ABSTRACT

Background: This study was carried out to investigate the effects of *Datura metel* (leaf, seed and fruit) on blood lipid profile of male albino rats.

Methods: Thirty-five albino rats (8 weeks old) weighing between 66g and 84g were purchased and randomly allotted into 7 groups. The normal control (group 1) received normal saline, while groups 2 to 7 received extracts of *Datura metel* at low (300 mg/kg body weight) and high doses (600 mg/kg body weight). The extracts were administered orally for seven consecutive days, while the animals were sacrificed on the 8th day; blood samples were collected, allowed to stand for fifteen minutes and then centrifuged.

Results: There was a general decreasing trend in the mean values of low density lipoprotein levels across the groups, however, group 7 (with lowest value) was found to be significantly lower (p <0.05) than other groups when compared with the normal control. Also, there was a general decreasing trend in the values of high density lipoprotein compared with normal control group, however lowest value was recorded to be 1.35±0.0 6 mmol/l for group 5. There were no significant differences (p >0.05) in triglyceride levels across the groups, while total cholesterol in groups 5 and 6 had significant differences with values of 2.05±0.06 mmol/l and 2.13±0.10 mmol/l respectively when compared with the normal control.

Conclusions: This study suggests that ethanolic extracts of *Datura metel* have active ingredients that are capable of improving blood lipid profile and this might be useful in the management of cardiovascular diseases.

Keywords: Albino rats, Blood, *Datura metel*, Ethanolic extract, Lipid profile, Body weight

INTRODUCTION

*Datura metel* which belongs to the family Solanaceae and commonly known as Thorn-apple and Devil’s trumpet, is a Nigerian medicinal plant widely used in phyto-medicine to cure diseases such as asthma, cough, convulsion and insanity. The leaves and seeds are widely used in herbal medicine as anaesthetic, antispasmodic, bronchodilator and as hallucinogenic. Various species of *Datura* are known and widely employed for their medicinal and toxic properties that are based upon more than 30 alkaloids. In China, it is known as “Yangjinhuai” and used for the treatment of asthma, convulsions, pain, and rheumatism. It is used in Italy to remove lice from hen bundles. *Datura stramonium* seeds are used for the treatment of acne and bronchitis in Sakarya province of north-west Turkey and locally called “Tatala”, while the petroleum ether extract is reported to possess antimicrobial activities against *Escherichia coli* and *Trachystemon orientalis*. It is also used commonly in ethno veterinary practices in Nepal, and by Gujjar community in India. *Datura* seeds have been used as a prophylactic measure to treat animal bites, especially dog bites. A person bitten by mad dog is administered a juice
of *Datura* along with butter milk and jaggery. Also, the site of bite is smeared with a paste of the fruit.  

*Datura metel*, is an erect shrub with spreading branches. A perennial herbaceous plant, and can reach a height of 2.0 m. Its leaves are simple, alternate, dark green, broadly ovate, shallowly lobed and glabrous. Flowers are large, solitary and trumpet-shaped with a sweet fragrance usually appreciated in the mornings and evenings, with a wide range of colours (ranging from white to yellow and light to dark purple). The flowers are hermaphrodite and are pollinated by insects. The fruit is in the form of a capsule with short spines.

*Datura* can tolerate average soil, though prefers soil which is rich and moist or very alkaline soil, but hardly survives under shade. *Datura* probably is of American origin and widely cultivated in all tropical and subtropical regions for its beautiful flowers.  

*Datura metel* can also be found in East Asia or India, and is used in traditional herbal medicine. In Traditional Chinese Medicine, the flowers of *Datura metel* are known as baimantuoluo and used for skin inflammation and Psoriasis. In Ayurvedic medicine, seeds of *Datura metel* are used to treat skin rashes, ulcers, bronchitis, jaundice and diabetes.  

In Brazil, the seeds are used for tea making which serve as a sedative, while the flowers are dried and smoked as cigarettes. There are various species of *Datura* which are now cultivated for the production of secondary metabolites.

Excessive doses of *Datura metel* can cause hallucinations, intoxication and death. The window of toxic and medicinal effects may be quite small. With medium doses, recovery can occur in 12 - 24 hours, however, with loss of memory and confusion that may last for days, no other psychoactive substance has received as many severely negative experience reports as *Datura*. Children are especially vulnerable to atrope poisoning, and its prognosis is likely to be fatal. *Datura metel* is bitter tasting and is considered as an anaesthetic, anti-asthmatic, antispasmodic, hallucinogenic and hypnotic agent. Its dried seeds are considered a more powerful soporific than the leaves.

In view of extensive traditional utilization of *Datura metel* and considering the fact that limited information is available on the lipid profile effects of *Datura metel*, this study was carried out to investigate the effects of administering ethanolic extracts of leaf, seed and fruit of this plant on blood lipid profile in male albino rats.

**METHODS**

**Experimental animals**

Thirty-five male albino rats (8 weeks old) were used for the laboratory experiment. They were housed in properly sanitized cages under natural light and dark cycles at room temperature in the animal house of the Department of Biochemistry, Federal University Wukari, Taraba State. The animals were purchased from National Veterinary Research Institute (NVRI), Vom, Jos, Plateau State. They were fed for one week on rat grower mash in order to acclimatise them environmentally and on feed intended for experimentation. During the experiment, they had access to feed and water ad libitum.

**Plant collection**

The plant materials were harvested for four days from a dump site at Wapan-Nghaku (popularly known as T-junction), Wukari local government area of Taraba State. The harvesting took place in the morning between 9.00 and 11.30 a.m. for the period between 1st and 4th March, 2016. The leaves, seeds and whole fruit were collected and sun-dried till they are properly dried and then ground into powder.

**Extract preparation**

Seventy per cent (70%) ethanol solution was prepared and it was used to soak the three ground samples separately. Three hundred (300) ml of 70% ethanol solution was used to soak 114 g of leaf sample, 100 ml of the solution was used to soak 38 g of seed, while 110 ml was used to soak 48 g of fruit. The mixtures were then filtered after 48 hours and the filtrates were collected separately. The filtrates were concentrated using a water bath set at 78°C in order to evaporate the ethanol. The concentrated extract was diluted with normal saline at the rate of 100 mg per ml.

**Experimental design**

The animals were grouped into seven (7) and received the extracts as follows:

- **Group 1** - The normal control (they were administered normal saline only).
- **Group 2** - Received 300 mg/kg body weight of leaf extract.
- **Group 3** - Received 600 mg/kg body weight of leaf extract.
- **Group 4** - Received 300 mg/kg body weight of seed extract.
- **Group 5** - Received 600 mg/kg body weight of seed extract.
- **Group 6** - Received 300 mg/kg body weight of fruit extract.
- **Group 7** - Received 600 mg/kg body weight of fruit extract.

The extract was administered to the animals orally for seven (7) consecutive days.

**Blood collection**

The animals were starved for 12hrs before sacrifice. On the 8th day, they were anaesthetised, sacrificed and the blood samples collected via cardiac puncture. It was allowed to stand for about 15 minutes and further spun in
a centrifuge. Serum was separated and used for the biochemical analysis.

**Biochemical analysis**

The concentrations of the lipid profile parameters (total cholesterol, HDL, LDL, TG and VLDL) were determined using an auto-analyser: Selectra ProM.

**Statistical analysis**

Statistical analysis was carried out with the use of standard student-t-distribution test: using Statistical package for social sciences (SPSS) version 21 and group means were compared for significance at (p ≤0.05). Data were presented as mean±standard deviation (n=5).

| Groups | HDL (mmol/l) | LDL (mmol/l) | VLDL (mmol/l) | Total Cholesterol (mmol/l) | Triglycerides (mmol/l) |
|--------|--------------|--------------|---------------|---------------------------|-----------------------|
| Group 1 | 1.78±0.17a   | 0.38±0.10a   | 0.20±0.14a    | 2.40±0.08a                | 0.75±0.08a            |
| Group 2 | 1.53±0.13a   | 0.34±0.16a   | 0.35±0.06a    | 2.40±0.18a                | 0.83±0.10a            |
| Group 3 | 1.65±0.06a   | 0.25±0.13a   | 0.33±0.05a    | 2.18±0.10a                | 0.70±0.08a            |
| Group 4 | 1.55±0.13a   | 0.33±0.10a   | 0.35±0.06a    | 2.23±0.17a                | 0.75±0.13a            |
| Group 5 | 1.35±0.06b   | 0.30±0.08b   | 0.40±0.08b    | 2.05±0.06b                | 0.80±0.16b            |
| Group 6 | 1.45±0.13c   | 0.33±0.15c   | 0.38±0.05c    | 2.13±0.10c                | 0.83±0.10c            |
| Group 7 | 1.53±0.10c   | 0.20±0.00c   | 0.28±0.05c    | 2.16±0.31c                | 0.73±0.10c            |

Results represent mean±standard deviation of group results obtained (n=5). Mean in the same column, having different letters of the alphabet are statistically significant (p <0.05) compared with the normal control (group one). HDL = High density lipoprotein, LDL = Low density lipoprotein, VLDL = Very low density lipoprotein.

**DISCUSSION**

The global world today is challenged with cardiovascular diseases. Some of the key manifestations include coronary heart diseases, stroke and hypertension. Elevated concentrations of plasma lipids are risk factors in cardiovascular problems and important lipids whose elevations are implicated in these conditions are cholesterol and triglycerides. Lipids are transported in the blood by combination of lipids and proteins complexes called lipoproteins. The main identified determinants of hyperlipidaemia are increased LDL-cholesterol and reduced HDL-cholesterol. Thus, any attempt to lower serum concentrations of LDL and increase HDL concentration is considered as one of the strategies that can hinder or delay the onset of chronic disorders that are associated with hyperlipidaemia in humans. In this study, the effects of administering *Datura metel* on seven groups of albino rats were investigated. It was revealed that the levels of Total plasma cholesterol and LDL-cholesterol decreased across the groups (except group 2) compared to the normal control (group 1). This observation is an indication that there is reduction of cholesterol transported by LDL-cholesterol from extracellular fluids to the blood vessels, hence this would reduce accumulation of plasma cholesterol in the blood vessels in a process that would lead to retrogression of atherosclerosis. This observation is similar to the researches on lipoprotein and lipid studies which emphasised a positive relationship between the plasma total cholesterol, LDL-cholesterol, VLDL-cholesterol and triglycerides on one hand and the risk of cardiovascular disease on the other. There was general decrease in the levels of HDL-cholesterol across the groups compared to the control (group 1), this might be due to the effects of administration of *Datura metel* on the reduction of synthesis of HDL in albino rats. Although increasing concentration of HDL particles are strongly associated with decreasing accumulation of atherosclerosis within the walls of arteries. This is important because atherosclerosis eventually results in sudden plaque ruptures, cardiovascular disease, stroke and other vascular diseases. However, the HDL decrease which was observed in this study across the treatments could be seen to have slight semblance with the study which showed that HDL-lacking mice still have the ability to transport cholesterol to bile, suggesting that there are alternative mechanisms for cholesterol removal from the blood.
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