

The effect of aqueous extract of *Euphorbia drupifera* on the physiology of wistar rat

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Abstract

The plant *Euphorbia* came from Mount Atlas region of present-day Morocco and was probably the resin Spurge. This local herb is used by traditional herbalists for treatment of hypertension, diabetes and several other ailments. The aim of this study is to investigate the toxic effect of aqueous extract of *Euphorbia drupifera* on the physiology of wistar rats. Considering objectives such as: determining the efficacy of *Euphorbia drupifera* in rat and determining if the extract is dose and time-dependent. Twenty five (25) normal wistar rats were used for this study. They were acclimatized and randomly distributed into groups A-D and control. They were given, oral administration of *Euphorbia* extracts twice daily. Doses of 0.056ml/g, 0.118ml/g, 0.174ml/g and 0.254ml/g were given to groups A,B,C and D respectively. The higher the dosage, the shorter the time of death. The animals were observed for morphological changes afterwards. Five rats, one from each group were examined after death. The results obtained recorded a 100% mortality rate in the test groups of rats. Tissue observation showed swollen intestine. Behavioural observation showed continuous itching immediately after feeding with extract, reduced activity, loss of appetite, drowsiness, and swollen jaws. *E. drupifera* was found to have a severe toxic effect on the physiology of rats as 100% mortality was observed in all test groups (Group A, 144hrs; Group B, 96hrs; Group C, 48hrs; and Group D, 36hrs). Thus, caution should be taken in handling and general usage of the plant. No death occurred in the control group without the extract.

Key words: *Euphorbia drupifera*, Dosage, Toxicity, Rats, Death Time

1. Introduction

Euphorbia is a genus of plants belonging to the family. Euphorbiaceae, consisting of about 2160 species. *Euphorbia* is one of the most abundant genera in the plant kingdom. May be exceeded only by "senecid". Members of the family and genus are sometimes referred to as SPURGES. The genus is primarily found in the tropical and subtropical regions of Africa and America, but some also in the temperate zones of the world. Succulent species originate mostly from Africa, the America and Madagascar. There exists a wide range of insular species; on the Hawaiian islands where spurges are collectively known as "akoko", and on the canary island as "tabaibas". The common name "spurge" derives from the middle English/old French spurge, due to the use of the plant sap as a purgative².

The plants are annual or perennial herbs, woody shrubs or tree with a caustic poisonous milky sap². The roots are fine or thick and fleshy or tuberous. Many species are more or less succulent and thorny. The main stem and mostly the side arms of the succulent species are thick and fleshy, measuring about 15-19cm (6-36inches) tall.

Euphorbia became the official scientific name for the genus when Carolus Linnacus published it in the first edition of his book species plantarum in 1753.

This local herb is used by traditional herbalist for the treatment of hypertension, diabetes and many other ailments. Ground leaves (paste) are dissolved in either, water or soft drink and administered orally in doses determined by age. In cases of over dosage producing adverse effects, fresh coconut (*Coccus nucifera*) water is administered to the patient as an antidote. The latex (milky sap) of spurges acts as a deterrent for herbivores as well as a wound healer¹⁵. In most cases it is white (except *E.alatelluri* which is yellow), and being under pressure, it runs out from the slightest opening and congeals within a few minutes of contact with air. Some of the constituents are di-terpen esters and tri-terpen esters. The terpen ester composition determines how caustic and irritating to the skin it is. In contact with the mucous membrane (eyes, nose, mouth) in experiments with animals, it was found that the terpen ester resiniferatoxin had an irritating effect of 10,000 to 100,000 times stronger than "Capsaicin", the "hot" substance found in chili peppers; and produces extremely painful inflammation⁴. Several terpen esters are also known to be carcinogenic¹⁴. This present study, therefore sets out to investigate the efficacy of *Euphorbia drupifera* in rats and to determine if the extract is dose-and-time

dependent. So far it has been shown to be highly toxic, resulting in a lot of toxicogenic effects which depended more on dosage rather than time.

2. Materials And Method

2.1. Preparation of *Euphorbia drupifera* extract

The leaves of *Euphorbia drupifera* were identified in the Department of Plant Science and Biotechnology, University of Port Harcourt. Cold extraction was done using 300ml distilled water in a homogenizer. The extracts was stored in sub-zero temperature in the refrigerator. The extracts were defrosted and administered twice daily, orally to the healthy wistar rats, using insulin syringes. Proximate analysis to obtain the main constituents of the plant was done.

2.2 Feeding of animals with extract

Twenty five (25) female Wistar rats, weighing between 100 and 200g were purchased and housed in plastic cages with steel nothings and solid bottom, in the laboratory of the Department of Animal and Environmental Biology. The acclimatization period was for Twenty-four (24) hours. The animals were weighed and randomly distributed into groups A-D and control. They were weighed on daily basis. To identify the animal groups, a dye was used to mark the animals. Oral administration of *Euphorbia* extract was given twice daily, for one (1) week. The Internationally accepted principles for laboratory animal use and care were adopted. Four rats, one from each group (groups A, B, C, and D) were examined at death. They were dissected, tissues and internal organs were observed for pathological changes, in comparison with the Control group at death.

3. Results

Physiological findings of control and experimental groups:

- Control group (Administered with 0ml/Kg of plant extracts): Physiological observation of the Internal Organs (especially the Intestine) showed normal physiological features (without any swellings) which served as reference points for comparing with experimental groups.
- Wistar rats fed with 0.056ml/g of extract: Physiological examination of the Wister rats treated with ml/g of extract did not differ from the normal control group (No swellings). The animals were however observed to be inactive for a few minutes and died after 144hrs (Fig I).
- Wistar rats fed with 0.118ml/g of extracts were seen scratching as a result of itching, and died after 96hrs.
- Wistar rats fed with 0.174ml/g of extracts were seen scratching due to continuous itching and after a short while a sudden calmness and finally drowsing as shown in fig 3 and died after 48hrs.
- Wistar rats fed with 0.254ml/g of extracts(highest dose), showed marked physiological distress; some of which were loss of appetite, intense itching of body parts, sudden calmness, stupor, drowsiness, swollen jaws and death in 36hrs.

Fig I: Healthy Albino rat (*Rattus norvegicus*)- from the control group



Fig II: Feeding of rat with *E drupifera* leaf extract.



Fig III: Internal organ from Experimental group



Fig IV: Drowsy rat (from experimental group)



Fig V: Control group Internal organ.



Table 1: Dose of *Euphorbia drupifera* extract and time of death

Groups	Extracts Dose (ml/g)	Death Time(Hrs)
A	0.056	144
B	0.118	96
C	0.174	48
D	0.254	36
Control	Nil	Nil

There was a significant difference between the time of death and the dosage of exposure, as the time of death of the animal groups decreased with increased dosage .Table 1

4. Discussion

The findings observed in this study, show that the toxicity of aqueous extract of *Euphorbia drupifera* leaves to the intestine of the rat is mainly dose-dependent, as the highest time of death (after administration of extract)}, occurred in wistar rats that were fed with the least dose while wistar rats fed with the highest dose of the extract had the shortest time of death Fig IV. These findings are in keeping with previous reports^{5,6}. An increase in gastric irritation that results in high mobility has also been reported⁶. Earlier studies however, showed a low toxicity of *E.drupifera* leaf extract; a high LD50

value (135.6 mg/kg. mine, i.p) shows low acute toxicity of the plant extract and it is evident from this findings that the extract contains agent(s) capable of stimulating the intestinal smooth muscle in a dose-dependent manner⁴. Acute toxicity of *Euphorbia* in rats produced severe clinical symptoms such as increased activity and irritability, itching of the nose and mouth on the cage floor, salivation, vomiting, diarrhea, burning of the mouth, esophagus and stomach, narrowing of the eye pupil, ruminal paresis, tachycardia, continuous shivering. It is also been reported that, the animals exposes to *Euphorbia* extract in some other studies were reluctant to stand, and moved with a stiff and unsteady gait, as was also noticed in this study¹. Regional differences is said to exist in the responsiveness of the intestinal muscles (duodenum, jejunum and ileum), to the various doses of the extract^{12,11,8, 7}.

The leaf extracts and the latex of *Euphorbia drupifera* has been shown to have an itching effect, on contact with human skin^{9,10,3}. Other physiological effects are swellings when the latex of the plant is robbed on the skin or if it comes in contact with the mucus membrane of the eyes, nose etc. It is notorious for being very dangerous to the eye and can cause blindness¹³. Furthermore, exposure to crude extract of *Elaeophorbium drupifera* causes haemolysis of rat erythrocytes⁵. Death of animals is therefore caused by multiple factors. This work's major weakness stems from the fact that, it is an undergraduate research work and as such, the report is not so comprehensive. However all information supplied are correct and verifiable.

5. Conclusion

Although, most herbalists believe that *Euphorbia drupifera* treats muscle problems, hypertension anti-diuretic situations, diabetes and many other ailments; water extracts of *Euphorbia drupifera* leaves was found to be highly toxic and dangerous to Wister rats. Their effect was dose-dependent. Thus, caution should be taken in handling and general usage of the plant. Children, and domestic animals should not be allowed to make contact with the spurge, as partially or congealed latex is often not soluble in water but in emulsion.

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