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INTRINSIC ACTIVITY AND POTENCY DETERMINATION FOR ANTIEMETIC EFFECT OF CHIKADOMA (*LUPINUS ARBOREUS*)

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ABSTRACT

Objective: To determine the intrinsic activity and potency rating of *Chikadoma* amongst two other natural remedies for antiemetic activity. **Materials** and **Methods:** Copper sulphate emesis technique was employed in the determination of antiemetic activity. The two other plant materials were *Elaeis guinensis* and *Ocimum gratissimum.* Five groups (I-V) comprising five (2 weeks old) chicks were used. Group 1 received 0.5 ml distilled water orally and served as negative control. Group II received 50 mg/kg of chlorpromazine orally and served as positive control. Group III, IV and V received 200 mg/kg each of *Chikadoma*, *Elaeis guinensis* and *Ocimum gratissimum* extracts orally respectively. **Results:** The leaf extract of *Chikadoma* showed significant intrinsic activity with a potency equal to that of *Ocimum gratissimum* but less potent than *Elaeis guinensis* and the positive control, chlorpromazine. **Conclusion:** The extract of *Chikadoma* exerted intrinsic activity and high potency for antiemetic effect in chicks.

KEYWORDS: Chikadoma, *Lupinus arboreus*, Intrinsic activity, Potency, *Ocimum gratissimum*, *Elaeis guinensis*, antiemetic effect.

INTRODUCTION

Intrinsic activity is the ability of an agent to induce a conformational change in or activate the receptor when it binds to it. It is otherwise called “efficacy”; while potency refers to the concentration by which an agent activates the receptor in comparison with another agent. Simply put, two agents can be equally efficacious but with different potency. The difference

is the concentration by which activation takes place.[1] In South-eastern Nigeria, three plants are prominent in the ethnomedical management of emesis. These plants are *Chikadoma, E. guinensis*, and *O. gratissimum*. They are used singly or as polypharmacy. Most developing nations are endowed with vast resources of medicinal and aromatic plants.[2] Apart from serving as medicinal preparations, *O. gratissimum* is used as spices in which modern food processors use spices to render appealing and appetizing flavours to food. *E. guinensis* is a *species* of palm; native to Guinea Coast of West Africa where it derived its name "*guinensis*" and commonly called oil palm tree[3] or macaw fat tree. *Chikadoma*[4] is the South-eastern (Igbo) Nigeria name of *Lupinus arboreus*, a bushy shrub with bright yellow flowers blended with white and purple colours, so named after a lead researcher Dr. **Chika** Oha**doma** whose novelty scientific studies on this plant pioneered and extensively documented numerous Pharmacological utility of *L. arboreus*.[5] In all gatherings of human, majority of plants that avail active ingredients for prescription drugs attracted the attention of researchers because of their ethnopharmacological use.[6,7] This study therefore, investigated the efficacy and Potency rating of Chikadoma amongst some natural remedies with antiemetic effect.

MATERIALS AND METHODS

Plant materials

Fresh leaves of *Chikadoma* collected from Owerri, Imo State; *E. guinensis and O. gratissimum* collected from Elele, Rivers State, Nigeria were identified officially by Dr. Osuala F.N of Pharmacognosy Department, Madonna University, Elele, Nigeria where Herbarium specimen were deposited.

Preparation of the extracts

The fresh leaves of *Chikadoma, E. guinensis*, and *O. gratissimum* (500 g each) were sliced into small pieces and boiled separately with 2.5 L water for 1 h. After filtration, the resultant solutions were freeze – dried.

Animals

Two weeks old chicks weighing 250 – 300 g were used and maintained under standard environmental conditions. The animals had access to Pellet diets (Pfizer Feeds Plc, Lagos) and clean water. The chicks were transferred to work area and allowed for 7 days acclimatization prior to experimental use.

Antiemetic (intrinsic activity & potency) experimental protocol

The antiemetic activity and potency determination of *Chikadoma* was evaluated using the standard method[8] with slight modification.

A total of 25 chicks (2 weeks old) were employed.

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

Group II: received 50 mg/kg of chlorpromazine only and served as positive control.

Group III: received 200 mg/kg of *Chikadoma* orally

Group IV: received 200 mg/kg of *E. guinensis* orally

Group V: received 200 mg/kg of *O. gratissimum* orally

Emesis was induced after one hour of all the administrations in the animals, using a single oral administration of 50 mg/kg of anhydrous copper sulphate. Immediately, the number of retches was counted for 25 minutes. Retches refer to emetic action without vomiting gastric material. The effect (antienesis) was assessed as the decrease in number of retches in treated groups in contrast to the control. The percentage inhibition was calculated as follows:

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

Where A = the frequency of retching of control group

B = the frequency of retching of treated groups.

Statistical Analysis

Using student's t-test, statistical evaluation was performed in which data were expressed as mean ± standard error of mean (SEM). The values were considered statistically significant when P-value is less than 0.05 ($P < 0.05$).

RESULTS

Antiemesis intrinsic activity and potency determination

The outcomes of the intrinsic activity and potency determination for antiemetic effect of *Chikadoma* leaf extract are as shown in Table 1. The extract showed significant percentage inhibition when compared with the control thereby, manifesting reasonable intrinsic activity. The negative control did not show any inhibition of emesis ($P>0.05$) throughout the period of experimentation. The positive control (chlorpromazine) exhibited significantly ($P<0.01$) percentage inhibition.

The Potency determination showed that at the same concentration (200 mg/kg), *Chikadoma* is as potent as *O. gratissimum* but less potent than *E.guinensis.*

Table 1: Intrinsic activity and potency rating of *Chikadoma* for antiemesis in chicks.

Group	Treatment	Dose (mg/kg)	Number of retches	Percentage inhibition
I	Distilled water (0.5 ml)	-	64 ± 4.0	-
II	Chlorpromazine	50	8 ± 2.0**	87.5
III	*Chikadoma*	200	10 ±1.0*	84.3
IV	*E. guinensis*	200	9 ±1.0**	85.9
V	*O. gratissimum*	200	10 ±1.0*	84.3

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

DISCUSSIONS

The outcome obtained in this study showed that leaf extract of *Chikadoma* possessed remarkable intrinsic activity and potency for antiemetic effect. Among various folkloric claims, the efficacy of *E. guinensis* and *O. gratissimum* leaves in this investigation support previous reports.[9,2] The antiemetic tendency of *Chikadoma* as well as the plants used in the potency comparison may not be unconnected with the plethora of phytochemicals identified in the plants.[11,2,9] However, it is not actually known which of the phytochemicals account for the antiemetic effect in chicks, yet it is believed that the ingredient(s) would have acted on the vagal centre, central trigger zone or the reticular formation to cause their inhibition.[8] Unlike the piperazine phenothiazines (fluphenazine, perphenazine and prochlorperazine) known to exert strong extrapyramidal and antipsychotic effects, chlorpromazine (an aliphatic phenothiazine) is employed as positive control though it possesses moderate antiemetic action but the drug class is preferred and often used for vomiting treatment having the advantage of exerting mild to moderate in both antipsychotic and extrapyamidal effects.[8] With percentage inhibition above 80, all the investigated plants and the orthodox (Positive control) agent manifested superb potency in the following order: chlorpromazine (87.5%) > *E. guinensis* (85.9%) > *Chikadoma* (84.3%) = *O.gratissimum (84.3%).* The position of Chlorpromazine in this potency rating may be related to its pure form as purified agents are known for higher potency than crude or extracts.[12]

CONCLUSION

This work demonstrated that *Chikadoma* leaf extract exerted intrinsic activity as well as significant potency and hence justified its ethnopharmacological application. Further work

however, is encouraged to isolate and characterize the specific active ingredient(s) responsible for this benefit.

Conflict of interest statement

We declare that we have no conflict of interest.

Source of support: Nil.

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