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Research Article

Median Lethality Dose of *Xylopia aethiopica* Fruit Ethanol Extract

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Abstract

The present study was designed to assess the median lethality dose of *Xylopia aethiopica* fruit ethanol extract (XAFEE) administration on sixteen albino rats. The animals were assigned to four groups (n=4). Each group was administered orally as single arithmetic doses of 1000 mg/kg b.w, 2000 mg/kg b.w, 3000 mg/kg b.w and 4000 mg/kg b.w respectively. The animals were monitored and examined for about 24 h, thereafter, for mortality after the extract administration. Maximum dose with 0% and minimum dose with 100% mortality were recorded as 3000 mg/kg b.w and 4000 mg/kg b.w. Thus, the median lethality dose (LD50) is 3,464 mg/kgb.w.

Keywords: *Xylopia aethiopica*; Lethality dose; Medicinal; Toxicology

1. Introduction

Xylopia aethiopica or Ethiopian pepper as it is usually called, is an angiosperm belonging to the family "Annonaceae" and is among the species that thrive in the evergreen rain forests of tropical and subtropical Africa [1]. Xylopia is a compression from the Greek words "xylon pikron" which means "bitter wood". The second part of the plant's binomial name, aethiopica, refers to its origin, Ethiopia. It has its English name as Negro pepper or grains of Selim. In Nigeria, Yoruba call it 'Eeru', Igbo call it 'Uda' and Hausa calls it 'Chimba' [2]. This plant possesses great nutritional and medicinal values in African traditional medicine for several centuries owing to its wide array of therapeutic indications in the treatment of cough, bronchitis, malaria among other diseases [3]. Almost all parts of *Xylopia aethiopica* are very useful medicinally, but the fruits are most commonly used for therapeutic purposes.

Extracts of the fruits are used in the treatment of cough, biliousness, bronchitis, rheumatism, dysentery, malaria, uterine fibroid and amenorrhea [4, 5].

Figure 1: *Xylopia aethiopica* fruit.

2. Toxicity Study

Toxicology is the science that deals with the study of the adverse effects caused by chemicals or physical agents in living organisms under specific conditions of exposure [6] It is a science that attempts to qualitatively identify all the hazards, such as: organ toxicities associated with a substance, as well as to quantitatively determine the exposure conditions under which those hazards are induced. It also experimentally determines the occurrence, nature, incidence, mechanism, and risk factors for the adverse effects of a toxic substance [7]. Toxicity studies are conducted to provide greater understanding of the potential intrinsic hazard of the test item and to estimate safety margins [8]. These safety margins are used to determine an initial safe starting dose for clinical trials, a safe dose for continued use in humans through longer clinical trials. However, the median lethality dose (LD_{50}) is the dose that is efficient to kill 50% of the population.

3. Materials and Methods

3.1 Collection and identification of plant

Dried fruit of *Xylopia aethiopica* was purchased from a local herb store, Osiele, Abeokuta, Ogun state, Nigeria. Its botanical identification and authentication was done by a Botanist in the Department of Botany, College of Biosciences, Federal University of Agriculture, Abeokuta, Ogun State, Nigeria. The fruit was washed with clean tap water and allowed to dry again.

3.2 Extraction of plant materials

The dried fruit of Xylopia was pulverized in a mortal. Six hundred grams (600 g) of the pulverized samples were cold macerated in 6.0 L of absolute ethanol (1:10 v/v) over 48 h periods. The extract was filtered using clean Whatmann No.1 filter paper. The filtrate was then concentrated using rotatory evaporator, then placed in a water bath to allow evaporation of the solvent.

3.3 Experimental animals and design

Sixteen adult male albino rats weighing an average weight of 110.5 g were randomly selected into six (4) groups (n=4). The animals were fed *ad libitum*, kept on a 12 h light–dark cycle periods and acclimatized for two weeks prior to the experiment.

3.3.1Determination of median lethality dose, LD_{50}: The median lethality dose, LD_{50} of the *Xylopia aethiopica* fruit ethanol extract (XAFEE) were tested on sixteen (16) albino rats using the modified method and calculation proposed by Lorke [9]. Different doses of the extract (XAFEE) were administered orally as single arithmetic doses to the animals (n=4) in four groups. Each groups was administered 1000 mg/kg b.w, 2000 mg/kg b.w, 3000 mg/kg b.w and 4000 mg/kg b.w respectively.

The animals were monitored and examined for about 24 h, thereafter, for mortality after the extract administration. Maximum dose with 0% and minimum dose with 100% mortality were recorded. The two doses were used to calculate the LD_{50} of the extract (XAFEE) as follows:

$LD_{50} = \sqrt{a \times b}$

Where;
a = Maximum dose with 0% mortality
b = Minimum dose with 100% mortality

4. Results

a = 3000 mg/kg
b = 4000 mg/kg
$LD_{50} = \sqrt{3000\ mg/kg \times 4000\ mg/kg}$
$LD_{50} = \sqrt{12{,}000{,}000\ mg/kg}$
LD_{50} = 3,464 mg/kgb.w

5. Discussion

The result showed that *Xylopia aethiopica* fruit ethanol extract (XAFEE) exerted its oral acute toxicity at the concentration higher than 3000 mg/kg. However had no effect at the 1000 mg/kg, 2000 mg/kg and 3000 mg/kg.

6. Conclusion

The median lethality dose of *Xylopia aethiopica* fruit ethanol extract (XAFEE) suggested that the fruit may not be completely safe for consumption at a dose higher than 3000 mg/kg. As though no report yet on the median lethality

concentration of the ethanolic extract of the fruit. Thus, a concentration that would be suitable for any therapeutic experiment would be 10% or any dose lesser than the 10% of the 3.464 mg/kg. Further investigation may be done on the molecular toxicity of the ethanolic extract of the *Xylopia aethiopica* fruit.

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