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Research Article

INFLUENCE OF ETHANOLIC LEAF EXTRACT OF *SARGASSUM WIGHTII* AND *ADIANTUM CAPILLUS* ON HISTAMINE INDUCED ASTHMA IN ANIMAL MODEL

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ABSTRACT

The marine alga is always an exemplary source of drugs so many usefull drugs are directly belonging to ocean sources. The marine algae *Sargassum wightii* have many pharmacological activities.

The antiasthmatic activity of leaf of *Sargassum wightii* and *Adiantum capillus*. Ethanolic extracts of leaf of *Sargassum wightii* and *Adiantum capillus* were prepared. The antiasthmatic activities of EESW, EEAC were evaluated by experimental models like histamine aerosol induced asthma in whole guinea pig. Animals treated with *EESW, EEAC* showed significantly prolonged the latent period of convulsions (PCT) as compared to control animals when exposure of histamine aerosol.

The histamine produced bronchial construction in animal model in histamine chamber. Where ethanolic extract *Adiantum capillus (EEAC)* was more effective comparatively to ethanolic extract *Sargassum wightii (EESW).* Present study concluded ethanolic extracts *S.wighti, A.capillus* possess antiasthmatic activity, thus justifying to some extent the traditional use of the plant *Adiantum capillus* and *sargassum wightii* in asthma.

Keywords: *Adiantum capillus*, *Sargassum wightii*, Antiasthmatic, H_1-antagonist.

INTRODUCTION

Asthma is a chronic condition. These symptoms may be due to liberation of endogenous and intrinsic mediators like histamine, leukotrienes (LTs), bradykinin, prostaglandins (PGs), nitric oxide, platelet activating factors (PAF), chemokines and endothelin from mast cells during the allergic reactions and inflammation of the air passages in the lungs. Nearly 7-10% of world population suffers from bronchial asthma. For management of asthma attacks adrenergic relief is most requirements.[1] Bronchial asthma is one of the most complex disorders of the airway characterized by reversible air way obstruction inflammation, bronchial hyper-responsiveness and excessive mucous production.[2] It is known that asthma can be triggered by various infections, dust, cold air, exercise, emotion, perfumes, chemical, environmental tobacco smoke and histamine.[3] In asthma some pathophysiological changes to the airways, thickening of the airways walls, which have been produced reduction of airflow and the development of hyper responsiveness in airway system.[4] In the present study the antiasthmatic property of leaf extract of this plant has been investigated against histamine induced asthma. [5-7] The brown marine algae *Sargassum wightii* (Sargassaceae) harvested from the ocean and it is widely found in India, possess Sulphated Polysaccharides which are responsible for wide Pharmacological actions likely free radical scavenging, [8] antioxidant, [9] antifungal activity, [10] anti-inflammatory [11] and hepatoprotective. [12] Ayurveda, An Indian system of medicine has described several drugs from indigenous plant sources for use in the treatment of bronchial asthma and allergic disorders.[13]

Adiantum is a genus of about 200 species of ferns in the family *Pteridaceae,* though some researchers place it in its own family belonging to the *Adiantaceae, Adiantum capillus veneris.* [14]

The traditional medicinal systems and the availability of a large variety of medicinal plants in universe have greatly facilitated the researchers to develop keen interest in their screening, research and development.[15] The extracts of *Adiantum capillus-veneris* showed significant inhibitory effect against cucumber green mosaic virus. Chemical composition and antimicrobial activity of the volatile oil and extracts of leaves of *Adiantum capillus-veneris* was studied. Two pure compounds filicene and filicenal were isolated from the non-polar fraction of the fern and it has exhibited potent analgesic activity.

MATERIALS &METHODS

Histamine solution

Histamine solution was freshly prepared in normal saline (NaCl, 8.5 g/l), Carboxy methyl cellulose (2%) (Loba chemie Pvt. Ltd) All other chemicals used were of analytical grade.

Plant collection

The marine brown algae species *Sargassum wightii* was collected from mandapam, Gulf of Mannar region, Rameswaram in Tamilnadu, India than the seaweed was washed thoroughly with sea water and fresh water to remove extraneous materials the sample was then shade dried till constant weight obtained and ground in an electric mixer to get coarse powder. The powdered sample stored in refrigerator. The leaves of *A.capillus-veneris* were collected from the Tirumala Hills, Tirupathi, Andhra Pradesh, India. The plants were authenticated by Dr. Jayaraman, Botanical Survey of India, Chennai, Tamil Nadu, India

Extraction

The ethanolic extracts of *Sargassum wightii* and *Adiantum capillus* were prepared by using of 70% of ethanol, by maceration method for 72 hrs. at room temperature. The extract was concentrated by simple evaporation at room temperature. The extract was dissolved in 2% CMC to prepare the 100mg/ml stock solution.

Animals

Guinea pigs of either sex 350- 450 were procured from animal house, department of pharmacology, Vels University, and throughout the study. Six animals were taken in each group and maintained under controlled environment (temperature 25±2^{0}C and 12 h dark and light cycle) with standard diet and water *ad libitum* during experiment. All the animals used in this study were approved by CPCSEA. (XII/VELS/PCOL/22/2000/CPCSEA/IAEC/11.03.11)

Acute toxicity study

The acute oral toxicity study was carried out as per the OECD guidelines-423. Animals were observed individually after administration of *EESW* and *EEAC,* during the first 30 minutes, and periodically 24 hours with special attention given during the first 4 hours and daily thereafter for a total of 14 days for toxic symptoms and mortality. All observations are systematically recorded with individual records being maintained for each animal. One-fifth, one-

tenth and one-twentieth dose of the maximum dose used in the acute toxicity study was considered as therapeutic dose for further pharmacological study.

Evaluation of Anti-asthmatic activity

Experimental bronchial asthma was induced in guinea pigs by exposing them to histamine. Overnight fasted guinea pigs of either sex (350-450) were selected and randomly divided in to five groups each consisting of six animals. Group I was treated as control, Animals belonging to groups II, III received of *Sargassum wightii* ethanolic extract in dose (250,500 mg/kg) and groups IV, V were administered *Adiantum capillus* ethanolic extract in dose (250,500 mg/kg). All the doses were given orally. Prior to drug treatment each guinea pigs were exposed to an atomised fine mist of 2% w/v histamine dihydrochloride aerosol (dissolved in normal saline) using a nebulizer in the histamine chamber. Guinea pigs exposed to histamine aerosol showed progressive signs of difficulty in breathing leading to convulsions, asphyxia and death. The time until signs of convulsion appeared is called pre-convulsion time (PCT) and was determined from the time of exposure to onset of convulsions. [16, 17] As soon as pre convulsion time was noted, animals were removed from the chamber and placed in fresh air to recover.

The percentage protection offered by treatment was calculated by using the following formula:

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

Where; T_1 = the mean of PCT of control group animals.

T_2 = the mean of PCT of test group animals.

Statistical analysis

Data were expressed as Mean ± SEM. Differences between groups were analysed by one way analysis of variance (ANOVA) followed by Dunnet "t" test. Differences were considered significant when P< 0.05 and very significant when P< 0.01.

RESULTS AND DISCUSSION

Histamine induced bronchoconstriction is the traditional immunological model of antigen induced airway obstruction. Histamine when inhaled causes hypoxia and leads to convulsion in the guinea pigs and causes very strong smooth muscle contraction, profound hypotension, and capillary dilation in the cardiovascular system. A prominent effect caused by histamine is severe bronchoconstriction in the guinea pigs that causes asphyxia and death. [18] Histamine was released after degranulation of mast cell by an antigen exposure by antigenic stimulation causing smooth muscle contraction, increased vascular permeability and mucus formation.

Histamine is one of the important mediators of allergy, inflammation and bronchoconstriction. Targeting histamine, either prevention of its release from mast cell or use of histaminergic receptor antagonist becomes part of antihistaminic therapy in allergic diseases. [19] In vivo study of *EESW* and *EEAC* have been also shown the significant increase in pre-convulsion time due to pre-treatment with *EESW* and *EEAC* at the dose of 250 and 500 m/kg of body weight of guinea pigs, when the guinea pigs were exposed to histamine.The results of *EESW* and *EEAC* suggested that it is effective in reducing the symptoms of bronchial asthma and also improve the lung function parameters of asthmatic subjects (Table-1).

Table 1: Effect of *EESW* and *EEAC* on latent period of asthma caused by histamine hydrochloride

S. No.	Groups	Doses	Latent period of asthma (sec)	% Protection
1.	Control	NS	89.04± 2.06	-------
2.	Group-I	*EESW*(250mg/kg)	129± 19.0*	30.97
3.	Group-II	*EESW*(500mg/kg)	193± 1.01**	53.86
4.	Group-III	*EEAC*(250mg/kg)	798± 4.06**	88.84
5.	Group-IV	*EEAC*(500mg/kg)	958± 3.25**	90.706

Values are Mean ± SEM (n=6), *P<0.05, **P<0.01 compared with control.

In the present study, guinea pigs were used because of the extreme sensitivity of their airways to the primary mediators of bronchoconstriction, including histamine and leukotrienes, and their ability to be sensitized to foreign proteins. Although there are various model of asthma, guinea pig airways react to histamine, acetylcholine, leukotrienes, and other bronchoconstrictors in a manner similar to that seen in humans. Another similarity between the guinea pig model and asthmatic patients is that enhanced bronchoconstriction occurs in both species following sensitization, in response to β-adrenergic antagonists. Thus, the guinea pig model resembles the human allergic pathology in several aspects, especially in terms of mediator release. Histamine antagonists can be conveniently recognized and assayed by their ability to protect guinea pigs against lethal effects of histamine-induced bronchospasm. [20]

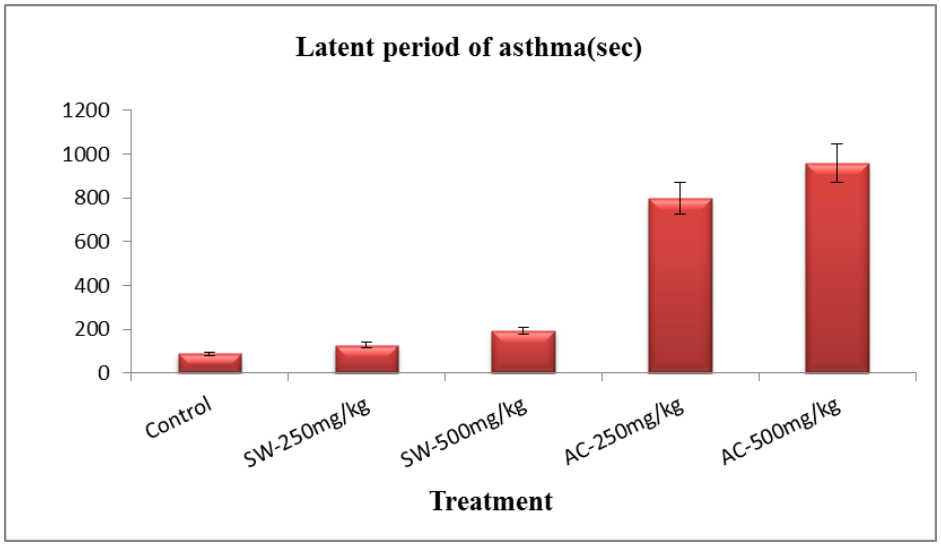

Fig. 1: Effect of *EESW* and *EEAC* on latent period of asthma caused by histamine hydrochloride.

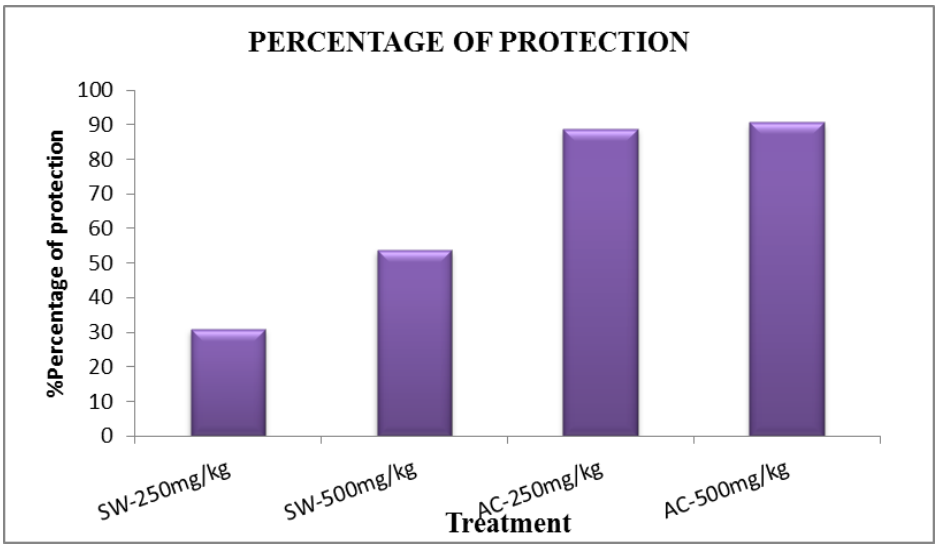

Fig. 2: % of asthma protection by of *EESW* and *EEAC* in histamine hydrochloride induced asthmatic rats.

CONCLUSION

The results of present study suggested that ethanolic leaf extract of *Sargassum wightii (EESW)* and *Adiantum capillus (EEAC)* significantly protected the Guinea pigs against histamine-induced bronchospasm. *Adiantum capillus (EEAC)* use traditionally in the management of asthma is justified. The ethanolic two extract significantly prolonged the latent period of convulsions (PCT) as compared to control following the exposure of histamine aerosol. The action started after 1 h of drug administration. Thus, our findings suggest that *EESW* and *EEAC* possess significant antihistaminic (H_1 receptor antagonist) activity. Further studies are needed for exact molecular mechanism of action and also to isolate and characterize the active constituent for its activity.

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