Phytochemical screening and antiemetic activity of *Lepidagathis cristata* root extract.

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**ABSTRACT**

*Lepidagathis cristata* root (Family: Acanthaceae) is an herb distributed in central and eastern peninsular India and used as bitter tonic in fevers and used in pneumonia, flu, mouth and lip infections. An earlier study was carried out on this plant has shown antifungal activity, immunosuppressant activity. Chemotherapy induced nausea and vomiting is a common side effect of many cancer treatments. The development of effective antiemetic prophylaxis is one of the most significant steps forward in the area of supportive care. The potential of this extract as antiemetic activity may be due to the presence of phytoconstituents like alkaloids and terpenoids and might be responsible for its activity. However, so far the antiemetic property of ethanol extract of *Lepidagathis cristata* root had not been carried out. Hence, in the present investigation extract of *Lepidagathis cristata* root was screened for antiemetic activity by using standard procedures. The results illustrated that the extracts of root have antiemetic potential comparable with that of Metoclopramide.

**Keywords:** Chemotherapy, Antiemetic prophylaxis, Metoclopramide.

**INTRODUCTION**

Chemotherapy induced nausea and vomiting (CINV) is a common side effect of many cancer treatments. The development of effective antiemetic prophylaxis is one of the most significant steps forward in the area of supportive care. The potential of this extract as antiemetic activity may be due to the presence of phytoconstituents like alkaloids and terpenoids and might be responsible for its activity. *Lepidagathis cristata* root (family: Acanthaceae) is an herb distributed in central and eastern peninsular India and used as bitter tonic in fevers and used in pneumonia, flu, mouth and lip infections. An earlier study was carried out on this plant has shown antifungal activity, immunosuppressant activity and anti-inflammatory activity¹. Several plants belonging to the genus *Lepidagathis* including *Lepidagathis incurva* known to exhibit strong antioxidant property.

**MATERIALS AND METHODS**

**Plant material**
The plant material was collected from Boduppal, Ranga Reddi district, and Andhra Pradesh, India. It was identified by Dr. (Mrs.) B. Prathibha Devi, Department of Botany, Osmania University, Hyderabad. Voucher no. 0535 of the plant was deposited in the Department of Botany, Osmania University, and Hyderabad. Air-dried under the shade at room temperature. Dried plant material was pulverized and the powder kept in polyethylene bags.

**Experimental Animals**
2-4 days male chicks (32-52 gms) were obtained from poultry. After 24 hrs fasting, the antiemetic activity was evaluated. All chicks were kept under laboratory conditions at room temperature with 12hr light and dark cycles.

The experimental protocol was duly approved by institutional animal ethics committee (IAEC) and care of the animals was carried out as per the guidelines of committee for the purpose of control and supervision of experiments on animals (CPCSEA) (IAEC: I/IAEC/LCP/034/2013/CK-40).

**Drugs, Chemicals, Reagents**
Copper sulphate was purchased from SD Fine Chemicals Limited, Metaclopramide Hydrochloride was purchased from IPCA Laboratories, Poly Oxy Ethylene Sorbitan Monoleate (Tween 80), Acetic Anhydride, Sulphuric Acid, Lead Acetate, Nitric Acid, Copper Acetate and all other reagents were purchased from Sd Fine Chemicals Limited.

**Preparation of extracts**
Accurately weighed plant material was extracted with ethanol by using Soxhlet apparatus. Solvent recovery done by using simple distillation method. Extract was collected and stored in refrigerator.

**Preliminary phytochemical screening**
Preliminary phytochemical study was screened for presence of alkaloids, phenols, phytosterols, Saponins, proteins and amino acids, flavonoids, diterpens & triterpenes. These were identified by characteristic colour changes using standard procedures.

**Anti-Emetic Activity**
Anti-Emetic effect was determined by calculating the mean decreases in number of retching following the protocols. Chicks are divided into three groups of five chicks each chicks was kept in beaker at 25°C for 10 min. The extract of Lepidagathis cristata was dissolved in 1% Tween 80 and administered at a dose of 50 mg/kg, 100 mg/kg , 200 mg/kg orally and volume of 10 ml/kg to test animal on the basis of body weight. Control group received only 1% Tween 80 Metoclopramide was used as standard drug (50 mg/kg) B.W. (Intra peritoneally). 10 min. later 50 mgs anhydrous copper sulphate /kg body weight was administered orally to each chicks, then the number of retches (an emetic action without vomiting gastric material) was counted for next 10 min., The Anti-Emetic Effect was assessed as the decreasing the number of retches in the treated group in contrast to the control. The inhibition 95% was calculated as follow.

Inhibition (%) = \( \frac{(A-B)}{A} \times 100 \)

Where, A is the control frequency of retches, B is the frequency of retching of the treated group.

**RESULTS AND DISCUSSION**

**Preliminary phytochemical screening**
By preliminary phytochemical screening it was found that flowers extract contain alkaloids, phytosterols, diterpins, amino acid & protein, flavonoids & phenolic compounds. (Table 1)

<table>
<thead>
<tr>
<th>Extract</th>
<th>Alkaloids</th>
<th>Phenol compounds</th>
<th>Glycosides</th>
<th>Tannins</th>
<th>Flavonoids</th>
<th>Saponins</th>
<th>Steroids</th>
<th>Terpenoids</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ethanol extract</td>
<td>+</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>(Root)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

‘+’ indicates presence of constituents  ‘-‘ indicates absence of constituents

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Anti-Emetic Activity
Result of the antiemetic activity of ethanol extract of Lepidagathis cristata root was given in Table 2. After administration of a dose of 50mg/kg BW metoclopramide and the extract of seeds (50 mg/kg, 100 mg/kg, 200 mg/kg BW respectively), the number of retches were reduced. The group of chicks treated with metoclopramide was found to have 15.8 ± 1.428 retches as compared to the 68.6 ± 2.482 retches of control group, thus metoclopramide reduced the retches by 76.968%. The chicks treated with root extract 50 mg/kg inhibited the retches up to 22.741%, 100 mg/kg inhibited the retches up to 48.688%, 200 mg/kg inhibited the retches up to 73.761%. Therefore, ethanol extract of 200 mg/kg inhibited emesis to an extent equal to metoclopramide at 50mg/kg.

Table 2 Antiemetic activity of ethanol extract of Lepidagathis cristata root

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Drug / Dose</th>
<th>Number of retches (Mean ± S. E. M)</th>
<th>% Inhibition</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Control (10ml/kg)</td>
<td>68.6 ± 2.482</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Metoclopramide</td>
<td>15.8 ± 1.428</td>
<td>76.968</td>
</tr>
<tr>
<td>3</td>
<td>Extract (50 mg/kg)</td>
<td>53 ± 3.755</td>
<td>22.741</td>
</tr>
<tr>
<td>4</td>
<td>Extract (100 mg/kg)</td>
<td>35.2 ± 1.594</td>
<td>48.688</td>
</tr>
<tr>
<td>5</td>
<td>Extract (200 mg/kg)</td>
<td>18 ± 1.225</td>
<td>73.761</td>
</tr>
</tbody>
</table>

S.E.M= Standard Error Mean.

The results illustrated that the extracts of root have antiemetic potential comparable with that of metoclopramide (Fig 1.).

Retching may occur after administration of cancer chemotherapeutic agents. Chemotherapy induced nausea and vomiting (CINV) is a common side effect of many cancer treatments. Chemotherapeutic agents or their metabolites can directly activate the medullary chemo receptor trigger zone or vomiting center or act peripherally by causing cell damage in the gastrointestinal tract and releasing serotonin from entero chromaffin cells of the small intestinal mucosa. The released serotonin activates 5-HT receptors on vagal and splanchnic afferent fibers, which then carry sensory signals to the medulla, leading to the emetic response. It has also been established that the peripheral 5-HT receptors play an important role in copper sulphate induced emesis.
Although the results are significant but the mode of action is not known. Lepidagathis cristata root reduces copper sulphate induced retchings in young chicks, possibly by peripheral action as the oral copper sulphate induces emesis by peripheral action through excitation of visceral afferent nerve fibers of the gastro intestinal tract. This study also justifies the traditional use of Lepidagathis cristata in GIT complaints. From chemical point of view, root of Lepidagathis cristata contain alkaloids and terpenes showed significant activity as compared to standard. Therefore it may be said that alkaloidal contents may play some role in antiemetic effect. Further studies are required to determine the exact mode of action and the active compounds responsible for these effects.

CONCLUSION
The development of effective antiemetic prophylaxis is one of the most significant steps forward in the area of supportive care. This development has not only led to improve efficacy but also to a decrease risk associated with the use of Antiemetics. The results of this study suggest that the ethanol extracts of Lepidagathis cristata (200 mg/kg) have protective effect against copper sulfate induced–retching in young chickens, possibly by peripheral and central mechanisms. The potential of this extract as antiemetic activity may be due to the presence of phytoconstituents like alkaloids and terpenes and might be responsible for its activity. Further studies (including the analysis and identification of the specific active compounds, toxicological and hematological studies) with this plant extract should be carried out using higher animal models, in order to authenticate it as a potent antiemetic agent.

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REFERENCES