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Pharmacognostic evaluation and toxicity studies of the leaf of *Dacryodes edulis* (G. Don) H. Lam (Burseraceae)

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Abstract

Purpose: *D. edulis* leaf is used in the treatment of various ailments such as anaemia and malaria. Hence this study, designed to evaluate the leaf for its pharmacognostic and toxicity potentials.
Methods: Pharmacognostic characteristics and oral toxicity tests were evaluated using standard methods of analyses.
Results: Macroscopically, the leaf was found to be compound imparipinnate, oblong-lanceolate in shape, has entire margin with asymmetric base and pinnate venation. Microscopically, prismatic calcium oxalate crystals, straight walled epidermal cells, trichomes, starch granules and fibres were present. Transverse section through the midrib and lamina has isobilateral arrangement. The findings also included chemomicroscopical, quantitative and phytochemical contents. LD_{50} of the aqueous leaf extract was 6 g/kg and the values of the various haematological parameters were elevated. The spleen showed brisk activation of the immune system.
Conclusion: Thus, data have been provided pharmacognostically for the correct identification of *D. edulis* leaf and the aqueous extract have been shown to be practically non-toxic.

Keywords: *Dacryodes edulis*, leaf, pharmacognostic investigation, toxicity

Indexing: Index Copernicus, African Index Medicus

Background

Dacryodes edulis is a dioecious, shade loving, evergreen tree indigenous to the Gulf of Guinea and widely cultivated in other tropical parts of Africa for its fruits. It is a medium sized tree attaining a height of 18-40 m in the forest [1]. It is commonly called "Native pear, Bush butter tree, African plum, African pear and African palm" (English); "*Orunmwun*" (Edo); "Ube" (Ibo); "*Orumu*" (Urhobo) and "*Elemi*" (Yoruba). This plant has enjoyed a lot of medicinal applications which include treatment of ear infection, fever and oral problems, parasitic skin diseases and jiggers, tonsillitis, dysentery, anaemia and malaria, headache, general pains and cutaneous conditions among others [1-3]. Economically, D. edulis is of great importance and a number of pharmacological researches have also been reported on *D. edulis* [1,4]. However, there are scanty reports on toxicity studies of this plant in experimental animals. Hence, these study to evaluate the leaf for its pharmacognostic and toxicity potentials.

Aim/Objectives

The aim of this study was to determine the pharmacognostic characteristics of the leaf of *D. edulis* as well as evaluate the toxicity potential of the aqueous extract of *D. edulis*. Specific objectives were to: a) collect, identify and authenticate the plant as *D. edulis*, b) carry out macroscopical, microscopical, chemo-microscopical and numerical standards

determination on the leaf, c) conduct phytochemical screening on the aqueous extract, d) determine the acute toxicity effect of the extract in mice and e) determine the sub-acute toxicity effect of the extract in Wistar rats by verifying its' effect on body weight, haematological parameters and end organs (liver, spleen, kidney and heart).

Materials and Methods

The leaves of *D. edulis* were collected from a cultivated tree growing in Osasogie quarters of Egor Local Government Area of Edo State, Nigeria; in January 2011. Preliminary identification was done by Mr. Sunny Nweke of Pharmacognosy Department, Faculty of Pharmacy, University of Benin, Benin City while authentication was done at the Forest Research Institute of Nigeria (FRIN), Ibadan; where a voucher specimen number FHI 106456 was assigned. The leaves were oven dried for 3 days at a temperature of 40 °C, powdered with a mortar and pestle and stored in an airtight bottle till required for analysis.

Pharmacognostic characteristics of the powdered leaf as well as phytochemical screening of the aqueous leaf extract were evaluated using standard methods of analyses [5-7]. This research on animals was carried out in accordance with internationally accepted laws governing the use of laboratory animals and ethical approval was sought from the Ethics Committee of the Faculty of Pharmacy, University of Benin, Benin City, Edo State. Oral toxicity studies were carried out on Swiss albino mice (acute) and Wister rats (sub-acute). LD_{50} was calculated [8], changes in body weight and haematological parameters were determined. Histological examination of the spleen, liver, kidney and heart, as well as the effect of the extract on organ: body weight ratios were also determined

Results

Macroscopy of the leaf showed that it is compound imparipinnate, oblong-lanceolate in shape, has entire margin with asymmetric base and pinnate venation. Microscopical evaluation revealed the presence of prismatic calcium oxalate crystals, straight walled epidermal cells, trichomes, simple starch grains and a pair of fibre. Transverse section through the midrib and lamina has isobilateral arrangement. Chemomicroscopy revealed the presence of lignin, starch, calcium oxalate crystals and fixed oils. Quantitative parameters (%w/w ± S.E.M) were; Moisture content (1.89 ± 0.12); Total ash value (5.94 ± 0.60); Acid insoluble ash value (0.76 ± 0.14); Water soluble ash value (2.32 ± 0.01); Alcohol soluble extractive value (3.70 ± 0.23) and Water soluble extractive value (3.12 ± 0.21). Phytochemical screening revealed the presence of glycosides, flavonoids, saponins, tannins and cardiac glycosides. The LD50 of the aqueous leaf extract was 6 g/kg. On body weights of Wistar rats used, changes were observed not to be significantly different ($p > 0.05$) from that of control. At a dose of 1500 mg/kg, the aqueous extract of the leaf caused a significant ($p < 0.05$) elevation of the platelet value when compared to control.

Also, there was increase in the values of lymphocytes, white blood cells, red blood cells, haemoglobin, haematocrit and neutrophils, respectively. Statistically, these values were not significantly different ($p > 0.05$) from the control. Histopathological examination showed mild chronic inflammation across the tissues and the spleen showed brisk activation of the immune system. On organ: body weight ratio, the effect of the extract was not significantly different ($p > 0.05$) from that of control.

Conclusion

Data have been provided pharmacognostically for the correct identification of the leaf, so as to avoid adulteration or contamination. Phytochemical screening revealed the presence of useful phytoconstituents that could serve as drugs or as templates for the synthesis of useful drugs. Also, the aqueous leaf extract of *D. edulis* is practically non-toxic (LD_{50} = 6 g/kg), though precautions should be taken during higher dose and chronic use.

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