Anti-Lipidaemic Effect of Kola Pod Extract on Wistar Albino Rats Fed with High Fat Diet

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Abstract: The anti-lipidaemic profiles of kola pod extract on wistar albino rats were assayed. Twenty four (24) apparently healthy male albino wistar rats with mean weight of 1.50±0.60kg were used. The rats were divided into four different groups (I-IV) of six (6) rats each. Group I rats were fed with normal feed only (morning and evening for seven days). Group II rats were fed with 10mg/ml of high fat diet (morning and evening for seven days). Group III rats were fed orally with 10mg/ml of high fat diet for 7 days (morning and evening). They were later on administered orally with 5mg/kg of atorvastatin drug for the following three days (once each day). Group IV rats were also fed orally with 10mg/ml of high fat diet for seven days (morning and evening) and were administered orally with 5mg/kg of kola pod extract for the following three days (once daily). The results showed that group 2 rats fed with 10mg/ml of high fat diet recorded the highest and lowest levels of low density lipoprotein cholesterol and high density lipoprotein cholesterol respectively when compared to that of group 1 (fed with normal feed). Groups 3 and 4 rats treated with 5mg/kg of standard drug (atorvastatin) and 10mg/kg of kola pod extract significantly reduced (p<0.05) the LDL cholesterol molecule and consequently increased the HDL cholesterol molecule thereby showing the anti-lipidaemic properties of the water pod kola extract and that of the standard drug atorvastatin. Groups 3 and 4 rats also significantly reduced (p<0.05) the concentrations of total cholesterol and triacylglycerol compared to that of control group rats (group 1).

Key words: Kola Pod Extract • HDL • LDL • Triacylglycerol • Total Cholesterol And Lipitor

INTRODUCTION

Kola pod trees are native to Central and Western Africa, but are now found in the West Indies and Brazil, where they were introduced by African slaves. The species are used as stimulant and can be prepared in the same manner with other species Kolavera and Kola accuminata [1].

The kola tree grows to approximately 40ft (12m) in height and has white to yellow flowers with spot that range from red to purple. The leaves are 15-80cm and the tree bears fruit that is shaped like a star. Inside the fruit, about a dozen or square seeds can be found in white seed shell. The primary active substances in kola pod root are caffeine, catechins and the bromine [2-4]. They can be found in all parts of the plant but are found in their highest concentration in the seeds. Caffeine is a mild stimulant found in coffee, tea and food drinks etc. It stimulates the central nervous system and improves mental alertness, as well as reducing physical fatigue and appetite [5].

In developing countries, the occurrence of heart disease increases rapidly [3-6]. Medical studies have shown that 70% of adults from 50 years old suffer atherosclerosis [7-9]. A large number of synthetic hypolipidaemic drugs are available in market. Long term use of these drugs cause serious side effects and at the same time they are costly [10-12].
Lipid and lipoprotein abnormalities play major role in the development and progression of coronary artery disease. Low levels of high density lipoprotein (HDL) cholesterols have been identified as independent coronary risk factors [13-16]. High levels of blood cholesterol are responsible for circulatory system disorder [17,18]. Increased levels of low density lipoprotein (LDL) cholesterols are also responsible for cardiovascular disease [19,20]. The aim of this research was to determine the anti-lipidaemic properties of water pod extract of Kola on wistar albino rats.

**MATERIAL AND METHODS**

**Identification and Extraction of Plant Materials:** Fresh kola pods were obtained at Umueze-Awkunanaw in Nkanu-West Local Government Area of Enugu State, Nigeria on the month of February, 2012. The pods were identified and authenticated by a plant taxonomist: Prof. J.C Okafor of the Department of Applied Biology and Biotechnology, Enugu State University of Science and Technology, Agbani Enugu, State Nigeria. The kola pods were dried at room temperature for eighteen days. The dried pods were later ground into fine powder with the aid of a clean dry electric grinder (Moulinex, Optiblend 2000). 130g portion of the fine powder was soaked in 130ml of distilled water for twelve 12h, filtered and then extracted with double distilled water. The solvent was passed in a reservoir for recycling (hot-continuous percolation method). The process was allowed to continue until the desired extraction was then distilled off and evaporated to dryness at 40°C. A measured solid extract of 18.3g was placed in a sterile container.

**Experimental Animal Model:** Twenty four apparently healthy male albino wistar rats with mean weight of 1.50±0.60kg were obtained from the animal house of Veterinary Medicine Department, University of Nigeria, Nsukka, Enugu State, Nigeria. The rats were divided into four different groups of six rats each. They were housed separately and fed with water and growers mash (Guinea feed Nigeria). The experimental rats were acclimatized for 7 days. Group I rats were fed orally with only growers mash and water for seven days. Group II rats were fed orally with 10mg/ml of high fat diet twice a day (morning and evening) for seven days. Rats in group III were also fed orally with 10mg/ml of high fat diet for seven days (morning and evening ) and later were administered orally with 5mg/kg of Atorvastatin drug for the following three days (once each day) during which growers mash and water was used as their food. Rats in group IV were also fed orally with 10mg/ml of high fat diet for seven days (morning and evening) and later were administered orally with 5mg/kg of kola pod extract for the following three days once daily) during which growers mash and water was used as their food.

**Collection of Blood Samples:** The collection of blood samples from the rats in each group was done simply by dissection of the rats followed by cardiac puncture after a mild anesthesia with chloroform. About 5.9mls of blood sample was collected in an EDTA tube from each group using a medical syringe. Serum was separated from the blood after collection by centrifugation and then used for lipid analysis.

Blood samples were collected from group I rat and group II rats on the following day after the 7th day of oral feeding of the rats with normal feed (growers mash and water) and lipoprotein food [high fat diet] mixture respectively.

Blood samples were collected from group III and IV rats after the 3rd day of orally administering of a known drug (atorvastatin Lipitor ) and the extract (kola pod water extract) respectively.

**Lipid Profile Analysis:** Lipid profile of triacylglycerol, HDL, LDL and total cholesterol were determined using the methods of [21-24] respectively.

**RESULTS**

From Table 1, group 3 rats treated with 10mg/ml of high fat diet and 5mg/kg of atorvastatin significantly (p<0.05) decreased in cholesterol concentration when compared with group 1 rats fed with only normal feed. Group 4 rats treated with 10mg/ml of high fat diet and 5mg/kg of kola pod extract significantly (p<0.05) increased in HDL-cholesterol when compared with that of group 1 rats fed with normal feed only. Groups 3 and 4 rats treated with (10mg/ml of high fat diet + 5mg/kg of atorvastatin ) and (10mg/ml of high fat diet+5mg/kg of kola pod extract) significantly decreased in LDL cholesterol concentration when compared with that of groups 1 and 2 fed with normal feed and high fat diet.
Table 1: lipid profile analysis

<table>
<thead>
<tr>
<th>Groups</th>
<th>Cholesterols (mg/dl)</th>
<th>HDL-cholesterols (mg/dl)</th>
<th>LDL-cholesterols (mg/dl)</th>
<th>Triacylglycerol (mg/dl)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group 1 (Normal Feed)</td>
<td>142.00±121</td>
<td>28.00±1.11</td>
<td>4.60±0.14</td>
<td>94.00±1.21</td>
</tr>
<tr>
<td>Group 2 (10mg/ml of high fat diet)</td>
<td>147.00±1.31</td>
<td>18.00±1.21</td>
<td>5.90±0.03</td>
<td>106.00±1.41</td>
</tr>
<tr>
<td>Group 3 (10mg/ml of high fat diet + 5mg/kg of Atorvastatin)</td>
<td>105.00±0.00</td>
<td>30.00±1.41</td>
<td>1.70±0.14</td>
<td>40.00±1.41</td>
</tr>
<tr>
<td>Group 4 (10mg/ml of high fat diet+5mg/kg of kola pod extract)</td>
<td>130.00±1.41</td>
<td>33.00±1.21</td>
<td>1.30±0.00</td>
<td>55.00±0.00</td>
</tr>
</tbody>
</table>

Results as Mean±Standard Deviation; p<0.05 as significant; p>0.05 as non-significant and n=6.

DISCUSSION

A medicinal plant is any plant that contains substance that can be used for therapeutic purposes or which is a precursor for synthesis of useful drug [25-27]. Many medicinal plants have been shown to possess anti-lipidemic property and recent researches have proved their efficacy in cardiovascular diseases [28-30].

From table 1 above, group 3 rats treated with 10mg/ml of high fat diet and 5mg/kg of atorvastatin significantly (p<0.05) decreased in cholesterol concentration when compared with group 1 rats fed with only normal feed. Group 4 rats treated with 10mg/ml of high fat diet and 5mg/kg of kola pod extract significantly (p<0.05) increased in HDL-cholesterol when compared with that of group 1 rats fed with normal feed only. Groups 3 and 4 rats treated with (10mg/ml of high fat diet + 5mg/kg of atorvastatin) and (10mg/ml of high fat diet+5mg/kg of kola pod extract) significantly decreased in LDL cholesterol concentration when compared with that of groups 1 and 2 fed with normal feed and high fat diet.

CONCLUSION

From the results of this research, Kola pod extract reduced the concentration of LDL-cholesterol and subsequently increased the concentration of HDL-cholesterol showing its anti-lipidemic properties.

REFERENCES


