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Pharmacognostic and Antiemetic Determination of The Methanol Leaf Extract of *Elaeis Guinensis*

KEYWORDS: Antiemetic, pharmacognostic, Chlorpromazine, leaf extract, Elaeis guinensis.

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ABSTRACT *Objective: To assess the pharmacognostic and antiemetic effect of the leaf extract of Elaeis guinensis. Materials and methods: The pharmacognostic evaluation of the leaf of E. guinensis was carried out using macroscopic, microscopic, chemomicroscopic, and phytochemical methods. The acute toxicity test (LD50) was done; while the antiemetic activity was determined using copper sulphate emesis technique. Results: The macroscopic analysis of the condition, apex, size, venation, margin, base, shape, surface, taste, texture and colour of E. guinensis leaf showed a fresh, acuminate, 35-50 cm long, parallel, entire, cuneate, narrow and pinnate, glabrous, sour, rugose and dark-green respectively. The microscopic investigation showed trichome and actinocytic type of stomata present on the leaf of E. guinensis. The chemomicroscopic evaluation revealed the presence of lignin, starch, calcium oxalate, and cellulose. Phytochemical analysis revealed the presence of saponins, alkaloids, tannins, steroids, terpenoids, flavonoids, proteins and carbohydrates. The LD50 was above 5,000 mg/kg. The extract significantly reduced the number of retches when compared with the control. The activity was dose-dependent. Chlorpromazine exhibited the highest significant ($p < 0.01$) percentage inhibition (89 %) followed by extract at 200 mg/kg (85.9 %) and least at 50 mg/kg (68.7 %). Conclusion: The leaf extract of E. guinensis significantly possesses antiemetic effect.*

Introduction

Myriads of indigenous plants in West Africa are used as foods, spices or as medicinal preparations. Herbal medicine constitutes a large part of what is practiced as traditional medicine around the world[1]. From earliest times, medicinal plants have been crucial in sustaining the health and well-being of mankind. Fortunately, most developing countries are endowed with vast resources of medicinal and aromatic plants. Among non-industrialized societies, the use of herbs to treat ill-health conditions is almost universal[2]. In Europe and America, where the phytomedicine industry is thriving, extracts from medicinal plants are sold in purified form for the treatment and prevention of various kinds of diseases. Three quarters of plants that provide active ingredients for prescription drugs came to the attention of researchers because of their use in traditional settings[3,4,5]. In Africa, modern and orthodox healthcare has never been, and probably will never be adequately and equitably provided due to financial limitations related to rapid population growth, political instability, high inflation rate, and declining real income [6,7,8]. Elaeis guinensis is a specie of palm commonly called oil palm tree or macaw fat tree in English. It is native to Guinea Coast of West Africa where the specie derived its name "guinensis" referring to its country of origin. E. guinensis belongs to the family Palmae and tribe Cocaneae[8]. Every part of the whole oil palm tree is of utility. The trunk when sawed provides woods and planks for house roof; the whole fronds can be used in making of fences in remote villages and tourist centres. When the mid ribs of E. guinensis are detached, they can be used to make brooms. The unique composition of its oil makes it versatile in application across food, cosmetic and pharmaceutical industries[9] Fixed oil from palm oil can be used as lubricants, raw material for soaps and lotions, diluting essential oils and medicinally for treatment of sprain and rheumatism [10,11] as well as exert antimicrobial effect[12]. Study had reported that the leaf extract of E. guinensis showed potent wound healing capacity and improved tissue regeneration[13]. In view of various folkloric uses of E. guinensis, this present study investigated the pharmacognostic and antiemetic activity of its leaf.

2. Materials and Methods

2.1 Collection and preparation of plant materials

The fresh leaves of Elaeis guinensis were collected from Elele, Rivers State, Nigeria, and authenticated at the Department of Pharmacognosy. Madonna University, Elele, where herbarium specimen was deposited. The harvested leaves were detached from the petiole, separated from the mid rib and were sliced into small pieces. The sliced leaves were washed with water and air dried for 28 days. The dried leaves were ground into fine powder using laboratory hammer mill. Three hundred grams of the powdered leaves were extracted with absolute methanol (Sigma Aldrich, Germany) by cold maceration for 72 h. The extract was filtered, evaporated using a rotary evaporator (RV 05 Basic. IB, IKA Staufen, Germany) and the concentrated extract stored in a refrigerator.

2.2 Phytochemical screening

Phytochemical screening of the crude methanol extract (CME) was carried out using standard procedure [14]

2.3 Animals

Chicks (2 weeks old) weighing 240-300 g of both sexes obtained from Laboratory Animals facility of the Department of Pharmacology and Toxicology, Madonna University, Elele, were used in this study. The animals were maintained under standard laboratory situations and had free access to food and clean water. Prior to experimental uses, the animals were transferred to work area and allowed for one week of acclimatization.

2.4 Acute toxicity and lethality (LD_{50}) test

The LD_{50} of the methanol leaf extract of E. guinensis was determined adopting the method described by Loke[16]. A total of 12 Chicks weighing 240-300 g, were employed;

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carried out in 2 stages. Stage 1 involved 9 chicks grouped into 3 groups of 3 animals per group.

Group I received 10 mg/kg of extract orally
Group II received 100 mg/kg of extract orally, while
Group III received 1000 mg/kg of extract orally.
The animals were constantly monitored for three hours then monitored intermittently for the next 12 hours and then over a period of 24 hours for mortality. From the outcome of the first stage, the second stage was carried out. Three animals were used, three groups of one animal per group.

Group I received 2000 mg/kg orally
Group II received 4000 mg/kg orally, while
Group III received 5000 mg/kg orally of the crude extract.

The animals were monitored as was in the first stage.
Then the number of death was recorded after 24 hours.

2.5 Macroscopic and Microscopic evaluations
The macroscopic characters of the leaf: Size, shape, surface, venation, petiole, apex, margin, base, texture, taste, colour; and microscopic characters: stomata (type and distribution), epidermal cells (nature), epidermal trichomes (type and distribution), cell inclusions (calcium oxalate crystals) were carried out using standard method[15]. The epidermal membranous layers of E. guinensis was carefully peeled off and mounted on a clean slide with dilute glycerin after clearing with chloral hydrate. The transverse section of the leaf fragment was covered with a clean cover slide and observed under the microscope (x 400 magnification).

2.6 Chemomicroscpic screening
The chemomicroscopic analysis of the extract was done using the standard method [15]. For lignin test, the powdered sample was placed in a few drops of phloroglucinol and concentrated HCl, and observed under the microscope for a pink colour. For starch test, the powdered sample was placed in normal iodine solution and observed for a blue-black coloration. For calcium oxalate test, the powdered sample was placed in a few drops of chloral hydrate and observed under the microscope for the presence of the crystal calcium oxalate. A few drops of concentrated hydrochloric acid was also added and observed under the microscope for the disappearance of the crystals of calcium oxalate which indicates a positive test. For cellulose test, the powdered sample was placed in iodine and 80% H_2SO_4, and observed under the microscope for blue-black coloration which indicates a positive test.

2.7 Animal grouping and antiemetic experimental protocol
The antiemetic activity of methanol leaf extract of E. guinensis was evaluated using the standard method[17]. A total of 25 (2 weeks old) chicks were employed.

Group I: Served as negative control and received 0.5 ml distilled water orally.

Group II: Served as positive control and received 50 mg/kg of chlorpromazine orally

Group III: received 50 mg/kg of extract orally

Group IV: received 100 mg/kg of extract orally and

Group V: received 200 mg/kg of extract orally.

After one hour of all the administration, emesis was induced in all the animals by single oral administration of 50 mg/kg of anhydrous copper sulphate. Then the number of retches (an emetic action without vomiting gastric materials) was counted for 20 minutes. The antiemetic effect was assessed as the decrease in number of retches in treated groups in contrast to the control. The inhibition (%) was calculated as follows: inhibition (%) = 100

Where A= the control frequency of retching

B = the frequency of retching of treated groups

3. Results
3.1 Phytochemical constituents
The phytochemical studies of E. guinensis leaf extract showed the presence of saponins, alkaloids, tannins, steroids, flavonoids, proteins and carbohydrates.

3.2 Acute toxicity and lethal tests
The acute toxicity test (LD_{50}) of E. guinensis leaf extract was calculated to be over 5000 mg/kg.

3.3 Macroscopic and microscopic evaluations
The macroscopic analysis of E. guinensis leaf showed a fresh, acuminate, 35-50 cm long, parallel, entire, cuneate, narrow and pinnate, glabrous, sour, rugose, and dark-green leaf; while the microscopic investigation showed trichome and actinocytic type of stomata present on the leaf.

3.4 Chemomicroscopic evaluations
The chemomicroscopic evaluation revealed the presence of lignin, starch, calcium oxalate, and cellulose.

3.5 Antiemetic activity
The antiemetic activity of the leaf extract of E. guinensis showed dose-dependent significant percentage inhibition when compared with the control (Table I). The positive control chlorpromazine exhibited significant ($p < 0.01$) percentage inhibition as well as the extract at high (200 mg/kg) dose. The negative control group did not show any inhibition of emesis throughout the period of experimentation ($p > 0.05$).

4. Discussion
The result obtained from this study showed that methanol extract of E. guinensis leaf possessed antiemetic effect. The presence of plethora of phytochemicals-saponins, alkaloids, tannins, steroids, flavonoids, protein and carbohydrates corroborates previous studies in which E. guinensis extract had been reported to contain a good number of active ingredients [18,19] it is not actually known which of these agents accounts for the antiemetic effect in the chicks. However, it is believed that the active ingredient(s) would have acted on the central trigger zone (CTZ), vagal centre or the reticular formation to cause their inhibition. Chlorpromazine as an aliphatic phenothiazine is known to possess moderate antiemetic action but they are favoured and are often used for treatment of vomiting for the fact that they have advantage of exerting mild to moderate extrapyramidal and antipsychotic effects unlike the piperazine phenothiazine (prochlorperazine, perphenazine, fluphenazine)[17]. The LD_{50} of E. guinensis leaf extract was over 5000 mg/kg and thus considered safe for consumption. The macroscopic and microscopic characteristics of E. guinensis are in agreement with Arecaceae[20]. The chemomicroscopy showed the presence of lignin, starch, cellulose as well as calcium oxalate. This report is consistent with the finding in pharmacognostic and pharmacological screening of plant

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decoctions commonly used in Cuba folk medicine[21]

Conclusion

The antiemetic activity of E. guinensis in this study justified the tradomedical use of this plant and further studies are encouraged with the view to isolate and characterize the specific active component(s).

Conflict of Interest

The authors have not declared any conflict of interest.

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Table 1: Antiemetic activity of methanol leaf extract of E. guinensis.

Table 1: Antiemetic activity of methanol leaf extract of *E. guinensis*.

Group	Treatment	Dose (mg/kg)	Number of Retches	Percentage inhibition
I	Distilled Water 0.5 ml	----	64±4.0	----
II	Chlorpromazine	50	7±2.0**	89.0
III	Extract	50	20±1.0*	68.7
IV	Extract	100	15±2.0*	76.5
V		200	9±1.0**	85.9

*$p < 0.05$; ** $p < 0.01$ significant level compared with control. Value mean ±SEM, n=5

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