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Effects of Oral Administration of a Decoction on Lipid Profiles of Female Dutch-White Rabbits

Adebayo Esther Modupe

Chemistry Unit, National Open University of Nigeria
Victoria Island, Lagos, Nigeria
mabdul@noun.edu.ng

Abstract: *This study investigated the effects of oral administration of a decoction of twenty medicinal plants used by South-Western local healers with a view to establish the effects of various doses on lipid profiles using animal models. Three different concentrations of the extract were prepared according to the body weights of rabbits: 20 mg/kg/ml (low dose), 40 mg/kg/ml (medium dose) and 80 mg/kg/ml (high dose). Twenty female Dutch-white rabbits were divided into four groups of five rabbits each on the basis of uniform average weight. Groups 1, 2 and 3 were dispensed with low dose, medium dose and high dose of the extract respectively while group 4 was served none being the untreated control. After twenty one days of administration of extract, the animals were fasted overnight, anaesthetized with diethyl ether and blood sample collected by cardiac puncture into heparin bottle. The blood samples obtained were used for the biochemical analyses of Triglyceride, Total cholesterol, high density lipoprotein cholesterol (HDLc) and low density lipoprotein cholesterol (LDLc). The assay was carried out by colorimetric standard methods. The result of the study showed that there was a significant increase in triglyceride concentration in medium and high dose groups while there was a decrease in low dose group compared to control. It revealed that there was an increase in total cholesterol concentration in low and medium dose groups while there was a decrease in high dose group compared to control. The HDLc level was reduced in all the groups compared to control. There was a significant decrease in LDLc level in low dose group and a significant increase in medium and high dose groups relative to control. The result showed the effect of the decoction to be dose-dependent and its intake could increase the level of blood cholesterol.*

Keywords: *Decoction, Triglyceride, Total cholesterol, high density lipoprotein cholesterol and low density lipoprotein cholesterol.*

1. INTRODUCTION

Traditional medicine is very much relied on, especially in the developing countries where the cost of orthodox medicine is astronomical and unaffordable to a large size of the populace [1]. A medicinal plant is any plant which contains substances that can be used for therapeutic purposes in one or more of its organs. Information on the use of medicinal plants has been obtained from herbalists, herb sellers and indigenous people of Africa over many years [2]. However, the herbal portions prescribed by local healers are usually not standardized, documented, specified and dosage are not precise. Although the World Health Organization supports the appropriate use of herbal medicine and encourages the use of safe and effective remedies, it has also stated that most herbal medicines need to be studied scientifically [3]. Hence, this study investigated the safety of a decoction which is used in Western part of Nigeria in the treatment of various ailments. The active substances in medicinal plants are not evenly contained in all parts of a plant. Sometimes, they are contained mainly in flowers, leaves, roots, seeds, fruits or in the bark. One of the ways the active substances can be extracted for use is by decoction, in which the herb is put in cold water and heated to boiling point. Several different components in medicinal plants may act together (synergistically) to produce the desired effect. Coronary heart disease resulting from progressive atherosclerosis remains the most common cause of morbidity and mortality all over the world [4]. It is well established that increased levels of blood cholesterol especially LDLc is an important risk factor for cardiovascular complications since it favors lipid deposition in tissues including blood vessels. Evidences from lipid lowering trials have clearly established that reduction of total cholesterol or LDLc is associated with decreased risk of atherosclerosis and coronary heart disease [5] and [6]. [7], through epidemiological studies has also shown an inverse correlation between HDLc level and the risk of cardiovascular disease.

2. MATERIALS AND METHODS

2.1. Preparation of Plant Materials

The twenty plant materials chosen for this study include: (*Alstonia congensis, Tetrapleura tetraptera, Aristolochia repens, Citrullus colocynthis, Lonchocarpus cyanescens, Treculia africana, Anthocleista djalonensis, Uvaria afzelli, Plumbago zeylanica, Croton lobatus, Khaya ivorensis, Mondia whitei, Nauclea latifolia, Rauvolfia vomitoria, Securidaca longepeduculata, Urena lobata, Uvaria chamae, Olax subcorpioidea, Adenopus breviflorus, Petiveria alliacea.*

The information about their local names, part(s) of plants used, therapeutic effects, methods of preparation and administration, as well as duration of treatment were obtained from South Western local healers.The plant materials were purchased from Oyingbo market in Lagos state. The plant materials were washed and boiled in 14 litres of distilled water for 2 hours. The decoction was allowed to cool, decanted and kept in air-tight container. 10 ml of the decoction was concentrated and the stock concentration of the extract was used to prepare different doses of the decoction in low dose (20 mg/kg/ml), medium dose (40 mg/kg/ml) and high dose (80 mg/kg/ml). To prepare the low dose, 2.6 g of the concentrated extract was dissolved in water and made up to 100 ml. The medium dose was prepared by dissolving 4.8 g of the concentrated extract in water and made up to 100 ml. The high dose was prepared by dissolving 11.2 g of the concentrated extract in water and made up to 100 ml.

2.2. Phytochemical Screening

Phytochemical screenings for alkaloids, tannins, saponins, flavonoids, cardiac glycosides, phylobatannin and anthraquinone were carried out on the concentrated extract, according to the methods of Trease and Evans [8] and Wall *et. al.* [9].

2.3. Administration of Extracts

Twenty mature female Dutch-white rabbits weighing 1.2-1.4 kg were divided into four groups of five rabbits each. Groups 1-3 received 1 ml of the appropriate dosage of the extract every morning before meal for 21 consecutive days while group 4 served as the control which received no dosage of the extract. Administration of extract was done orally by means of a catheter.

2.4. Collection of Blood Samples

After administration of extract, prior to sacrifice, the animals were fasted overnight, anaesthetized with diethyl ether and blood sample collected by cardiac puncture into heparin bottle. The blood samples obtained were used for the biochemical analyses of Triglyceride, Total cholesterol, HDLc and LDLc. The assay was carried out by Colorimetric standard methods [10].

2.5. Statistical Analysis

The tests in this research work were carried out in triplicate and subjected to statistical analysis. The student's t-test was used in analyzing the data collected and p-values of < 0.05 were considered statistically significant.

3. RESULTS AND DISCUSSION

Phytochemical screening of the plant extract revealed the presence of alkaloids, cardiac glycosides and anthraquinones (Table 1).

Table1. *phytochemical screening of the decoction of twenty medicinal plants.*

Phytochemical	Inference
Alkaloids	+
Tannins	-
Flavonoids	-
Cardiac glycosides	+
Anthraquinones	+
Saponins	-
Phylobatannins	-

+ shows the presence of phytochemical *- shows the absence of phytochemical*

Table2. *Effects of oral administration of varied doses of decoction on lipid concentration in female rabbits.*

GROUPS	Triglyceride (mmol/l)	Total Cholesterol (mmol/l)	HDLc (mmol/l)	LDLc (mmol/l)
Low Dose	8.80 ± 0.20	3.21 ± 0.20	130.00 ± 10.00	5.60 ± 0.40*
Medium Dose	11.47 ± 0.03*	3.32 ± 0.17*	141.22 ± 4.59	8.13 ± 0.55*
High Dose	12.50 ± 0.04*	2.77 ± 0.15	140.82 ± 11.90	9.40 ± 0.36*
Control	9.24 ± 0.25	2.80 ± 0.17	151.07 ±1.13	6.73 ± 0.29

**P<0.05 relative to control*

There was a significant increase in triglyceride concentration in medium and high dose groups relative to control while the concentration decreased in low dose group relative to control (Table 2). There was a significant increase in Total cholesterol concentration in medium dose group relative to control. Although there was an increase in the low dose group, this was not statistically significant (Table 2). The result also showed a decrease in HDLc level in all the groups relative to control. There was a significant increase in LDLc concentration in medium and high dose groups relative to control (Table 2). There are five kinds of lipoproteins, which include: chylomicrons, very low density lipoproteins, intermediate-density lipoproteins, low density lipoproteins and high density lipoproteins [11]. Cholesterol is an important constituent of cell membrane and it is the precursor of steroid hormones and bile acids. High cholesterol level in the blood is the major cause of cardiovascular disorders such as atherosclerosis, myocardial infarction and coronary heart diseases [12]. It is well documented that elevated Total cholesterol and LDLc levels promote atherosclerosis and cardiovascular complications [13]. Except for the HDL cholesterol, high level of all lipids in the blood is arguably a high risk factor in the onset of cardiovascular disorders. High serum concentrations of triglycerides and LDLc have been reported to cause atherosclerosis and coronary heart diseases [14].

In this study, elevated levels of Total cholesterol, Triglyceride and LDLc may predispose to atherosclerosis. Deficiency in lipoprotein lipase activity is a disorder characterized by marked hyperchylomicronemia and a corresponding hypertriglyceridemia [15]. Hence, the increased triglyceride level may indicate the potential of the decoction to disrupt lipoprotein lipase activity. The risk of developing atherosclerosis is directly related to plasma LDLc and inversely related to HDLc levels [16]. Therefore, the decrease in the HDLc level at all doses reveals that the decoction may be unsuitable for those who are at a high risk of coronary heart diseases such as atherosclerosis. The lipid profile also showed that an intake of the decoction would encourage the development of atherosclerosis as shown by their LDLc elevating effects.

Phytochemicals like tannins, saponins and flavonoids are constituents of plant extracts that have lipid lowering effects [17, 18]. The absence of these phytochemicals may be responsible for the cholesterol elevating effects of this decoction. The joint use of multiple medicinal plants could be due to synergistic or additive effects of constituents [19]. Therefore, the cholesterol elevating effects of this decoction may be due to the synergistic effects of the twenty medicinal plants used in this study. No previous scientific study has been carried out on this decoction. Thus, this study presents a preliminary report on the effect of this decoction used by south Western Nigeria, on lipid profiles.

4. CONCLUSION

The effect of this decoction was found to be dose-dependent and its intake could increase the level of blood cholesterol. Therefore, it could expose users to the risks of cardiovascular diseases.

REFERENCES

[1] K. Busia, "Medical provision in Africa—past and present," Phytotherapy Research, vol. 19, no. 11, pp. 919–923, 2005.

[2] Sofowora A. Plants in African traditional medicine-an overview. In: Evans WC (ed) Trease and Evans pharmacognosy, 15th edn. W.B. Saunders, Edinburgh,2002 pp. 488-496.

[3] Ukueze N.O. and Abariku P.O. Antimicrobial Activity of Certain medicinal plants used in traditional medicine in Nigeria-A preliminary study. J. Microbiol 6: 32-40 (1998).

[4] Yusuf S., Reddy S., Ounpuu S. and Anand S. Global burden of cardiovascular disease. Part I: General consideration, the epidemiologic transition, risk factor and impact of urbanization. Circulation 104, 2746-2753 (2001)

[5] Brown A.S., Bakker-Arkema R.G. and Yellen L.: Treating patients with documented atherosclerosis to National Cholesterol Education Program - recommended low density lipoprotein cholesterol goals with atorvastatin, fluvastatin, lovastatin and simvastatin. J. Mol. Cell.Cardiol.32, 665-692 (1998).

[6] Grundy S. M., Cleeman J. I. and Merz C. N. Implications of recent clinical trials for the National Cholesterol Education Program Adult Panel on Detection, Evaluation and Treatment of high blood cholesterol in adults. JAMA 285, 2486-2497(2004).

[7] Wierzbicki A. S. Have we forgotten the pivotal role of the high density lipoprotein cholesterol in atherosclerosis prevention? Curr.Med. Res. Opin.21, 299-306 (2005).

[8] Trease G.E. and Evans W.C.: A textbook of pharmacognosy 15thedition, W.B Saunders. 2002 Pg 232.

[9] Wall M.E., Eddy C.R., Mc Clenns M.L. and Klump E., Detection and Estimation of steroid sapogenins in plant tissues. Anal. Chem., 24:1337 (1952).

[10] Tietz N.W., Clinical Guide to Laboratory Tests, Second Edition W.B. Saunders Company, Philadelphia, USA, 1990 pp 554-556.

[11] Rang, H.P., Dale M.M., Ritter J.M. and Gardner P., Pharmacology. New York, Church-Livingstone (1995).

[12] Nduka, N.,Clinical Biochemistry for Students of Pathology. Animo Press, pp: 157-168 (1999).

[13] Dominiczak M.H., Hyperlipidemia and cardiovascular disease. Current.Opin.Lipidol.9, 609-611 (1998).

[14] Eisenhauer L.A., Nicholes L.W., Spencer R.T., and Bergan F.W., Clinical Pharmacology and Nursing Managenent, Lippincott, Philadelphia, Pa, USA, 1998.

[15] Brunzell J D,"Familial lipoprotein lipase deficiency and other causes of the chylomicronemia syndrome", in The metabolic and molecular bases of inherited disease, Vol.Vol II. Scriver C R, Beaudet A L, Sly W S, Valle D, editors. McGraw Hill, Inc, New York (1995): pp. 1,913–1,932

[16] Glew R.H., Lipid metabolism II: pathways of metabolism of special lipids. In: Devlin TM (ed) Textbook of biochemistry with clinical correlations, 6th edn. Wiley Liss, New Jersey, 2006, pp. 695-741

[17] Ram A., Laura P., Gupta R., Kumar P., Sharma V.N., Hypocholesterolaemic effects of Terminalia arguna tree bark. J. Ethanopharmacol., 55(3): 165-169 (1997).

[18] Adeneye, A.A, Adeneke, T.I, Adeneye, A.K. Hypoglycemic and hypolipidemic effects of the aqueous leaves extracts of Clerodendrumcapitatum in wistar rats. J. Ethanopharmacol., 116(1): 7-10. Farnsworth W.R., Biodiversity, National Academy Press, Washington, DC, USA, 1988. (2008).

[19] Igoli, J.O., Ogaji, O.G., Tor-Anyiin, T.A., Igoli, N.P., Traditional medicine practice amongst the Igede people of Nigeria. Part II. Afr. J. Trad.CAM. 2(2): 134-152 (2005).

AUTHOR'S BIOGRAPHY

Adebayo E. Modupe is an Assistant Lecturer in Chemistry unit of National Open University of Nigeria, Victoria Island, Lagos.