical and quantitative screening in animal studies.

Experimental Design and Extract Administration

Forty male Albino wistar rats were aged between 10–12 weeks and weighed between 130–170g were reared in animal house of Biochemistry Department, Kogi State University, Anyigba. Prior to experimentation, the animals were acclimatized for seven days before the experiment and maintained ad–libitum on water and growers mash (Pfizer feed, Lokoja), obtained from Anyigba market. The Experimental animals were kept at ambient temperature of 26^{o}c, with adequate ventilation and a natural 12 hour day –light cycle, in animal house facility of Department of Biochemistry, Kogi State University, Anyigba, and were housed in locally fabricated modern cages. The cages were constructed locally, with planks and iron nets with dimension of 2ft long and 1ft by width and height respectively. Each cage contained ten animals Albino Wistar rats, thus representing one group each.

The *Saccharum barberi* extract of 20g obtained which represent a yield of 5.7% was used to prepare a solution in distilled water. Moreover, 2g of crude extract was dissolve in 100ml of distilled water to give a stock solution which corresponds to 20mg/ml. The dosage corresponding to 100mg/kg, 200mg/kg and 300mg/km body weight were administered to the experimental male Albino Wistar rats using oral intubator method for a period of twenty one days respectively.

A total of forty male Albino wistar rats were randomly assigned into four study groups on the basis of their weight. The animal studies was conducted in two phases, acute toxicity studies using a dose level of 300mg/kg body weight and chronic toxicity study using graded doses of the extract. In acute toxicity studies, 10 male albino wistar rats were used. This acute dose (300mg/kg body weight) was administered to all animals for 3 days were observed for physical signs of toxicity. Also, physiological parameters were observed, tested and recorded on the animals. In the chronic toxicity studies, Group I served as control and received the normal diet and distilled water. Groups II to IV were the test and administered graded doses, 100mg/kg body weight, 200mg/kg body weight and 300mg/kg body weight of the extract respectively. The animals were weighed before and after the oral administration of the extract which occurs between the hours of 9.00am to 10.00am daily and lasted for 21 days. Extract administration in both animals was by gastric intubation using sterilized syringe and needles.

Determination Serum Cholestrol (Abel *et al.* 1952)

Randox kits were used for quantitative invitro determination using serum Cholesterol sample.

$$\text{Cholesterol Ester} + H_2O \xrightarrow[\text{Esterase}]{\text{cholesterol}} \text{cholesterol} + \text{fatty acids}$$

$$H_2O_2 + \text{Phenol} \xrightarrow{\text{peroxidase}} \text{Quinoline} + H_2O + \text{4 amino-anti pyrine}$$

Determination High density Lipoprotein (Richmand, 1973)

Randox CH 203 kits were used for the qualitative invitro analysis of the high density lipoprotein cholesterol in serum using the Method of (Trinder *et al*. 1969). In principle, the high density lipoprotein, low density lipoprotein and chylomicrons were precipitated by the addition of phosphotungitic acid in the presence of Mg^{2+} ion. After centrifugation, cholesterol concentration in the high density lipoprotein which was the main supernatant was then determined analytically.

Determination Triacylglycerol (Trinder *et al*., 1963)

Randox TR 210 kits were used for the qualitative invitro determination of Triacylglycerol according to (Jacob *et al*, 1960) Method. In principle, hydrolysis of triglycerides and its products, led to the production of quinoneimine and the absorbance of which was taken and used in the determination of triacylglycerols.

$$TAG + H_2O \xrightarrow{\text{Lipase}} \text{Glycerol} + \text{fatty acids}$$

$$\text{Glycerol} + ATP \xrightarrow{\text{Glycerol kinase}} \text{G–3–Phosphate} + ADP$$

$$\text{G–3–P} + O_2 \xrightarrow{\text{Glycerol peroxidase}} \text{DHA} + P + H_2O_2$$

$$2H_2O_2 + \text{4–amino–phenazone} \xrightarrow{\text{POD}} \text{quinoneimine} + \text{4-chlorophenol} + HCl + 4H_20$$

Determination of Low Density Lipoprotein Cholesterol

As the values of Total Cholesterol, Triacyglycerols and High Density Lipoprotein were determined using above methods, the value of Low Density Lipoprotein was calculated using method of (Friedwald *et al.* 1972). This was used to estimate the LDL cholesterol by differences in Total Cholesterol and the sum of HDL cholesterol and VLDL cholesterol respectively.

LDL = Total Chol – HDL + VLDL

(Burnsteri and Samaille, 1960)

$$\text{VLDL} = \frac{TG}{5}$$

RESULTS

Table 1: Effect of *Saccharum barberi* extract Administration on cholesterol, LDL, HDL and TAG (mg/dl) in Albino wistar rats

Group	Mean value Chol. (mg/dl)	Mean value LDL (mg/dl)	Mean value HDL (mg/dl)	Mean value TAG (mg/dl)
A (Control)	116.89±0.71	54.01±1.23	37.73±1.12	120.48±1.07
B (100mg/kg)	113.77±1.25	48.86±1.30	40.92±1.20	118.25±0.98
C (200mg/kg)	110.92 ±1.30	42.13±1.59	44.20±0.74	115.61±0.82
D (300mg/kg)	109.25±1.48	35.55±2.01	50.26±1.02	116.75±0.44

Values: Mean ±SD of 3 Determinations

Table 2: T – Test for cholesterol, LDL, HDL and TAG for Albino Wistar rats (p< 0.05)

	A VS B	A VS C	A VS D
Chol.	6.84	12.98	15.68
HDL	-0.55	-15.22	-22.27
LDL	8.86	18.71	24.89
TAG	4.97	11.46	19.57

Values: Mean ±SD of 3 Determinations

Graphical Illustration of Obtained Data

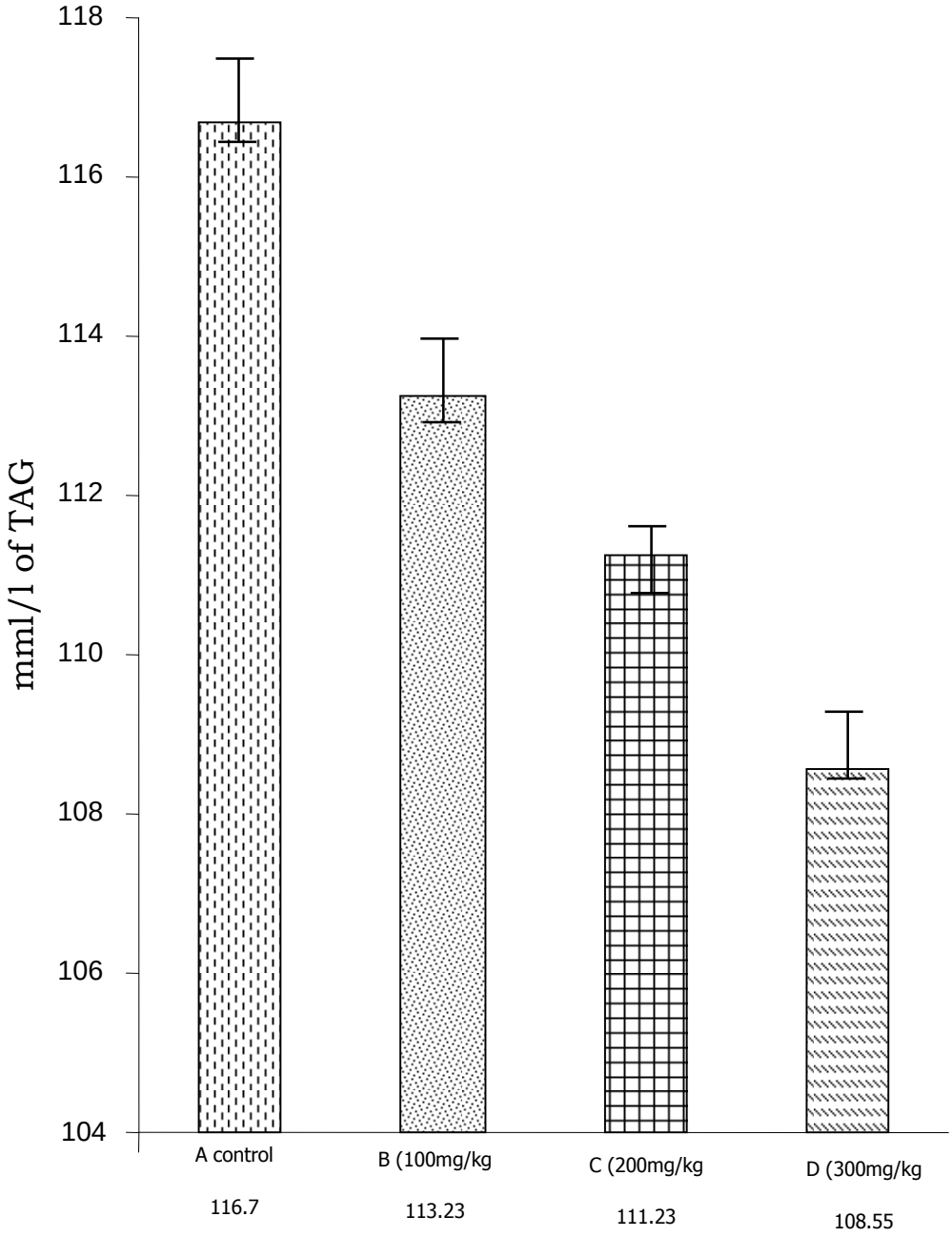

Fig. 1: Effect of extract of *Saccharum barberi* on the TAG of Albino wistar rat.

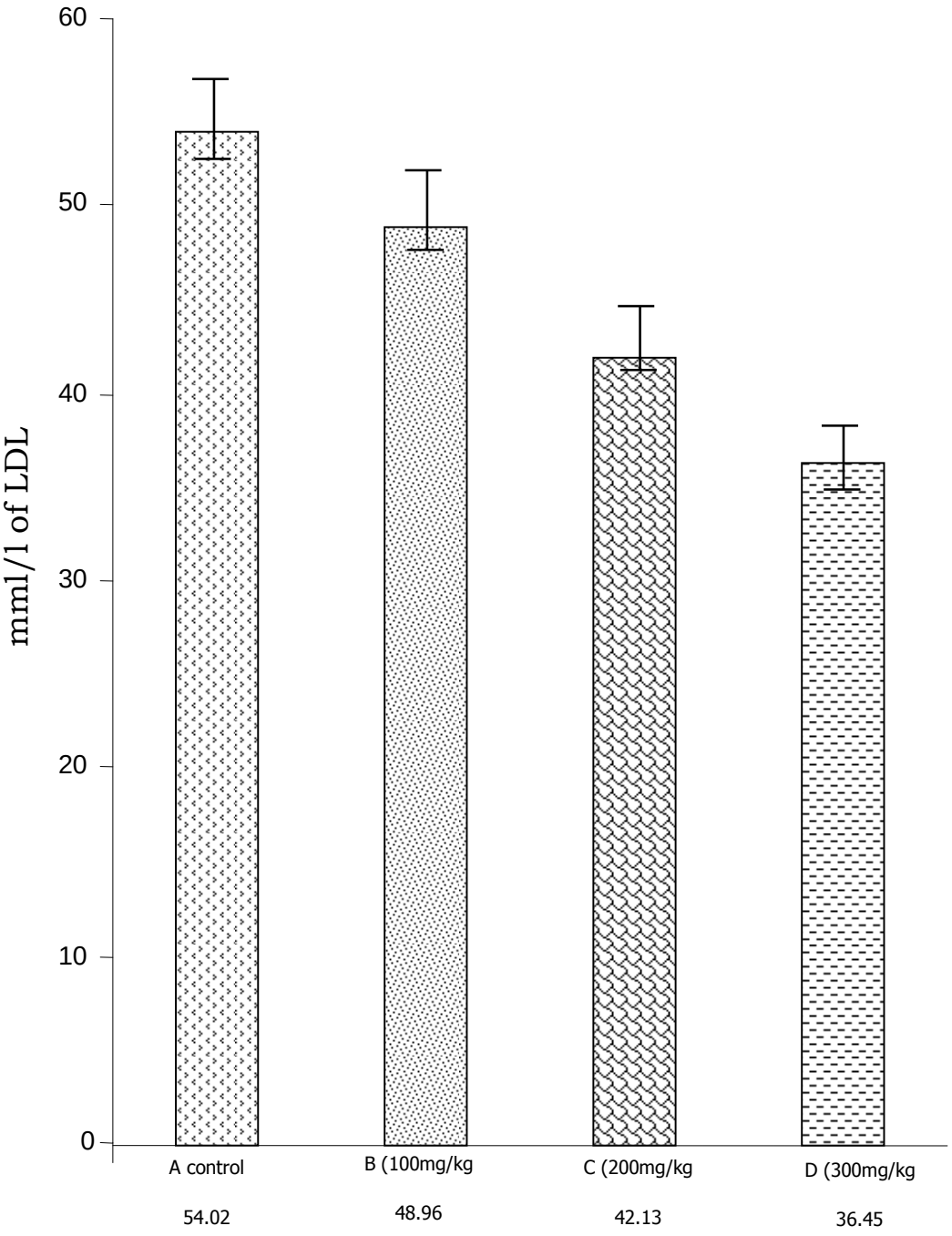

Fig. II: Effect of extract of *Saccharum barberi* on the LDL of Albino wistar rat.

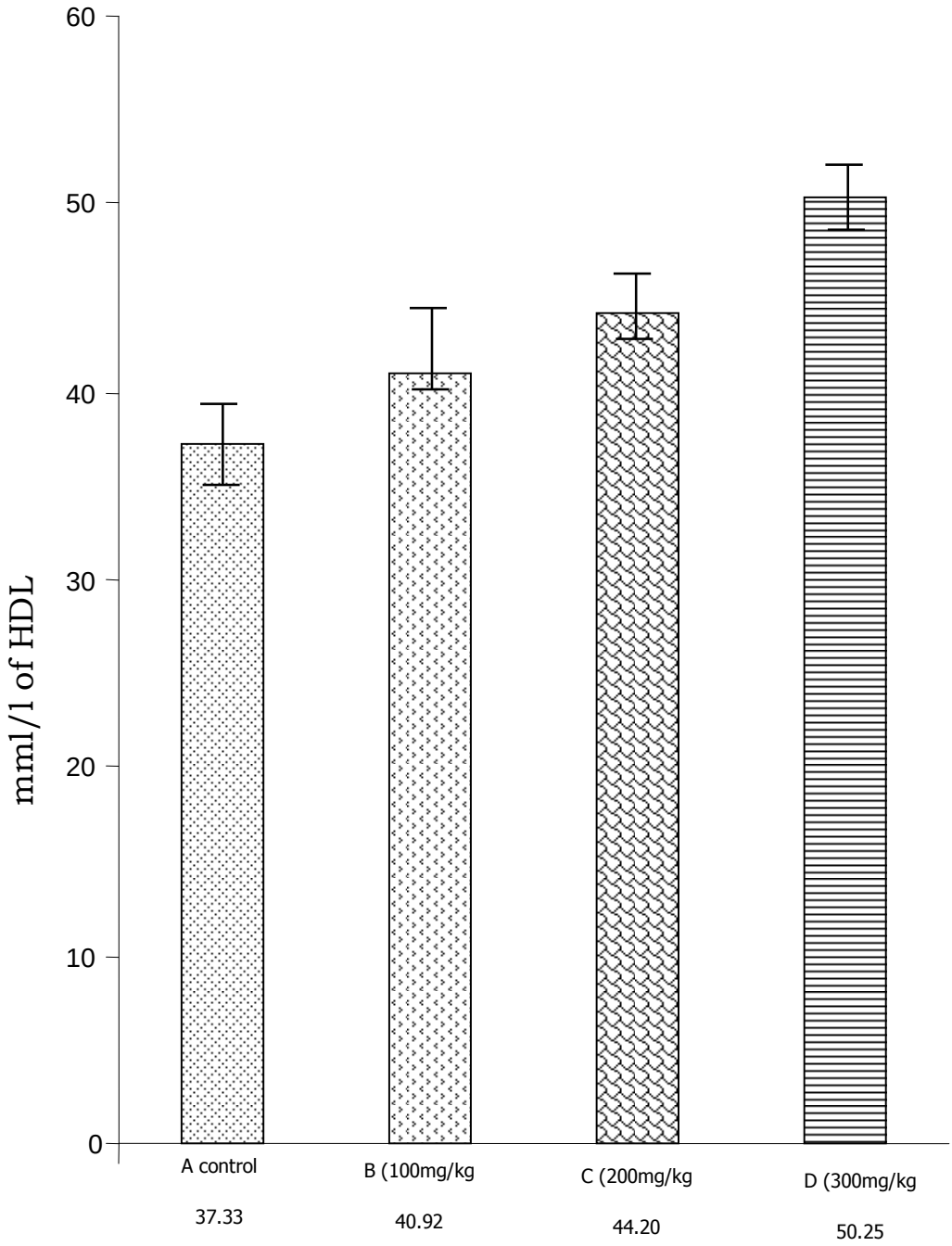

Fig. III: Effect of extract of *Saccharum barberi* on the HDL of Albino wistar rats.

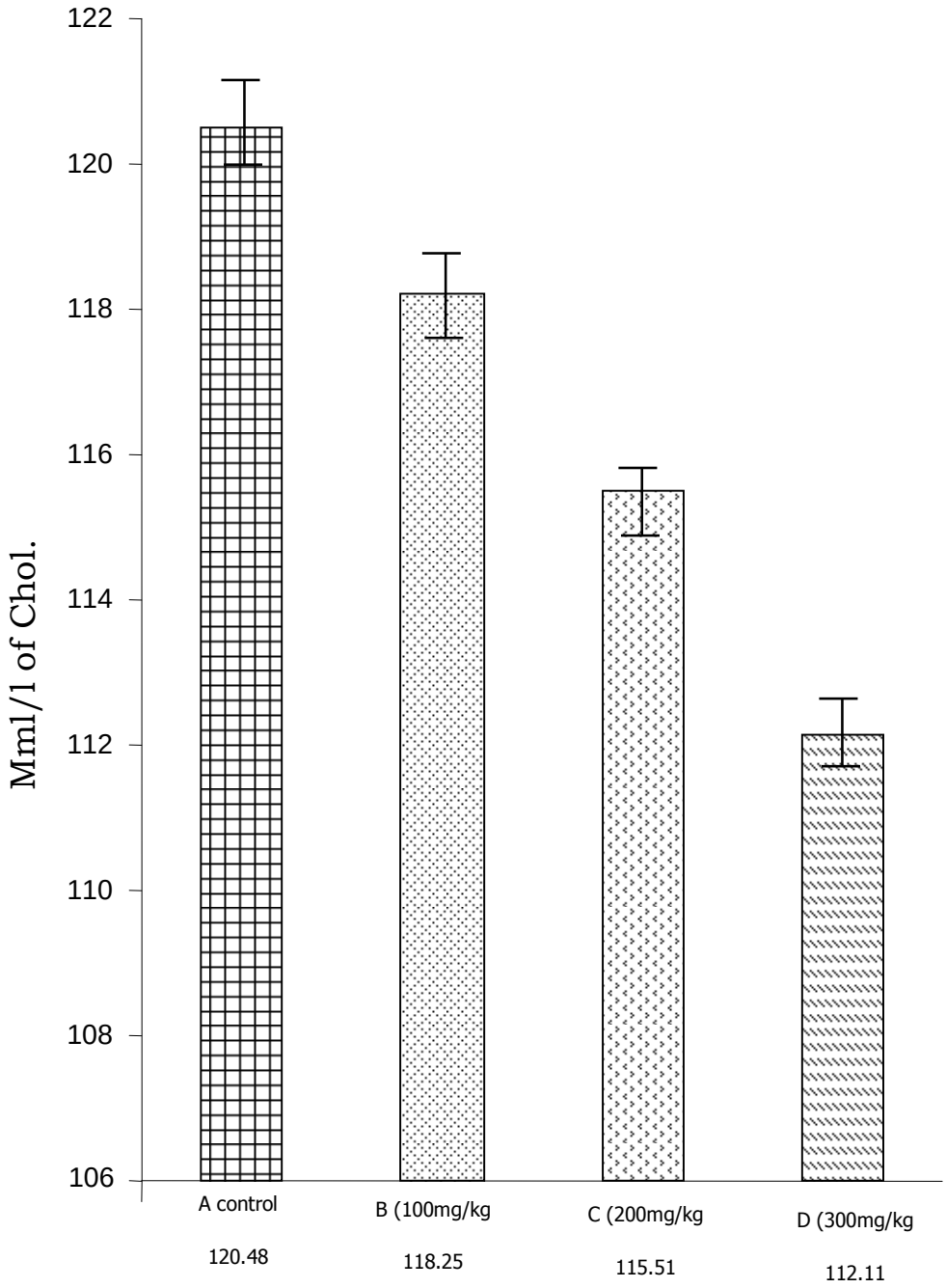

Fig. VI: Effect of extract of *Saccharum barberi* cholesterol level of Albino wistar rats.

DISCUSSION

The result of serum lipid profile showed a decrease in cholesterol, LDL and TAG value as the oral dose of the extract of *Saccharum barberi* increase while HDL result on the hand increase as the dose level of the extract increases at ($p<0.05$). An elevated serum triacylglycerol can result to liver diseases, coronary heart diseases, diabetes mellitus etc [7]. Since the extract result in the increase in concentration of HDL and a decrease in the concentration of TAG, LDL and cholesterol, then the extract could be used for the treatment of cardio vascular diseases. High concentration of cholesterol leads to formation of plaque in the arterial wall, which serves as a cardio vascular risks

factor [8]. [9] Reported that; HDL carries cholesterol from thermo within the arteries to the liver for excretion and this serves to protect the body cardiovascular well being.

Reduction of low density lipoprotein concentration by extract of garden egg and ginger plants decrease as the rises of DNA oxidative through damage by per oxidation while LDL oxidation lead to fat accumulation in the arteries, which cause atherosclerosis and other cardio vascular diseases [10]; [11]). The increase in HDL suggests that the crude extract can be used to treat heart failure due to coronary arteries, which is a leading cause of death in industrialized societies. There is a negative correlation between the HDL and LDL. Atherosclerosis is due to high level of cholesterol and LDL in the blood. The plant *Saccharum barberi* extract has the ability to lower the cholesterol and the LDL levels and increase in the HDL level. The HDL is responsible for the clearance of cholesterol from the blood which addition could inhibit the oxidation of HDL antioxidant.

CONCLUSION

The result of serum lipid profile showed a decrease in cholesterol, LDL and TAG value as the oral dose of the extract of *Saccharum barberi* increase while HDL result on the hand increase as the dose level of the extract increases. Since the extract result in the increase in concentration of HDL and a decrease in the concentration of TAG, LDL and cholesterol, then the extract could be used for the treatment of cardio vascular diseases.

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