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Antiemetic activity of *Acalypha fimbriata* Schumach. & Thonn., *Acalypha ornata* Hochst., and *Acalypha wilkesiana* cv. *godseffiana* Muell Arg.

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Abstract

Current study was designed to explore the antiemetic effect of the methanolic extracts of *Acalypha fimbriata* Schumach. & Thonn., *Acalypha ornata* Hochst., and *Acalypha wilkesiana* cv. *godseffiana* Muell Arg., aerial parts using chick emesis model in order to validate their folk use in G.I. disorders. Emesis was induced by the oral administration of copper sulfate to male chicks. All the extracts (150 mg /kg orally) showed antiemetic effect and compared with reference drug chlorpromazine. Among all the extracts *Acalypha ornata* Hochst., leaves extract showed highest (94.51%) and *Acalypha fimbriata* Schumach. & Thonn., stem extract showed lowest (35.04%) antiemetic effect.

Keywords: Antiemetic; *Acalypha fimbriata*; *Acalypha ornata*; *Acalypha wilkesiana*; chi-ck emesis model

Introduction

Acalypha is the fourth largest genus of Euphorbiaceae, comprises of fast growing, evergreen shrubs, trees and annuals from tropical to subtropical regions particularly in the tropics of Africa, America and Asia. A large proportion of genus *Acalypha* is weed while others are ornamental plants (Riley, 1963; Ogundaini, 2005). Decoction of *Acalypha fimbriata* Schum. & Thonn., is used as laxative (Kola *et al.,* 2008), where as leaves are used in asthma, rheumatism, syphilis, ulcers, and also as anthelmintic, antimicrobial and antifungal in Nigeria (Odugbemi, 2008). The leaves and roots of *Acalypha ornata* Hochst., are used for the relief of postpartum pain (Newton-Fisher *etal.,* 2006) and to treat scabies and haemorrhoids (Schmelzer and Gurib-Fakim, 2008). The leaves of *A. wilkesiana* cv. *godseffiana* Muell Arg., are used in diabetes mellitus, gastrointestinal disorders, hypertension, malaria and skin infectio-

ns, (Akinyemi *etal.,* 2005) and are reported to possess antihypertensive (Ikewuchi *etal.,* 2009 a), antimicrobial (Adesina *etal.,*2000), diuretic (Ikewuchi *etal.,* 2009b), hypoglycaemic (Ikewuchi *etal.,* 2011) and hypolipidaemic activities (Ikewuchi *etal.,* 2010a). The leaves of *Acalypha wilkesiana* possess flavonoids, saponins, tannins (Ikewuchi *etal.,* 2010b; Madziga *etal.,* 2010) and terpenes (Akinde, 1986). The seeds of *A. wilkesiana* are used in South-West Nigeria to treat breast tumours (Bussing *etal.,* 1999). In the present study, the antiemetic activity of leaves and stem extracts of three *Acalypha* species *viz*., *Acalypha fimbriata* Schumach. & Thonn., *Acalypha ornata* Hochst., and *Acalypha wilkesiana* cv. *godseffiana* Muell Arg., was studied using chick emesis model.

Materials and Methods

Collection of Plant material and identification

The leaves and stems of *Acalypha fimbriata* Schumach. & Thonn., *Acalypha ornata* Hochst., and *Acalypha wilkesiana* cv. *godseffiana* Muell Arg., were collected from the forest of Ibadan, Nigeria and identified by Mr. Felix Usang of Forest Research Institute of Nigeria (FRIN). The voucher specimen No. 107318 (*Acalypha fimbriata*) and 107320 (*Acalypha ornata*) and 107323 (*Acalypha wilkesiana* cv. *godseffiana*) respectively were deposited in the Forest Herbarium of Ibadan, Nigeria.

Preparation of the plant extracts

Fresh plant materials (2 kg each) of *Acalypha fimbriata, Acalypha ornata* and *Acalypha wilkesiana* cv. *godseffiana* were soaked separately in methanol for a week and the extracts were condensed to dryness by evaporation using rotary evaporator at 40°C. These concentrated methanol extracts were used for bioassay.

Animals

Young male chicks, 4 days of age, weighing from 32-52 g were taken from local market. After 24 hrs fasting, the antiemetic activity was evaluated. All chicks were kept under laboratory conditions at room temperature with 12h light and dark cycles and were allowed free access to food and water. Permission and approval from animal studies were obtained from Board of Advanced Studies and Research, University of Karachi [BASR. Res. No.09 (46)-2006].

Chemicals

Copper (II) sulfate pentahydrate (copper sulfate) was purchased from Scharlau Chemie S.A. Barcelona, Spain. 3-(2-chloro-10*H*-phenothiazin-10-yl)-*N*,*N*-dimethyl-propan-1-amine (chlorpromazine) was purchased from ICN, USA. Dimethyl sulfoxide (DMSO), Polyoxyethylene sorbitan monooleate (Tween 80) and methanol were purchased from Merck, Darmstadt, Germany.

Antiemetic activity

The chicks were divided into eight groups of six animals each and each group transferred in different cages with their identification mark. Group I received 0.9% saline solution (10ml/kg) as normal control. Group II received Chlorpromazine (10ml of 150mg/kg orally) as standard antiemetic drug. Group III and IV received leaves and stem extract of *Acalypha fimbriata*, group V and VI received leaves and stem extract of *Acalypha ornata* whereas Group VII and VIII received leaves and stem extract of *Acalypha wilkesiana* cv. *godseffiana* (10ml of 150mg/kg orally for each group) respectively dissolved in 0.9% saline containing 5% DMSO and 1% Tween 80 taken as treated groups. The antiemetic effect was determined by calculating the mean decrease in number of retching following the protocols of Akita *et al*., 1998. Each chick was kept aside for 10 minutes to stabilize in a large beaker. After 10 minutes of treatment copper sulfate was administered orally at a dose of 50 mg / kg, then the number of retching was recorded during the next 10 minutes. The percentage inhibition was calculated by the following formula:

$$\text{Inhibition (\%)} = [(A-B)/A] \times 100$$

Where, A = Frequency of retching in control group, and B = Frequency of retching in test group

Statistical analysis

Value for antiemetic activity is expressed as mean ± S.E.M. The statistical significance of the difference is determined by an unpaired Student's *t*-test. *P* values of < 0.05 were considered significant and < 0.01 were highly significant.

Results

Results of the antiemetic activity of methanol extracts of *Acalypha fimbriata*, *Acalypha ornata* and *Acalypha wilkesiana* cv. *godseffiana* leaves and stem are given in Figure 1. All the extracts inhibited emesis to an extent greater than chlorpromazine at a dose of 150 mg/kg. Among all the extracts *Acalypha ornata* leaves showed highest antiemetic activity (94.51% inhibition) and 3.8 mean number of retches where as *Acalypha fimbriata* stem extract showed lowest 35.04% inhibition and 45 mean number of retches. The stem of *Acalypha wilkesiana* cv. *godseffiana* and *Acalypha ornata* showed 77.91 and 65.64 % inhibition of emesis while the leaves of *Acalypha wilkesiana* cv. *godseffiana* and *Acalypha fimbriata* showed 68.96 and 44.42 % inhibition of emesis. The mean number of retches in control was 69.28. The standard drug chlorpromazine reduced these retches to 46.42 and showed 32.99% inhibition. From results (Figure 1 and 2), it is clear that all tested extracts of the genus *Acalypha* having antiemetic potential which are comparable to chlorpromazine.

Discussion

Acalypha species are popularly used for the treatment of gastro-intestinal disorders in Western Nigeria (Akinyemi *etal.*, 2005; Kola *et al.*, 2008) and the present investigation (antiemetic study) further justify one of them. The mechanism of antiemetic effect of these extra-

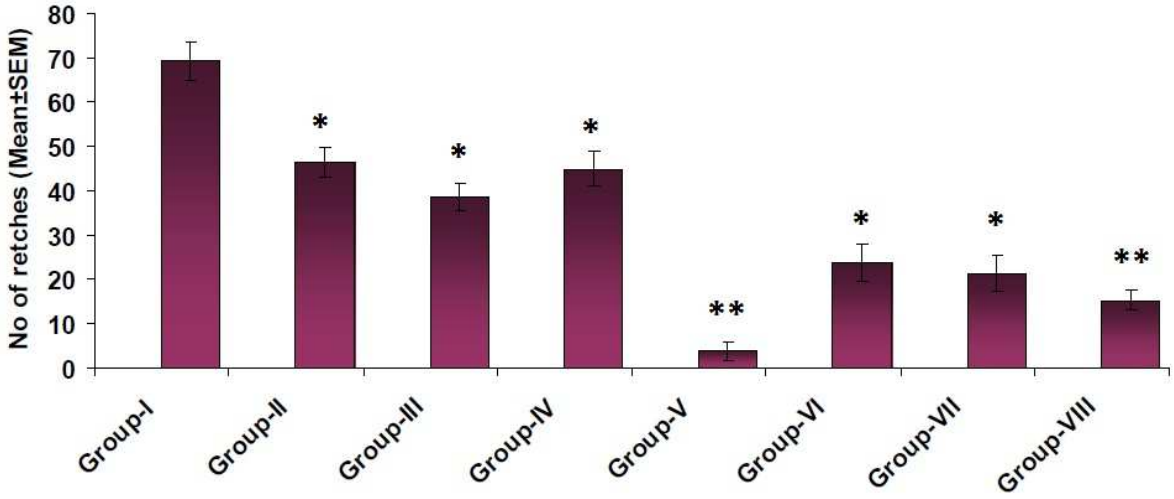

Figure 1. Antiemetic effect of three *Acalypha* extracts. Group-I: Control (Normal saline solution); Group-II: Ch-lorpromazine; Group-III: *Acalypha fimbriata* leaves extract (150 mg/kg); Group-IV: *Acalypha fimbriata* stem extract (150 mg/kg); Group V:*Acalypha ornata* leaves extract (150 mg/kg); Group-VI:*Acalypha ornata* stem extract (150 mg/kg); Group-VII: *Acalypha wilkesiana* cv. *godseffiana* leaves extract (150 mg/kg). Group-VIII: *Acalypha wilkesiana* cv. *godseffiana* stem extract (150 mg/kg)

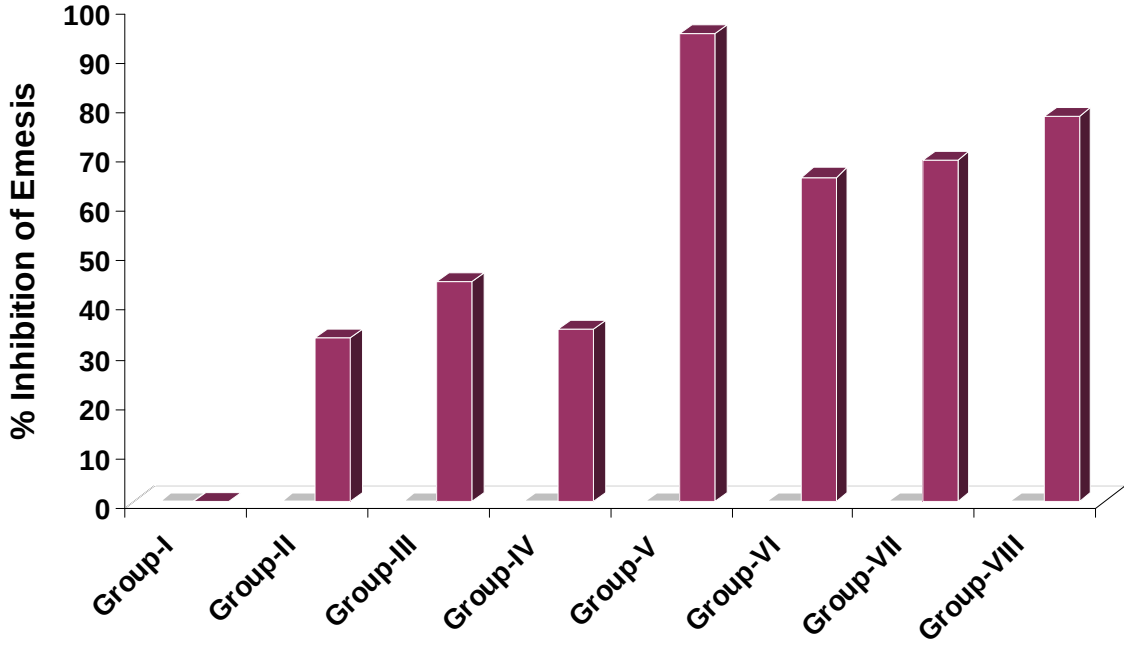

Figure 2. % Inhibition of emesis by three *Acalypha* extracts. Group-I: Control (Normal saline solution); Group-II: Ch-lorpromazine; Group-III: *Acalypha fimbriata* leaves extract (150 mg/kg); Group-IV: *Acalypha fimbriata* stem extract (150 mg/kg); Group V:*Acalypha ornata* leaves extract (150 mg/kg); Group-VI:*Acalypha ornata* stem extract (150 mg/kg); Group-VII: *Acalypha wilkesiana* cv. *godseffiana* leaves extract (150 mg/kg). Group-VIII: *Acalypha wilkesiana* cv. *godseffiana* stem extract (150 mg/kg)

cts of *Acalypha* is not clear. However, as the oral copper sulfate induces emesis by peripheral action (Hossein *etal.*, 2005) and the peripheral 5- HT_4 play an important role in this action (Bhandari *etal.*, 1991; Fukui *etal.*, 1994). The extracts of *Acalypha* were able to effectively prevent its effect, it could be implied that *Acalypha* species have a peripheral antiemetic acti-

vity. *Acalypha* species contain flavonoids (Ikewuchi *etal.*, 2010b) and terpenes (Akinde, 1986) which are reported as active principles against emesis in chick emesis model (Kinoshita *etal.*,1996). Therefore if these compounds are present in the tested extracts, it may be said that they may be involved in the antiemetic activity of these extracts. Further studies are required regarding the active compounds and the mechanism of action responsible for antiemetic activity of these extracts.

It may be said that the preliminary screening of methanol extracts of *Acalypha* species have significant protective effects against copper sulfate induced retching in young chicks, possibly by peripheral action. The present study validates the folk uses of *Acalypha* species against G.I. disorders in Western Nigeria. However, investigation of compounds related to this activity is further required.

Conflict of interest

There is no conflict of interest associated with the authors of this paper.

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