Anti asthmatic activity of leaves of *Cordia subcordata* Lam. (Boraginaceae)

*A.Pandi Selvi, S. Rajkumar, G. Sandhya*

*Department of Pharmacology, Innovative College of Pharmacy, Greater Noida, Uttar Pradesh, India-201 308.

**ABSTRACT**

Over the past decade, herbal and ayurvedic drugs have become a subject of world importance, with both medicinal and economical implications. A regular and widespread use of herbs throughout the world has increased serious concerns over their quality, safety and efficacy. Thus, a proper scientific evidence or assessment has become the criteria for acceptance of herbal health claims. the leaves of *Cordia subcordata* Lam. (Boraginaceae), is widely used in remedies for bronchitis and asthma. We examined the effect of ethanol extract of bark of *Cordia subcordata* Lam. at 25, 50,100mg/kg doses orally in the isolated goat tracheal chain preparation, passive paw anaphylaxis in rat. The extract showed significant dose-dependent antiasthmatic activity in all these models.

**Keywords:** Antiasthmatic activity, *Cordia subcordata* Lam., Boraginaceae.

**INTRODUCTION**

*Cordia subcordata* Lam. (Boraginaceae) is Widespread from east Africa through tropical Asia and throughout the tropical Pacific. The plant is also used to treat rheumatic aches and swellings of muscles and joints. In New Guinea, a preparation made from the leaves is used to treat knee wounds or skin ulcers. In Tahiti, the leaves are used in remedies for bronchitis and asthma where the leaves probably act as a purgative. The plant is also used in the treatment of hepatic infections, cirrhosis of the liver and inflammation of the lymph nodes [1-3]. Even though *Cordia subcordata* Lam. was reported to be useful in a many ailments, scientific evaluation of the plant was not reported for its antiasthmatic activity. Hence, in the present study, the antiasthmatic activity of extract of roots of *Cordia subcordata* Lam. was studied using different in vivo and in vitro animal models.

**MATERIALS AND METHODS**

**Plant collection**

The Plant material of bark of *Cordia subcordata* Lam. used for investigation was collected from S.V. University at Tirupathi, Chittoor (Dist.), Andhra Pradesh, India. The plant was authenticated by Dr. K. Madhava Chetty, Department of botany, S.V.University, Tirupathi.

**Preparation of extracts**

The bark of *Cordia subcordata* Lam. were dried in shade, separated and made to dry powder. It was then passed through the 40 mesh sieve. The powdered material (300 g) was extracted with ethanol using Soxhlet apparatus. The extract was evaporated under reduced pressure using rotary evaporator until all the solvent has been removed to give an extract sample. Percentage yield of Ethanol extract of *Cordia subcordata* Lam. (EECS) was found to be 18.5% w/w.

**Animals**

Isolated adult goat tracheal tissue, and Albino rats (Wistar Strain) of either sex weighing 150-200 g respectively were used for studies. Isolated adult goat trachea tissue was obtained immediately after slaughter of the animal. Pieces of the trachea were collected in the ice cold oxygenated Krebs solution. The albino rats were obtained from animal house of Innovative College of Pharmacy, Greater Noida, Uttar Pradesh. They were housed in polypropylene cages with standard pellet chow and water ad libitum. In all experimental sets, 5 rats were used for each treatment.
ANTIASTHMATIC ACTIVITY

1) Isolated goat tracheal chain preparation

Isolated adult goat tracheal tissue was obtained immediately after slaughterhouse of the animals. Trachea was cut into individual rings and tied together in series to form a chain. Trachea was suspended in bath of Krebs solution and was continuously aerator at 37 + 0.5°C. DRC of histamine in plane Krebs solution and in 80 μg/ml EECS act in Krebs solution was taken. Graph of percentage of maximum contractile response on ordinate and concentration of histamine on abscissa was plotted to record dose response curve of histamine, in absence and in presence of drug extract [4,5].

2) Passive paw anaphylaxis in rats

Rats (Wistar) were given (s.c.) three doses of 100 μg of egg albumin adsorbed on 12 mg of aluminum hydroxide gel prepared in 0.5 ml of saline on 1st, 3rd, 5th day. On 10th day of sensitization blood was collected from the retro orbital plex and collected blood was allowed to clot and the serum was separated by centrifugation at 1500rpm. Animals were divided into five groups (n = 5). Animals belonging to group I served as control and were administered only the vehicle (10ml/kg p.o.). Animals belonging to groups II, III, IV received three doses (25, 50, 100mg/kg p.o.) respectively of EECS. Animals of group V, as positive control group received Dexamethasone (0.27mg/kg p.o.). The animals were passively sensitized with 0.1ml of the undiluted serum into the left hind paw of animals. The contra lateral paw received an equal volume of saline. Drug treatment was given 24 hr after sensitization. Animals were challenged in the left hind paw with 10μg of egg albumin in 0.1ml of saline, and the paw inflammation was measured using a Plethysmometer. The difference in the reading prior to, and after antigen challenge represented the edema volume and the percent inhibition of volume was calculated using the following formula.

Percent Inhibition = 1 - (Vt / Vc) × 100
Vt = Mean relative change in paw volume in test group
Vc = Mean relative change in paw volume in control group.

Prior drug treatment animals were sensitzes with serum. Next 24 hours, after drug treatment animals again challenged for10 μg egg albumin and edema inhibition was calculated [6,7].

Statistical Analysis

The data were expressed as mean ± standard error mean (S.E.M). The Significance of differences among the group was assessed using one way and multiple way analysis of variance (ANOVA). The test followed by Tukey-Kramer multiple comparison tests, the p values less than 0.05 were considered as significance.

RESULTS

1. Isolated goat tracheal chain preparation

It was observed that EECS inhibits contraction produced by histamine in these tissue preparations. Histamine (50μg/ml) was taken in different dose level and DRC was plotted. Study revealed that Cordia subcordata Lam. extract exhibits significant (p<0.01) percentage decreased contraction at concentration 80 μg /ml in goat tracheal chain preparation Dose dependent response relationship was seen. (Table-1)

2. Passive paw anaphylaxis in rats

There was significant inhibition in rat paw edema at the dose 50mg/kg of EECS, in all time intervals when percentage inhibition was calculated but more specific effect was seen at 3hour interval time. It was 39.07% and 57.82% for 50mg/kg and dexamethasone respectively. Paw edema volume also significantly (p<0.01) decreased in all time intervals at this dose only. Control group showed (0.64 ± 0.18) paw edema volume and that of for 50 mg/kg dose and dexamethasone was (0.39 ± 0.06) and (0.27 ± 0.07) at 3 hour interval. Results are comparable with that of standard dexamethasone. It was seen that further increase in dose showed decrease in activity. (Table-2)

Table 1. Effect of Cordia subcordata Lam. extract on histamine induced contraction on isolated goat tracheal chain preparation.

<table>
<thead>
<tr>
<th>Groups</th>
<th>Dose of histamine (50 μg/ml)</th>
<th>Control group % maximum contraction (Mean ± SEM)</th>
<th>Test group % maximum contraction (Mean ± SEM)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0.1</td>
<td>22.16 ± 1.04</td>
<td>10.42 ± 0.97*</td>
</tr>
<tr>
<td>2</td>
<td>0.2</td>
<td>26.81 ± 1.08</td>
<td>13.52 ± 1.07**</td>
</tr>
<tr>
<td>3</td>
<td>0.4</td>
<td>44.32 ± 1.07</td>
<td>22.21 ± 1.44**</td>
</tr>
<tr>
<td>4</td>
<td>0.8</td>
<td>56.17 ± 2.02</td>
<td>28.47 ± 1.09**</td>
</tr>
<tr>
<td>5</td>
<td>1.6</td>
<td>82.06 ± 1.05</td>
<td>40.74 ± 1.49**</td>
</tr>
<tr>
<td>6</td>
<td>3.2</td>
<td>95.16 ± 1.07</td>
<td>46.21 ± 1.58**</td>
</tr>
</tbody>
</table>

n = 6 Values are in Mean ± SEM. Control = D.R.C. of Histamine in absence of Cordia subcordata Lam. extract. Test = D.R.C. of Histamine in presence of Cordia subcordata Lam. Extract (80μg/ml) Statistical analysis done by using Student’s ‘t’-test. **p<0.01, significantly different from control.
Table 2. Effect of *Cordia subcordata* Lam. extract on passive paw anaphylaxis in rats

<table>
<thead>
<tr>
<th>Groups</th>
<th>Paw Edema Volume (ml) Mean ± SEM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1/2hr</td>
</tr>
<tr>
<td>1.</td>
<td>Control</td>
</tr>
<tr>
<td>2.</td>
<td>Dexamethasone</td>
</tr>
<tr>
<td>3.</td>
<td>25</td>
</tr>
<tr>
<td>4.</td>
<td>50</td>
</tr>
<tr>
<td>5.</td>
<td>100</td>
</tr>
</tbody>
</table>

n = 5; *p<0.05, **p<0.01, compared with control group.

**DISCUSSION AND CONCLUSION**

Histamine contracts the tracheo-bronchial muscle of guinea pig, goat, horse, dog and man. Goat tracheal chain is easier to handle and to prepare; it is also much more sensitive than guinea pig tracheal chain. In the present study the isolated goat tracheal chain preparation; there is right side shift of Dose Response Curve (DRC) of histamine in the presence of *Cordia subcordata* Lam. ethanolic extract indicating antiasthmatic action [8,9]. In passive paw edema models, extract showed the dose dependent responses. Thus *Cordia subcordata* Lam. can prevent the release of inflammatory mediators or inflammation in asthma.

In conclusion the present study confirmed that the ethanolic extract of *Cordia subcordata* Lam. exhibits significant dose dependent antiasthmatic activity in various in-vitro and in-vivo animal models and further supports the traditional claim of plant in the treatment of asthma. Further studies are in fact underway to isolate and characterize the active principle responsible for the antiasthmatic activity.

**REFERENCES**

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