A. precatorius
Got tracheal chain

asthmatic drugs have been reported by Taur and Patil in our review.1
pathogenesis of disease. The different evaluations methods for anti-
generally used to investigate the immunological and physiological
broncho-constriction and spasm. As the complex pathophysiology of asthma, various animal models are
generally used to investigate the immunological and physiological pathogenesis of disease. Abrus pre-
catorius Linn (Fabaceae) is a climbing shrub. The leaves and roots are sweet in taste and traditionally
used for the treatment of asthma, bronchitis, and inflammation. A. precatorius possesses different
pharmacological activities. Hence the objective of this study was to evaluate antiasthmatic activity of
ethanol extract of A. precatorius leaves using various models.

Methods: In present study ethanol extract of A. precatorius leaves was evaluated for antiasthmatic activity
using carrageenan induced paw edema in rats [100–150 mg/kg], histamine induced bronchospasm
in guinea pig [200–400 mg/kg] and histamine induced contraction of goat tracheal chain [2.5–25 μg/ml].
Results: Result of study revealed that ethanol extract of A. precatorius significantly exhibited anti-
inflammatory effects in rats, oral treatment of extract on guinea pig significantly increases histamine
induced preconvulsive dyspnoea times and the ethanol extract of plant increases got tracheal chain
precontracted with histamine.

Conclusion: Hence present study concludes that ethanol extract of A. precatorius possesses antiasthmatic
activity.

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authenticated by Prof. R. B. Deshmukh, Department of Botany, Shardabai Pawar Mahila Mahavidyalaya, Baramati, (plant specimen number PASR 114).

2.2. Extraction

Dried and coarsely powder of *A. precatorius* leaves 500 g was first defatted with petroleum ether and extracted successively with ethanol (95%) in soxhlet extractor. Solvent was evaporated in rotary evaporator dryness under reduced pressure to produce ethanol extract of *A. precatorius* leaves (EAPL) 10.26% w/w ethanol extract.

2.3. Animals

The Wistar rats (150–170 g) and guinea pig (350–400 g) were housed in the polypropylene cages at temperature 22 ± 2 °C, with 12 h day-light cycle. During whole experiments, animals were fed with a balanced diet and water *ad libitum*. The experimental protocol of the study was approved by Institutional Animal Ethical Committee (Registration No.1214/ac/08/CPCSEA) of Shivnagar Vidya Prasarak Mandal's College of Pharmacy, Malegaon (bk), Baramati.

2.4. Drugs and chemicals

Histamine dihydrochloride (Himedia, India), Dexamethasone (Himedia, India), Salbutamol (Cipla, India), Carrageenan (Himedia, India).

2.5. Experimental design

2.5.1. Acute toxicity studies

Acute toxicity study of test extracts were conducted according to the Organization for Economic Cooperation and Development (OECD) guideline, section 4, test number 425, oral acute toxicity by ‘up and down’ method, using limit test at 2000 mg/kg, body weight.

Female Wistar rats (150–170 g) were fasted overnight from food, but not water, prior to dosing and weighed before the test extracts were administered orally. The EAPL at dose of 2000 mg/kg, body weight was administered orally to the first rat, and this rat was observed for mortality and clinical signs like aggressiveness, restlessness, sedation tremor, ataxia, paralysis, convulsion, prostration, unusual locomotion etc. for the first hour, then hourly for 3 h and, finally periodically until 48 h. If the animal survived, then 4 additional rats in each group were orally administered the EAPL at dose 2000 mg/kg, sequentially at 48-h intervals. All of the experimental animals were maintained under close observation for 14 days, and the number of rats that died within the study period was noted.

2.5.2. Carrageenan-induced paw edema in rats

Rats were divided into 5 groups; six animals in each group. Control group intraperitoneally treated with 1% tween-80 at a dose 5 ml/kg, body weight. Test extracts EAPL at doses 100, 125 and 150 mg/kg, body weight were administered intraperitoneally and standard group received intraperitoneal treatment of dexamethasone at a dose of 5 mg/kg, body weight. 30 min after the treatment, all groups were injected 0.1 ml of 1% (w/v) carrageenan to the subplantar region of hind paw. Paw volume was measured by Plethysmometer (Ugo Basile 4140) at 1, 2 and 3 h after the injection of carrageenan.

2.5.3. Histamine induced bronchospasm in guinea pig

In this method, guinea pigs were kept in a closed chamber and exposed to an aerosol of 0.5% histamine using nebuliser. The time required to develop preconvulsive dyspnoea (PCD) was recorded from the time of aerosol exposure to the onset of dyspnoea leading to the appearance of convulsions. As soon as PCD commenced, animals were removed from the chamber and placed in fresh air to recover. Guinea pigs were divided into different groups, six animals in each group. Control group was orally treated with, 1% tween-80, at dose 5 ml/kg, body weight. Test groups received oral treatment of EAPL at doses 200 and 400 mg/kg, body weight and salbutamol at a dose 2 mg/kg, body weight orally was administered to standard group. All the groups were given a single dose treatment for seven days. The time for the onset of PCD was recorded on day 0 before treatment and on day 7, 2 h after the last dose. The increases in PCD onset time by the animals were calculated by the following formula.

\[
\text{Percent increase in PCD time} = \left[1 - \frac{T1}{T2} \times 100\right]
\]

Where, T1 = Time for onset of symptoms before treatment. T2 = Time for onset of symptoms after treatment.

2.5.4. Histamine induced contraction of goat tracheal chain

Goat trachea was procured from slaughter house. Trachea was cut into individual rings and tied together in a series to form a chain. Trachea was suspended in 30 ml organ bath containing Kreb’s solution which was maintained at 37 ± 0.5 °C with continuous aeration. Suspended tracheal chain was allowed to equilibrate for 45 min under the load of 400 mg. During which fresh Kreb’s solution was added to the organ bath at an interval of 15 min. The responses of contraction induced by histamine at a concentration 0.5 μg/ml without test extracts and in the presence of test extracts at a concentration of 2.5–25 μg/ml; in Kreb’s solution were recorded. The percent relaxation of histamine contracted goat trachea in the presence of test extracts were calculated.

3. Results

3.1. Acute toxicity studies

Acute toxicity study demonstrated that oral administration of EAPL shows no significant body weight variation of rats, neither any sign of toxicity nor mortality of rats at the dose of 2000 mg/kg, body weight.

3.2. Carrageenan-induced paw edema in rats

In this study the effect of EAPL at doses 100, 125 and 150 mg/kg, body weight intraperitoneally was examined on carrageenan induced paw edema in rats. The volume of rat paw edema was measured with plethysmometer at the end of 1, 2 and 3 h after the injection of carrageenan. EAPL at doses 100–150 mg/kg significantly exhibited anti-inflammatory effects in rats 1, 2 and 3 h after the injection of carrageenan and results are summarized in Table 1. The maximum swelling of paw edema 0.74 ± 0.02; 0.82 ± 0.02 and 0.90 ± 0.02 were observed in control group of rats 1, 2 and 3 h after the injection of carrageenan respectively. While at the end of 3 h, significant (P < 0.001) inhibition 0.50 ± 0.02, 0.41 ± 0.02 and 0.34 ± 0.02 of rat paw edema at the end of 1, 2 and 3 h respectively after the injection of carrageenan when compared to control group. At the end of 1 h significant (P < 0.001) reduction 0.63 ± 0.01, 0.63 ± 0.01 and 0.57 ± 0.01 of paw edema in rats were observed by EAPL at doses 100, 125 and 150 mg/kg, body weight respectively. Though at the end of 2 h significant (P < 0.01, P < 0.001 and P < 0.001) reduction 0.71 ± 0.01, 0.67 ± 0.01 and 0.66 ± 0.03 of paw edema in rats were observed by EAPL at doses 100, 125 and 150 mg/kg, body weight respectively. While at the end of 3 h, significant...
(P < 0.01, P < 0.001 and P < 0.001) reduction 0.79 ± 0.02, 0.75 ± 0.01 and 0.73 ± 0.01 of paw edema in rats were observed by EAPL at doses 100, 125 and 150 mg/kg respectively.

3.3. Histamine induced bronchospasm in guinea pig

The effect of oral treatment of EAPL at dose 200 and 400 mg/kg, body weight on percent increase in histamine induced preconvulsive dyspnea times are summarized in Fig. 2. Guinea pig treated with 1% tween-80 (control group) at dose 5 ml/kg body weight; showed less 3.40 ± 0.755 increased in PCD time. The group of guinea pig treated with salbutamol at dose 2 mg/kg, body weight caused significant P < 0.001; increase 79.52 ± 0.770 in PCD time when compared to control group. The oral administration of EAPL at doses 200 and 400 mg/kg body weight, caused significant P < 0.001 increase 42.62 ± 2.025 and 47.22 ± 1.407 in PCD time respectively when compared to control group.

3.4. Histamine induced contraction of goat tracheal chain

Histamine; at concentration 0.5 μg/ml, caused contraction of goat trachea. EAPL at concentration 2.5—25 μg/ml; produced neither any effects of contraction nor relaxation when tested alone on goat tracheal chain. The effect of EAPL at concentration 2.5—25 μg/ml; on histamine induced contraction of goat trachea are summarized in Fig. 3. Histamine; at concentration 0.5 μg/ml, caused contraction of goat trachea. EAPL at concentration 2.5—25 μg/ml; produced neither any effects of contraction when tested alone on goat tracheal chain. In present study it was observed that test extract at concentration 25 μg/ml; showed significant (P < 0.05) relaxation of goat trachea, pre-contracted with histamine. Test extract caused the dose dependent relaxations of goat trachea contracted by histamine. EAPL at concentration 25 μg/ml shows 60.22 percent relaxations of histamine induced goat trachea.

4. Discussion

Airway inflammation is the major cause of asthma pathogenesis. The major goal in asthma therapy is to reduce or prevent the inflammatory response associated with bronchial hyperresponsiveness, reversible airway obstruction and airway remodeling. However, because of the complex nature of disease a single target for such an ideal therapeutic approach remains elusive.

In carrageenan induced paw edema, the first phase is characterized by mast cell degranulation and release of histamine, serotonin and other proinflammatory mediators responsible for asthma.22,23 In this study at the end of 1 h the 28.38 percent inhibition of rat paw edema was observed by EAPL at a dose of 150 mg/kg, body weights. This decrease in paw edema by EAPL may be due to inhibition of histamine release. Hence EAPL may possess anti-histaminic or anti-inflammatory property.

In the histamine induced bronchospasm in Guinea pig, the result of study showed that, oral treatment of EAPL at dose 200 and 400 mg/kg, body weight for seven days causes significant increase in onset time of preconvulsion dyspnea in Guinea pig. Histamine when inhaled causes hypoxia and leads to spasm in Guinea pigs.
and causes very strong smooth muscle contraction and capillary dilation in cardiovascular system. Bronchodilators can delay the occurrence of these symptoms. The increase in onset time of preconvulsion dyspnea in guinea pig by test extract may be due to inhibition of mucus production in bronchioles or may be inhibition of histamine H₁ receptors or stimulation of β₂ adrenergic receptors.

The excessive release of histamine in the body affects the airway smooth muscles and plays major role in the pathogenesis of asthma and allergy. Kulshrestha et al (1983) reported that histamine causes the contraction of bronchial muscle of guinea pig, goat, horse, dog and man. The relaxation of precontracted goat trachea by EAPL may be due to stimulation of β₂ adrenergic receptors or inhibition of histamine H₁ receptors. Hence these extract possess bronchodilator activity and may be useful in the treatment of asthma.

5. Conclusion

The present study concludes that, EAPL at 150 mg/kg shows significant anti-inflammatory activity by inhibiting paw edema in rats. The significant increase in onset time of preconvulsion dyspnea in guinea pig confirmed bronchodilator property of test extract. The relaxation of precontracted goat trachea by EAPL may be due to bronchodilator activity. Hence in this study A. precatorius showed antiasthmatic related activity.

Conflict of interest statement

We declare that we have no conflict of interest.

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