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## ANTIASTHMATIC EFFECT OF ROOTS OF *CLITOREA TERNATEA* LINN.

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### ABSTRACT

**Keywords:**

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*Clitoria ternatea* L. (Family: Fabaceae) is being used in traditional medicine for the treatment of severe bronchitis and asthma. So the aim of study was to evaluate antioxidant and antiasthmatic activity of ethanol extract of *Clitoria ternatea* roots. The present investigation was undertaken to evaluate the histamine-induced bronchospasm of alcoholic extract of *Clitoria ternatea* Linn. roots in experimental animals. Bronchodilator activity of aqueous extract of *C. ternatea* studied on the histamine aerosol induced bronchospasm in wister rats. Treatment with alcoholic extract of *clitoria ternatea* (400 mg/kg, p.o) showed significant protection against histamine aerosol induced bronchospasm in wister rats. The results of the histamine- induced bronchospasm paradigms demonstrate bronchospasmolytic activity of ethanolic extract of *clitoria ternatea* (400 mg/kg, p.o.). *Clitoria ternatea* shows 47.45 % protection against histamine induced bronchoconstriction in rats. These results suggest that aqueous extract of *C. ternatea* has not only bronchodilating activity but also decreases bronchial hyperreactivity by decreasing the infiltration of inflammatory cells in the airway and inhibition of release of histamine like mediators from the mast cell by stabilizing it. *Clitoria ternatea* is diuretic and laxative, a decoction is given as a demulcent in the irritation of the bladder and urethra. It is useful in ophthalmopathy, bronchitis, asthma tubercular glands, hemicrania, burning sensation, starnjury, helminthiasis, inflammation, vitiated condition of pitta vicerormegaly and fever.

**INTRODUCTION:** Bronchial asthma is an inflammatory disorder of the airways characterized by various airway obstruction, airway inflammation and bronchial hyperresponsiveness<sup>1</sup> and is a global health problem that results from a complex interplay between genetic and environmental factors. Nearly 7–10% of the world population suffers from bronchial asthma. Among several respiratory diseases affecting man, bronchial asthma is the most common disabling syndrome. Despite the availability of a wide range of drugs, the relief offered by them is mainly symptomatic and short lived.

Moreover, these drugs produce side effects. Therefore, there is a dire need to identify effective and safe remedies to treat bronchial asthma<sup>2</sup>.

The current accepted modern medicine or allopathy has gradually developed over the years by scientific and observational efforts of scientists. However, the basis of its development remains rooted in traditional medicine and therapies. Herbal medicines are being used by nearly about 80% of the world population; primarily in developing countries for primary health care.

Assessing the current status of health care system in adequacies of synthetic drugs is likely to be more glaring in the coming years. It has been reported that there has been an alarming increase in number of diseases and disorders caused by synthetic drugs prompting a switch over to traditional herbal medicine. Ayurveda is a traditional Indian Medicinal System practiced for thousands of years. Considerable research on pharmacognosy, chemistry, pharmacology and clinical therapeutics has been carried out on ayurvedic medicinal plants. The polyherbal formulations described in Ayurveda have been the basis of treatment of various human diseases. Selection of scientific and systematic approach for the biological evaluation of herbal formulations based on their use in the traditional systems of medicine forms the basis for an ideal approach in the development of new drugs from plants.

In the light of above background, the present study is aimed at evaluation of *Clitoria ternatea* for the possible antiasthmatic action using experimental animals<sup>3</sup>.

**Asthma:** Asthma is the common chronic inflammatory disease of the airways characterized by variable and recurring symptoms, reversible airflow obstruction, and bronchospasm. Symptoms include wheezing, coughing, chest tightness, and shortness. Asthma is clinically classified according to the frequency of symptoms, forced expiratory volume in 1 second (FEV1),<sup>4</sup> and rate. Asthma may also be classified as atopic (extrinsic) or non-atopic (intrinsic).

It is thought to be caused by a combination of genetic and environmental factors<sup>5</sup>. Treatment of acute symptoms is usually with an inhaled short-acting beta-2 agonist (such as salbutamol). Symptoms can be prevented by avoiding triggers, such as allergens and irritants and by inhaling corticosteroids. Leukotriene antagonists are less effective than corticosteroids and thus less preferred<sup>6</sup>.

Its diagnosis is usually made based on the pattern of symptoms and/or response to therapy over time<sup>7</sup>. The prevalence of asthma has increased significantly since the 1970s. As of 2010, 300 million people were affected worldwide. In 2009 asthma caused 250,000 deaths globally.

Despite this, with proper control of asthma with step down therapy, prognosis is generally good<sup>8</sup>.

#### **Collection and identification of the Plant Material:**

The roots of *clitoria ternatea* was collected from the Bhopal in the month of January 2011 and authenticated at Safia College of science, peer gate, Bhopal, Madhya Pradesh and authenticated. The voucher specimen (235/bot/safia/11) of *Clitoria ternatea* was deposited in Department of Pharmacognosy, Technocrats Institute of Technology-college of Pharmacy, Bhopal, and Madhya Pradesh.

**Preparation of Powder:** The root of *clitoria ternatea* was dried in shade and then powder with a mechanical grinder. The powder were stored in a labelled air tight container for further studies.

**Extraction of Plant Material:** The powdered plant material was subjected to successive solvent extraction taking from nonpolar to polar solvents like petroleum ether, chloroform, ethyl acetate, methanol, water, and 50gms of powdered plant material was subjected to soxhlet extraction with 300ml of the various solvents. The extracts obtained were later kept for evaporation to remove the excessive solvents. These extracts were stored in a cool dry place for the analysis for the presence of preliminary phytochemicals and activity.

#### **Anti-Asthmatic Activity:**

**Animal care and Handling:** The experiment was carried out on Wistar albino rats of 4 months, of both sexes, weighing between 100 to 150 gm. They were provided from Sapience Bio-analytical Research Lab, Bhopal, (M.P.). The animals were acclimatized to the standard laboratory conditions in cross ventilated animal house at temperature 25±2°C relative humidity 44-56% and light and dark cycles of 12:12 hours, fed with standard pellet diet and water *ad libitum* during experiment. The experiment was approved by the institutional ethics committee and as per CPCSEA guidelines (approval no. 1413/a/11/CPCSEA).

**Chemicals:** Histamine diphosphate was purchased from Himedia and chlorpheniramine maleate inj. (Savil) was purchased from rajshree medical store, Bhopal. All other chemicals used for this study were of analytical grade.

**Preparation of Formulation:** After preparation of extract the next step was to formulate a suspension of extracts of *Clitoria ternatea* which were then subjected to animal studies. Suspension of the drug was made by dissolving 1gm of extract in 10 ml of 2% acacia solution.

**Experimental Design:** In the experiment, a total of 20 rats were used. The rats were divided into 5 groups comprising of 4 animals in each group as follows:

**Group I:** Inducer control rats received histamine (0.2%, aerosol)

**Group II:** STD treated rats received chlorpheniramine maleate (2 mg/kg, i.p.)

**Group III:** Rats received .....extract of *clitoria ternatea* (400 mg/kg p.o.)

**Histamine Aerosol induced Bronchospasm:** Histamine was dissolved in distilled water and 0.2% w/v solution prepared. Experimental bronchial asthma was induced in rats by exposing them to histamine aerosol produced by an ultra-sound nebulizer in an aerosol chamber (24×14×24 cm) made of Perspex glass. The time required for appearance of pre-convulsive dyspnoea caused by the histamine was recorded for each animal. Prior to drug treatment, each animal was placed in the histamine chamber and exposed to 0.2 % histamine aerosol.

The preconvulsion time (PCT), i.e. the time of aerosol exposure to the onset of dyspnoea leading to the appearance of convulsion, was noted. As soon as the preconvulsion dyspnoea (PCD) was noted, the animals were removed from the chamber and placed in fresh air to recover. This time for preconvulsive dyspnoea was recorded as basal value. Rats were then allowed to recover from dyspnoea for 24 hrs.

After 24 hrs, the animals group-III received *Clitoria ternatea* (400mg/kg) extract respectively and Std. received Chlorpheniramine maleate. These animals were again subjected to histamine aerosol later at an interval of 1 hr, 4 hrs and 24 hrs to determine preconvulsion time (PCT). The protection offered by the treatment was calculated by using the following formula

$$\text{Percentage protection} = (1 - T_1/T_2) \times 100$$

Where,  $T_1$  = the mean of Preconvulsion Dyspnoea Time before administration of test drugs, and  $T_2$  = the mean of Preconvulsion Dyspnoea Time after administration of test drugs at 1 hr, 4 hr and 24 hrs.

## RESULT AND DISCUSSION:

### Antiasthmatic Activity Results:

**Statistical Analysis:** The statistical analysis was performed by using one-way analysis-of-variance (ANOVA) Followed by Dunnett's test for comparison of groups with Normal control.

**TABLE 1: EFFECT OF EXTRACT OF CLITORIA TERNATEA ON HISTAMINE INDUCED BRONCHOCONSTRICTION IN RATS**

Groups	Preconvulsion Dyspnoea Time (sec) (mean ± SEM)			
	Before	After 1 hr	After 4 hr	After 24 hr
Group I	19.1±1.05	16.9±0.44	15.2±0.63	14.4±1.22
Group II	18.2±0.47	63.8±2.31*	69.4±2.24*	33 ±1.05*
Group III	18.6±0.43	44.2±1.07*	56.4±2.01*	35.4±1.40*

Values are mean ± SEM from a group of four animals. \*p<0.01 when all treatment groups compared to group-I (Inducer control)

**TABLE 2: PERCENT PROTECTION AGAINST HISTAMINE INDUCED BRONCHOCONSTRICTION IN RATS**

Groups	% protection		
	1 hr	4 hr	24 hr
Group II	71.47	73.77	44.84
Group V	57.91	67.02	47.45

**DISCUSSION:** Asthma is a common respiratory disease. The morbidity and mortality of the disease is increasing and making it a global concern<sup>10</sup>. The syndrome of bronchial asthma is characterized by wide spread narrowing of the bronchial tree due to contraction of the smooth muscle in response to multiple stimuli resulting in the release of chemical mediators such as histamine.<sup>11</sup> Wister rats is used for screening of antihistaminic activity.

Histamine induced bronchoconstriction is the traditional immunological model of antigen induced airway obstruction. Histamine when inhaled causes hypoxia and leads to convulsion in Wister rats and causes very strong smooth muscle contraction, profound hypotension and capillary dilation in cardiovascular system. A prominent effect caused by histamine leads to severe bronchoconstriction in the Wister rats that causes asphyxia and death. Bronchodilators can delay the occurrence of these symptoms.

The results of the study confirmed the bronchodilator properties of the plant, justifying its traditional claim in the treatment of asthma.

Drugs effective in the asthma are mostly steroidal in nature. Phytochemical profile of the plant reveals the presence of flavonoids, steroidal nucleus in form of triterpenoids and various saponin glycosides. The antiasthmatic activity showed by the plant may be because of these chemical moieties.

The results obtained in this study clearly demonstrate that the extracts of and *Clitoria ternatea* showed antiasthmatic activities against histamine induced bronchoconstriction. However this claim demands for further research and the studies are infact underway to isolate and characterize the active principles responsible for the anti-asthmatic activity<sup>9-11</sup>.

**CONCLUSION:** In the present study, extract of *Clitoria ternatea* significantly inhibited the histamine induced bronchoconstriction of rats indicating its H<sub>1</sub> receptor antagonistic activity and support the anti asthmatic properties of the plants. The results obtained in the study will provide basic data for further development and utilization of these plants.

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