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Research Article

Phytochemical screening and anti-emetic activity of *Leonotis nepetifolia* leaves extract

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Abstract

Objectives: *Leonotis Nepetifolia* (Family: Lamiaceae) is a herb distributed in central and eastern peninsular India which is used as a bitter tonic in fevers and also used in pneumonia, flu, mouth and lip infections. The present study focuses on the investigation of antiemetic activity of *Leonotis Nepetifolia* leaf extract.

Method: The study includes preliminary investigation of phytochemical constituents followed by the antiemetic activity of *Leonotis Nepetifolia* leaf extract on 2-4 days male chicks (32-52gms).

Results: The results reveal the presence of bioactive constituents comprising alkaloids, flavonoids, phenolics, tannins, glycosides, steroids and saponins in different solvents and also have antiemetic potential comparable with that of the reference drug Metoclopramide. Ethanol extract of 200 mg/kg inhibited the retches up to 73.761%, which inhibited emesis to an extent equal to Metoclopramide at 50mg/kg.

Conclusion: The antiemetic potential of *Leonotis Nepetifolia* leaf extract may be due to the presence of phytoconstituents like alkaloids and terpenoids.

Keywords: *Leonotis Nepetifolia*, leaf extract, phytochemical study, Anti-emetic activity, Metoclopramide.

1. Introduction

Medicinal plants are known to provide a rich source of raw materials as traditional medicines in the treatment of various diseases for the past. According to WHO, 80% people in developing countries, particularly those living in villages till today depend on traditional plant based medicines principally due to their low price. India exhibits a wide range of environmental conditions from sea level to high altitudes. India harbors include many important medicinal plants, some of whose potential is yet to be explored [1].

The genus Leonotis has 12 species widely distributed in Pan Tropics which is represented by one species, *Leonotis Nepetifolia* in India. It belongs to family Lamiaceae [2]. *Leonotis Nepetifolia* is an important medicinal plant of reputed Indian traditional systems of medicine such as Ayurveda, Unani and Siddha. The orange yellow coroneted verticilaster inflorescence and distinct plant odor are the unique characters. *Leonotis Nepetifolia* has been used to treat bronchial asthma, diarrhea, fever, influenza, malaria and also used as an analgesic. The plant has been evaluated for its hypotensive potential, anti-inflammatory activity and anti-plasmodial activity [3]. The infusion of the leaves has traditionally been used to cure the stomach pain in children and also to cure cough and cold by tribes of Melghat (MS) India.

Vomiting is an involuntary, forceful expulsion of the contents of the stomach through the mouth and sometimes the nose [4]. Vomiting can be caused by a wide variety of conditions; it may present as a specific response to ailments like gastritis or poisoning, or as a non-specific sequel of disorders. Antiemetic agents are the most common intervention in the management of treatment-related nausea and vomiting (N&V). The basis for antiemetic therapy is the neurochemical control of vomiting [5]. Although the exact mechanism is not well understood, peripheral neuroreceptors and the chemoreceptor trigger zone (CTZ) are known to contain receptors for serotonin, histamine (H1 and H2), dopamine, acetylcholine, opioids and numerous other endogenous

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neurotransmitters [6]. Chemotherapy induced nausea and vomiting (CINV) is a common side effect of many cancer treatments. Retching may occur after administration of cancer chemotherapeutic agents. 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 sulfate induced emesis [7].

Leonotis Nepetifolia used as a bitter tonic in fever and also used in the treatment of pneumonia, flu, mouth and lip infections. Recent studies carried out on the plant have shown antifungal, antibacterial, antidiabetic and immunosuppressant activity. The present study aims at determining the antiemetic activity of *Leonotis Nepetifolia* leaves. Anti-Emetic effect can be obtained by calculating the mean decreases in number of retchings in the experimental animals.

2. Materials and Methods

2.1 Chemicals and Reagents

Metoclopramide Hydrochloride was purchased from IPCA Laboratories, Copper sulphate, 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.

2.2 Plant material and Extraction

Leonotis Nepetifolia leaves were identified by the Department of Botany, Osmania University, Hyderabad. The leaves were thoroughly washed with distilled water to remove the impurities and were subjected to air-drying. The dried leaves were ground into fine powder and then extracted by Soxhlet apparatus using ethanol. The resultant mixture was concentrated using rotary evaporator and the dry powder was stored in a refrigerator.

2.3 Preliminary Phytochemical screening

Qualitative phytochemical tests were performed to detect the presence of active chemical compounds such as alkaloids, phenols, phytosterols, saponins, proteins, amino acids, flavonoids, diterpenes and triterpenes. These are identified by characteristic color changes using standard procedures [8].

2.4 Experimental Animals

2-4 days male chicks (32-52gms) were obtained from poultry. After 24 hrs fasting, the Anti-emetic activity was evaluated. The chicks were kept under laboratory conditions at room temperature with 12hr light and dark cycles. The experimental protocol was duly approved by the institutional animal ethics committee (IAEC) and animal care was performed as per the guidelines of the committee for the purpose of control and supervision of experiments on animals (CPSEA) (IAEC:1/IAEC/LCP/0109/2017/LK80)

2.5 Anti-Emetic Activity

Anti-Emetic effect was determined by calculating the mean decreases in the number of retching following the protocols [9]. Chicks are divided into three groups of five chicks, each chick was kept in a beaker at 25^0C for 10 min. The extract of *Leonotis Nepetifolia* was dissolved in 1% Tween 80 and administered at a dose of 50mg/kg, 100mg/kg, 200mg/kg orally and a volume of 10 ml/kg to test animal on the basis of body weight. The Control group received only 1%Tween 80. Metoclopramide was used as standard drug (50 mg/kg) B.W. Intra peritoneal, 10 minutes later 50 mg anhydrous copper sulfate per kg body weight was administered orally to each chick, then the number of retches (an emetic action without vomiting gastric material) was counted for next 10 minutes. [10] 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 follows.

$$\text{Inhibition (\%)} = \{(A-B)/A\}*100$$

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

3. Results and Discussions

3.1 Phytochemical Screening Test

The findings of the phytochemical screening of ethanolic crude leaf extracts of *Leonotis Nepetifolia* are presented in Table 1. The results indicate that terpenoids, saponins, steroids, alkaloids, and flavonoids are present in the ethanolic leaf extracts.

Table 1: Preliminary phytochemical screening of *Leonotis Nepetifolia* leaves

Extract	Alkaloids	Phenol compounds	Glycosides	Tannins	Amino acids	Flavonoids	Saponins	Steroids	Terpenoids
Ethanol extract (Leaves)	+	-	-	-	-	+	+	+	+

'+' indicates-presence of constituents **'-' indicates-absence of constituents**

3.2 Anti-Emetic Activity

The results of the antiemetic activity of ethanol extract of *Leonotis Nepetifolia* leaf were given in table and figure 2. After administration of a dose of 50mg/kg body weight metoclopramide and *Leonotis Nepetifolia* extract of (50 mg/kg, 100 mg/kg, 200 mg/kg BW respectively), the number of retches was 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 leaves extract 50 mg/kg inhibited the retches up to 22.741%, 100 mg/kg inhibited the retches up to 48.688% and 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. The results illustrated that the extracts of leaf have antiemetic potential comparable with that of Metoclopramide (the reference drug).

Table 2: Antiemetic activity of ethanol extract of *Leonotis Nepetifolia* leaves

	Drug / Dose	Number of retches (Mean ± S. E. M)	% Inhibition
1	Control (10ml/kg)	70 ± 1.672	-
2	Metoclopramide	17 ± 1.468	78.338
3	Extract (50 mg/kg)	55± 1.575	24.481
4	Extract (100 mg/kg)	37.2 ± 1.694	50.688
5	Extract (200 mg/kg)	20 ± 1.325	75.321

S.E.M = Standard Error Mean.

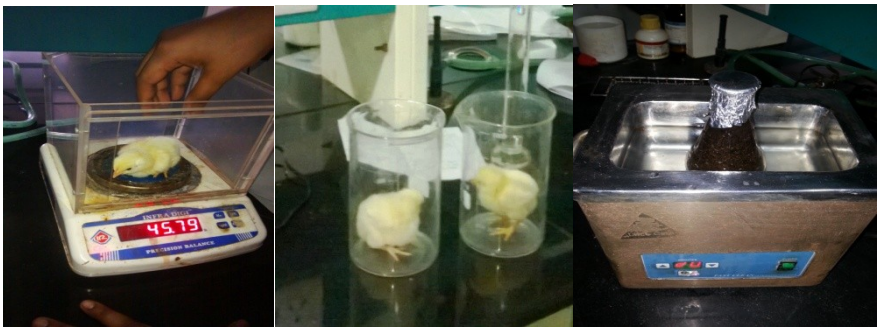

Figure 1: Anti emetic activity of *Leonotis Nepetifolia* ethanolic leaf extract on chicks

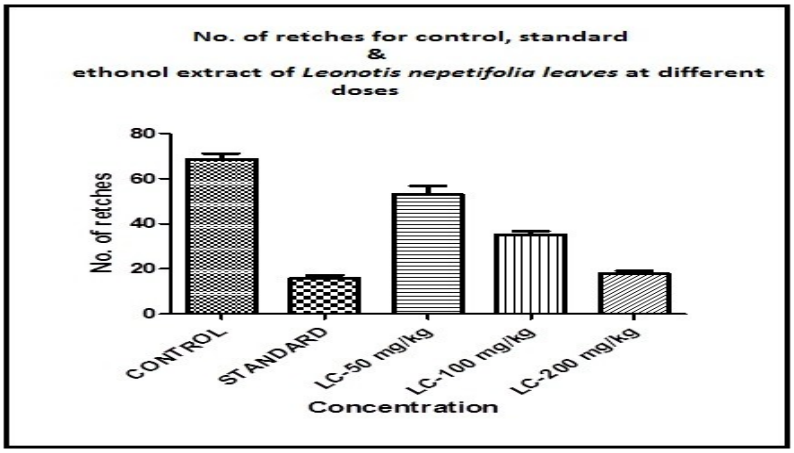

Figure 2: Number retches for control, standard and ethanol extract of *Leonotis Nepetifolia* leaves at different doses.

Although the results are significant but the mode of action is not known. *Leonotis Nepetifolia* leaves reduce copper sulfate induced retchings in young chicks, possibly by peripheral action as the oral copper sulfate 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 *Leonotis Nepetifolia* in GIT complaints. From a chemical point of view, leaves of *Leonotis Nepetifolia* 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.

4. 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 Anti-emetics. The results of this study suggest that the ethanolic leaf extract of *Leonotis Nepetifolia* (200 mg/kg) has 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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