



## EVALUATION OF ANTI-ASTHMATIC ACTIVITY OF *TINOSPORA CORDIFOLIA* ROOT EXTRACT AGAINST ACH AND CITRIC ACID INDUCED ASTHMATIC RATS

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### Abstract

Asthma is a chronic inflammatory lung disorder. Limitations of currently available therapies and associated side effects have created an urge to search new and better treatment options. Thus, this particular study was designed to evaluate the anti-asthmatic activity of *Tinospora cordifolia* using rat models. Ethanolic extract of dried roots of *T. cordifolia* was prepared and used in the dose of 100 and 200mg mg/kg; (p.o.). In-vivo models like histamine induced bronchospasm in rats, and acetylcholine induced contraction in rats preparations were used for evaluating anti-asthmatic activity of the drug. The major phytoconstituents in *Tinospora cordifolia* includes tinosporine, tinosporol, clerodane furanoditerpene, tinosporide, tinosporaside. Choline and tinosporin are accounted from the roots of the plant. Ethanolic extract of the drug showed a significant bronchodilatory and anti-histaminic, anti-inflammatory, mast cell stabilization, and anticholinergic activity in histamine induced bronchospasm in wistar rats. Thus, Ethanolic extract of dried roots of *Tinospora cordifolia* has significant antiasthmatic activity.

**Keywords:** Antiasthmatic activity, *Tinospora cordifolia*, Bronchospasm, Mast cell stabilization, Ketotifen, Theophylline.

### Introduction

The Global Asthma Report highlights all the major issues related to prevention and management of asthma, including access to essential medicines, national strategies, and policy. It is an excellent tool for advocacy purposes in all countries suggesting concrete actions for all stakeholders. Asthma kills around 1000 people every day and affects as many as 339 million people - and prevalence is rising. Low- and middle-income countries disproportionately suffer the most severe cases. Asthma is a hyper reactive airway disease running a chronic course; it has worldwide prevalence and is a common cause hospitalization in children (Global Asthma Report, 2018).

Asthma is a fiery issue of the aviation route in which numerous cells and cell components assume a job, specifically, pole cells, eosinophils, T-lymphocytes, macrophages, neutrophils and epithelial cells. In helpless people, this irritation causes intermittent scenes of wheezing, windedness, chest snugness and hacking, especially during the evening or towards the beginning of the day. These scenes are normally connected with broad yet factor wind stream block that is reversible either precipitously or with treatment. The irritation additionally causes a related increment in the current bronchial responsiveness to an assortment of boosts (Lippincott, 2010; Goodmann and Gilman, 2001 and Conceptual Pharmacology, 2010). Thus keeping in view all the above factors of severity and associated symptoms of the disease an attempt has been made to study antiasthmatic activity of the plant using animal models.

### Materials and Methods

#### Procurement of Plant material and experimental animals

Based on the literature review, the plant was collected from authenticated plant supplier and identified by botanist. Healthy adult Wistar rats of either sex between 8 of 12 weeks of age after IAEC approval procured from registered animal house. All the rats were kept under acclimatization for 5 days prior to grouping and initiation of experiment. The animals were kept in clean and dry plastic cages, with 12 h light: 12 h dark cycle at 25+20 c temperature and 45 – 60% relative humidity. Animals were given free access to standard feed and water ad libitum. For experimental purpose the animals were kept on overnight fasting but allowed free access to water. The protocol of the experiment was approved by Institutional Animal Ethical Committee (IAEC) as per the guidance of the Committee for the Purpose of Control and Supervision of Experiments on Animals (CPCSEA), Ministry of Social Justice and Empowerment, Government of India (Protocol No. IAEC: 1625/PO/a12/CPCSEA, 2018).

#### Methodology of extraction

Roots were carefully air dried under shade over a period of 7 days, cut to small pieces, powdered and sieved by 60 No mesh. Powdered material was defatted using petroleum ether and was extracted in soxhlet apparatus with 90% of ethanol and concentrated by using desiccators. The final amount of solid residue was 35% w/w.

#### Methodology of preliminary phytochemical screening

The extracted plant material was subjected to preliminary phytochemical screening using standard

procedures for the presence of phytoconstituents (Ghosal *et al.*, 1997).

### Methodology of antiasthmatic activity

Asthma was induced by citric acid 0.1 mg and acetylcholine 0.2 mg in the form of spraying in alternative days for two weeks. The extract of *Tinospora cordifolia* and Theophylline was administered by nasal route for two weeks. Overnight fasted Rats were divided into four groups Inducer control (IC) = Acetylcholine + Citric acid (0.2% spray), Standard group received Theophylline (200 mg/kg), and Test group –I AETCR (100mg/kg) & Test group –II Acetylcholine and Citric corrosive (0.2% shower) created by an ultra sound nebulizer in an airborne chamber (24\*14\*24 cm) made of Perspex glass was used to induce dyspnoea. When dyspnoea was noticed, the rats were expelled from the chamber and set in outside air to recoup as basal esteem. Rats were then permitted to recoup from dyspnoea for 24 hrs. After 24 hours, the animals of standard group got Theophylline (200 mg/kg), AETCR (100mg/kg and 200mg/kg). Then the animals were again subjected to Acetylcholine + Citric

corrosive 0.2% airborne later at an interim of 1hour, 4hours, and 24 hours (Maurya *et al.*, 1998; Kiem *et al.*, 2010; Bhoomika *et al.*; Vidya *et al.*, 2020)

### Statistical Analysis

All the values were expressed as mean  $\pm$  SEM. The results were analyzed for statistical significance by using one-way ANOVA followed by Dunnett's test.  $P < 0.05$  was considered significant.

### Results

The Ach + Citric acid induced asthma in rats, results have expressed on Table 1. All the groups of animals were affected with asthma, which indicated that the root extract of *Tinospora cordifolia* 100 & 200 mg/kg possesses antiasthmatic activity in dose dependent manner when compared with control group but positive control showed more anti asthmatic activity. Ethanolic extract of *Tinospora cordifolia* 200 mg/kg has shown equipotent activity compared with positive control. The antisthamatic activity might be due the presence of phytoconstituents present in the extract.

**Table 1 :** Dyspnoea in different experimental groups and protective effect of extracts

Treatment	Dose	Before	1 Hour	4 Hours	24 Hours
Negative Control	Ach + Citric acid	17.2 $\pm$ 2.2739	18.1 $\pm$ 0.1250	17.4 $\pm$ 0.091	17.2 $\pm$ 0.110
Positive Control	Ach + Citric acid + Theophylline	19.2 $\pm$ 0.1250	54.8 $\pm$ 1.315	61.3 $\pm$ 1.548**	34 $\pm$ 1.472**
AETCR	100 mg/kg	17.3 $\pm$ 0.1371	41 $\pm$ 1.291	43 $\pm$ 1.291	22.8 $\pm$ 0.478
AETCR	200 mg/kg	17.5 $\pm$ 0.2955	57.8 $\pm$ 1.750	57.8 $\pm$ 1.750**	33 $\pm$ 1.225**

### Discussion

Asthma is common respiratory disease. The morbidity and the mortality of the disease is increasing and making a global concern. 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 Ach and Citric acid. In the presence study *Tinospora cordifolia* significantly inhibited the Ach and Citric acid induced anti asthmatic properties of the plant Ach and Citric acid induced Bronchoconstriction is the traditional immunological model of the antigen induced air way obstruction. Ach and Citric acid when inhaled causes hypoxia and leads to convulsion in rats and causes very strong smooth muscle contraction, profound hypotension, capillary dilation in cardio vascular system a prominent effect caused by histamine leads to severe Bronchoconstriction in rats that causes asphyxia and death (Gupta *et al.*, 2002). Bronchodilator 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 and also Flavonoids in nature. Phytochemical profile of the plant reveals the presence cinnamaldehydes in the form of Flavonoids (Yih-Loong Lai *et al.*, 2009). The anti asthmatic activity showed by roots of the plant extract may be because of the chemical moieties. However this claims demands for further research and studies are in fact underway to isolate and characterized the active principles responsible for the anti asthmatic activity.

### Conclusion

The results of the study confirmed bronchodilator properties of the plant justifying its traditional claim in the treatment of asthma. The Antiasthmatic activity showed by roots of the plant extract may be because of the chemical moieties. However this claims demands for further research and studies are in fact underway to isolate and characterize the active principles responsible for the antiasthmatic activity

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