

Effects of the Ethanolic Extract of aerials of *Leptadenia pyrotechnica* (Forsk) Decne on the Liver function of Wister strain Albino Rats

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ABSTRACT:

The study was carried out to evaluate the subacute toxicity of the ethanolic extract of *Leptadenia pyrotechnica* (Forsk) Decne on the liver of wister strain albino rats. 20 rats were used and were divided into four groups of five rats each. First group received 50mg/kg body weight of the rats, second group received 100mg/kg body weight of the rats, third group received 150mg/kg body weight of the rats and the last group served as the control. The extract was administered for 21 days after which the serum of all rats was assayed for ALT, AST, ALP, Total protein and Albumin. The results of the liver function tests showed that the extract is mildly toxic to the liver of the rats.

Key words: *Leptadenia pyrotechnica*, liver function tests, subacute toxicity

1.0 INTRODUCTION: Today's health care systems rely largely on plant materials. Much of the world's population depend on traditional medicine to meet daily requirements especially in developing countries. The use of plant-based remedies is also widespread in many developed countries and pharmaceuticals are based or devised from plants or plant products (Gbile, 1986).

Medicinal plants have always been considered a healthy source of life. These are plants in which one or more of their organs contain substances that can be used for therapeutic purposes or which are precursors

for synthesis of useful drugs (Sofowora, 1982). About 80% of Nigerians depend on traditional medicine as a major approach to curing diseases. This may be due to the fact that local medicinal plants are considered to be readily available, effective, economical, and have less complicated methods of curing diseases (Awosika, 1991). In Nigeria, several plants are used traditionally for the treatment of various ailments. Among these plants are *Cassia Occidentalis* (combractacea), *Azadirichta indica* (Neem tree), and *Khaya senegalensis* (mahogany) as reported by Ethkin et al, 1983. *Artemisia herba alba* (Husni, 1988) *Cissus populnea* (Geidam et al, 2004), and *Muclea latifolia* (Abubakar et al, 2008) have all been

reported to possess hypoglycaemic properties.

Leptadenia pyrotechnica is one of the numerous plants used for medicinal and domestic purpose. Its uses affect not just humans but also animals. *Leptadenia pyrotechnica* is locally known as Namijin Na'adiya in Hausa, Kalimbo in Kanuri, Khimp or khip in Regasthan and Broom bush in English.

Leptadenia pyrotechnica is a straight, broom-like shrub, 1.0m-3.0m high with green stem and pale green alternating bushy branches. It contains watery sap. The leaves are rarely found and if found, they are small deciduous and linear-lanceolate. The flowers are clustered in short axillary chymes and are greenish yellow. The sepals of each flower are joined at base only and flower is bisexual pentamerous acting morphic. The seeds are 5-7mm long, numerous, comose (hairy) with tufted hairs of about 2.5-3.5cm long flowering and fruiting of *Leptadenia pyrotechnica* occurs from August to January (Sudhir *et al*, 2011).

Leptadenia pyrotechnica is widespread in tropical Africa, Asia and Mediterranean region. It is found mostly in Northern Senegal, Mauritania, Niger, Chad, Mali, Sahara, Arabia to Pakistan and Nigeria (Von, 2005). In Nigeria, it is mostly found in the North Eastern Region.

The whole plant, the seeds and flowers are all used for various purposes. The whole plant is used in treating wounds and has proved to have anti bacterial properties against *Bacillus subtilis* and *Staphylococcus aureus* (Al-fatima *et al*, 2007). The fresh Juice of *L. Pyrotechnica* is used for inducing abortion (Patel *et al*, 2010). The sap of the plant is applied as a treatment for Eczema and other skin diseases and also given in diabetes (Katera and Galav, 2006). It is traditionally used in the sudanodeccanian region of central Sahara for the treatment of fever, cough, kidney disorders, stones and

urinary diseases (Hammiche and Maiza, 2006). The young twigs are used as toothbrush. Flowers are occasionally eaten raw by shephards. The leaves, young shoots and flowers are used to flavour soups. *L. pyrotechnica* is browsed by camels, occasionally by sheep and goats, never by cattle. The Bark fibres are used for cortage and fishing nets and also used as fire wood. *Pyrotechnica* means "fire-making" (Von, 2005).

From a phytochemical analysis, Tanira *et al* (1994) reported the presence of 7 active pytochemicals in *Leptadenia pyrotechnica*. They are terpenes, Saponins, Flavonoids, tannins, alkaloids, β -Sitosterol and polyhydroxy pregnane glycosides. Leptadenol, a new pentacyclic triterpenoid was isolated from the n-hexane extract of *Leptadenia pyrotechnica* (Noor *et al*, 1993). Six simple amines and twenty-four alkaloids were detected from the aerial parts for the first time. When examined using GC-MS analysis, the isolated alkaloids were found to belong to pyridine, pyrrole, pyrazine, and indole types (Moustafa *et al*, 2009).

2.0 MATERIALS AND METHODS

2.1 Plant Material/Study site

The aerial part of the plant was collected from the banks of the river Yobe in Geidam Local Government Area of Yobe state in North East Nigeria in the second week of October, 2011. The plant was identified and authenticated by the Taxonomy unit of the Department of Biological sciences, University of Maiduguri, Nigeria. The aerals of the plant were room dried, size reduced and stored at room temperature in an air-tight container.

2.2 Experimental Animals

A total of 20 adult albino wister rats of both sexes weighing between 120-200g were used in this study. The animals were maintained under uniform conditions with free access to standard diet of growers mash (Sanders Nigeria limited, Kaduna) and water, *ad libitum*. The 20 rats were divided randomly into four (4) groups of five (5) rats each. The extract was administered daily intraperitoneally using a syringe with needle, with group A receiving 50mg/kg, group B, receiving 100mg/kg and group C receiving 150mg/kg of their body weight doses. The fourth group (D) which was administered nothing served as the control group. At the end of the 3rd week, the rats from all groups were sacrificed. The blood samples were collected centrifuged and the serum obtained were used for biochemical analysis.

2.3 Preparation of Extract

The ethanolic extract was obtained by extracting the powder of *Leptadenia pyrotechnica* with pure ethanol by the Soxhlet extraction method for about 12 hours. After the extraction was completed, the solvent was removed completely to get extract using the evaporator in an evaporating dish. All the extracts were then stored in a Dessicator.

2.4 Determination of Biochemical parameters

Total protein was determined by Biuret method as described by Tiez *et al* (1995). Albumin concentration was determined using bromocresol green method as described by Doumas *et al*,(1971). AST,ALT and ALP activities were determined in the serum using Randox diagnostic kits based on the principle described by Reitman and Frankel (1957).

2.5 Statistical Analysis

All obtained data were expressed as the mean \pm S.E.M. Differences between mean values of various groups were determined by one way ANOVA followed by student's t-test and $P < 0.05$ was considered to be significant. Computer Software Statistical Package (spss10.0) was used.

3.0 RESULTS

The result of the liver function tests following the administration of varying doses (50mg/kg, 100mg/kg and 150mg/kg) of *L. Pyrotechnica* showed that there was no significant increase in the serum level of AST, ALT, serum albumin and total protein. However, there was a statistically significant increase in the serum level of alkaline phosphatase (ALP) as compared with the control. This increase is also a progressive one in accordance to the increase in the dose of the extract administered to the rats with respect to the different groups.

Table 1: Result of Biochemical Analysis

	GroupA (50mg/kg)	GroupB (100mg/kg)	GroupC (150mg/kg)	GroupD (control)
AST	84.00 ± 3.26 ^a	86.25 ± 2.76 ^a	79.80 ± 3.97 ^a	80.30 ± 0.26 ^a
ALT	28.00 ± 1.84 ^a	28.00 ± 0.89 ^a	26.80 ± 1.96 ^a	27.67 ± 1.03 ^a
T.Protein	63.32 ± 1.48 ^a	69.61 ± 1.53 ^a	74.20 ± 0.76 ^a	74.52 ± 0.32 ^a
Albumin	26.32 ± 1.97 ^a	28.31 ± 0.67 ^a	30.32 ± 1.83 ^a	30.10 ± 1.52 ^a
ALP	155.60 ± 0.40 ^b	161.40 ± 4.65 ^c	176.60 ± 0.58 ^d	101.30 ± 0.26 ^a

Values are expressed as mean ± SEM (n=5). Values with different alphabetical superscripts (a, b, c, d) along a row are significantly different at P<0.05 as compared to the control.

4.0 DISCUSSION

There was no significant change in Serum Albumin and Total Protein in the rats and this shows that the toxicity of the drug was not significant enough to inhibit protein synthesis in the liver. The non-alteration observed in the level of these proteins indicates that the gut function in the administered rats was not affected or damaged. If the gut function is affected or damaged, low level of amino acid is absorbed and protein synthesis is also affected or distorted. Serum level of albumin, the major protein found in the serum is a marker of the liver's ability to synthesis proteins (Oluwole *et al*, 2012). Low levels of this protein in the serum indicate malnutrition, dehydration and ultimately, liver damage.

Alkaline phosphatase was significantly increased and highest level was observed in group c, rats administered with 150mg/kg. A rise in serum alkaline phosphates (ALP) level

is a characteristic finding in obstruction hepatobiliary disease as found in cholestatic liver disease. Therefore, the increased level of ALP showed possible cholestasis in the administered rats.

Liver cell damage is characterized by an increase in plasma enzymes (ALT, AST, ALP e.t.c). However, the administration of the various doses (50mg/kg, 100mg/kg, 150mg/kg) of the ethanolic extract to the rats for 3 weeks showed no significant increase in the serum level of ALT and AST, and this indicate that there is no major damage or rupture of the liver cells.

5.0 CONCLUSION

In conclusion, the result of these findings indicate that the administration of varying doses of *Leptadenia pyrotechnica* (50mg/kg, 100mg/kg and 150mg/kg) is mildly toxic to the liver of Wister stain albino rats and therefore has a little hepatotoxic effect on the

liver. Toxicity of plants products might not emerge immediately after consumption as most symptoms arise after weeks or months of intake. *L.pyrotechnica* is found to be mildly toxic and since *L.pyrotechnica* is used for medicinal purposes, it is recommended that further research be carried out before any administration of the plant extract.

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