Effect Of Saccharum Barberi Extract On Lipid Profile Level In Guinea Pigs

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Abstract: The interaction of Saccharum barberi extract on lipid profile level was investigated in male Guinea pigs strain. Forty Guinea pigs male 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 housed overnight and weighed. The animals were anesthetized in chloroform vapour and dissected and blood collected from the jugular vein using sterilized syringe and needle. The effect of the extract was more significant in the LDL than other parameters measured. The reduction in the CHOL, LDL and TAG and an increase in HDL is a good indicator that the extract could reduce the risk of atherosclerosis. The T – test for the lipid profile showed a decrease trend for cholesterol LDL and TAG as dose level increases but an increasing trend for HDL in Guinea pigs.

Key word: Saccharum barberi extract, Total Cholesterol, Low Density Lipoprotein, High Density Lipoprotein, Very Low Density Lipoprotein, Triacylglycerol

INTRODUCTION

Herbal medicine is the oldest form of health care known to man and its development is synonymous with the growth of civilization up to the modern era. Knowledge of herbal plants were transferred from one generation to another with new idea been added on daily basis (Lewis, S.M., B.J. Brain and D. Bates, (eds) 2001). Medicinal plants have been designated to be those plants, which produce and accumulate chemical constituents, which are of medicinal values therefore medicinal plants are plants that have been used, in the treatment of diseases and illness (Ekpe, E.D., et al., 1990). They form an important component of the environment and are useful for the health of individual and the communities at large. The primitive man in search of food undoubtedly experienced much poisoning. He learned by trial and error that eating certain mushrooms, berries, roots and fruits could produce various degree of gastrointestinal discomfort or death, whereas others could be ingested safely and hence this results to the advert of the used of herbs (Michael, M., 1994).

Herbalism is the traditional medicine practice based on the use of herbs (plants) or its parts. This is sometimes refers to as botanical medicine or phytotherapy. The twentieth century wicknessed the rapid use of herbs and hence the term medicinal plants took a new definition. They are crude drugs of vegetable origin selected and utilized primarily by lay person, for the treatment of disease state, often of chronic nature and maintenance of health (Acharya, L., et al., 2008).

The ancient Greeks and Romans made use of medicinal plants, and there were written records of medicinal plants, in achives. These were closely followed by herbal medicinal schools that sprang up in Arabia, China and Indian respectively. The 15th, 16th and 17th centuries wicknessed different publications on herbal medicine (Castleman, R. and D.A. Michael, 2001).

MATERIALS AND METHODS

Preparation Of Plant Extract:

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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:**

The forty Guinea Pigs strains of 10–12 weeks old and weighing between 200– 250g were purchased and transported from pre – clinical animal house of University of Nigeria, Nsukka to the animal house facility of Kogi State University, where the study took place. 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 Guinea pigs were fed with folder from selected grasses in the field on the campus of Kogi State University, Anyigba. Experimental animals were kept at ambient temperature of 26°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, cages with dimensions 2ft long by 1ft width and height were used for this experiment. Each cage contained ten Guinea pigs, thus representing one group each.

When 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/kg 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 Guinea pigs 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 Of Lipid Profile Indicees:**

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

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

\[
\text{Cholesterol Ester} + \text{H}_2\text{O} \xrightarrow{\text{esterase}} \text{cholesterol} + \text{fatty acids}
\]

\[
\text{H}_2\text{O}_2 + \text{Phenol} \xrightarrow{\text{peroxidase}} \text{Quino line} + \text{H}_2\text{O} + 4 \text{ amino-anti pyrine}
\]

**Determination High Density Liprotprotein (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 phosphotungtic 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 in vitro determination of Triacylglycerol according to (Jacobs, N.J. and P.J. Vandenmark, 1960) Method. In principle, hydrolysis of triacylglycerides and its products, led to the production of quinoneimine and the absorbance of which was taken and used in the determination of triacylglycerols.

\[
\begin{align*}
\text{TAG} + \text{H}_2\text{O} & \xrightarrow{\text{Lipase}} \text{Glycerol} + \text{fatty acids} \\
\text{Glycerol} + \text{ATP} & \xrightarrow{\text{Glycerol kinase}} \text{G}–3\text{–Phosphate} + \text{ADP} \\
\text{G}–3\text{–P} + \text{O}_2 & \xrightarrow{\text{Glycerol peroxidase}} \text{DHA} + \text{P} + \text{H}_2\text{O}_2 \\
\text{G}–3\text{–P} + \text{O}_2 & \xrightarrow{\text{POD}} \text{2H}_2\text{O}_2 + 4\text{–amino–phenazone} + \text{quinoneimine} \\
& \quad + \text{4–chlorophenol} + \text{Hcl} + 4\text{H}_2\text{O}
\end{align*}
\]

Determination Of Low Density Lipoprotein Cholesterol:

As the values of Total Cholesterol, Triacylglycerols and High Density Lipoprotein were determined using above methods, the value of Low Density Lipoprotein was calculated.

This was used to estimate the LDL cholesterol by differences in Total Cholesterol and the sum of HDL cholesterol and VLDL cholesterol respectively.

\[
\text{LDL} = \text{Total Chol} – \text{HDL} + \text{VLDL} \\
\text{VLDL} = \frac{\text{TG}}{5}
\]

Results:

<table>
<thead>
<tr>
<th>Group</th>
<th>Mean value Chol. (mg/dl)</th>
<th>Mean value LDL (mg/dl)</th>
<th>Mean value HDL (mg/dl)</th>
<th>Mean value TAG (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A (Control)</td>
<td>116.68±1.76</td>
<td>65.55±1.36</td>
<td>38.69±1.17</td>
<td>119.62±0.58</td>
</tr>
<tr>
<td>B (100mg/kg)</td>
<td>114.37±3.04</td>
<td>59.75±0.60</td>
<td>41.11±0.88</td>
<td>118.29±0.46</td>
</tr>
<tr>
<td>C (200mg/kg)</td>
<td>110.06±1.68</td>
<td>53.13±2.04</td>
<td>45.82±2.24</td>
<td>112.11±1.64</td>
</tr>
<tr>
<td>D (300mg/kg)</td>
<td>109.25±1.43</td>
<td>46.67±0.37</td>
<td>49.75±0.91</td>
<td>111.67±1.53</td>
</tr>
</tbody>
</table>

Table 2: T – Test for cholesterol, LDL, HDL and TAG for Guinea pigs (p< 0.05)

Graphical Illustration Of Data Obtained:

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 (Bucolo, G. and H. David, 2001). 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 cardiovascular diseases.

High concentration of cholesterol leads to formation of plaque in the arterial wall, which serves as a cardiovascular risks factor (Dennis, A.H., and S.K. Cheema, 2001). (Dharmisiri, J.R., et al., 2003) 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 (Steinberg, D. and A. Lewis, 1997; Anthony, M.S., et al., 1998). The increase in HDL suggest 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.

Fig. I: Effect of the extract of *Saccharum barberi* on the TAG of Guinea pigs.

Fig. II: Effect of Extract of *Saccharum barberi* on the LDL of Guinea pigs.
Fig. III: Effect of the extract of *Saccharum barberi* on the HDL of Guinea pigs.

Fig. IV: Effect of Extract of *Saccharum barberi* on the Cholesterol of Guinea pigs.
REFERENCES


