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Research Article

EFFECT OF VARIOUS PLANT EXTRACTS ON HISTAMINE AEROSOL INDUCED BRONCHOSPASM IN GUINEA PIGS

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ABSTRACT

The present study designed to evaluate the antiasthmatic activity of various plant extracts on histamine aerosol induced bronchospasm in guinea pigs. Histamine aerosol induced bronchospasm in guinea pigs showed that *Thuja orientalis* stem ethyl acetate extract inhibited bronchospasm of histamine ($P<0.05$) whereas *Mangifera indica* extract, *Solanum melongena* extract did not showed the bronchospasm of histamine. It is concluded that *Thuja orientalis* ethyl acetate extract possess antiasthmatic activity.

Keywords: Histamine aerosol, Bronchospasm.

INTRODUCTION

Asthma is a chronic inflammatory disorder of the airways characterized by acute exacerbation of coughing, dyspnoea, wheezing and chest tightness particularly at night as well as at the early morning [1].Asthma is also widely recognized as a disease of lung characterized by reversible bronchoconstriction ,elevated basal airway tone and lymphocyte (eosinophilis) activation and accumulation, epithelial cell dysfunction and damage, smooth muscle and sub mucosal gland hypertrophy, submucosal fibrosis, airway wall edema, mucous overproduction and episodes of non-specific airway hyper- responsiveness to spasmogens [2]. Medicinal plants have been known for millennium and are highly esteemed all over the world as a rich source of therapeutic agents for the prevention of diseases and ailments. A large number of medicinal plants have been used traditionally for the treatment of asthma and have been scientifically proven to have antiasthmatic properties [3].

The present study aims at exploiting some of the crude drugs used in the treatment of asthma. From the proceedings on the basis of ethno medical/ tribal information and literature survey four plants, *Mangifera indica* extract, *Solanum melongena* (root extract), *Thuja orientalis* (root extract), and, *Thuja orientalis* (stem extract) were selected. This study aimed to investigate antiasthmatic potential of different extract from above plants. Therefore an effort has been made to establish scientific evidence for its ethno botanical use.

MATERIALS AND METHODS

Plant materials

The collection of the plant materials *Mangifera indica*(extract), *Solanum melongena* (root extract), *Thuja orientalis* (root extract), *Thuja orientalis* (stem extract) were done in the month of April in the University of Modi Institute, Lachmagarh (Rajasthan). Roots and stems of four plants have been identified Department of Botany, Rajasthan University, Jaipur, (Rajasthan). Petroleum ether, ethylene acetate, chloroform and ethanol was purchased from R.S Enterprise, Jaipur. All other chemicals used were of analytical grade. The dried drug materials were powdered, passed through a mesh no 60 and stored in airtight container prior to extraction.

Preparation of Extracts

Powdered forms of respective plants were extracted with petroleum ether at 60-70 ºC by hot percolation using soxhlet apparatus. The extraction was continued for 72hrs. The petroleum ether extract was filtered and concentrated to a dry mass by using vacuum distillation. The petroleum ether extract was obtained as dark green residue. The marc left after the petroleum ether extract was taken and subsequently extracted with chloroform up to 72 hrs. The chloroform extract was then filtered and extract was concentrated to a dry mass. A dark green residue was obtained. The marc left after the petroleum ether extract was taken out and dried to get a dry mass and it was again extracted with ethanol up to 72hrs in soxhlet apparatus. The ethanolic extract was filtered. After concentrating the ethanolic extract, a dark brown residue was obtained. [1,2,5]

Animals and Treatment

Dunkin Hartley strain guinea pigs(350-550g) of either sex housed in standard conditions of temperature (22±2º), Relative humidity (55±5 %) and light (12 hr light / dark cycles) , were used and fed with green vegetables .The Institutional Animal Ethics Committee approved the experimental protocol. For the preparation of 1% Histamine aerosol, 250 mg of histamine HCl (Sigma,MO,USA) was dissolved in 25ml saline and used for spraying inside histamine chamber.

Histamine- Induced bronchospasm in guinea pigs

Bronchospasm was induced in guinea pigs by exposing them to 1% histamine aerosol under constant pressure in an aerosol chamber (24 X 14 X 24 cm) made of perplex glass (4). Animals were divided into five groups of six animals each, group I served as control received water and group II received the extract of Sample A Mangifera indica (1gm/kg), Sample B (Solanum melongena root extract (1gm/kg), Sample C Thuja orientalis root extract (10mg /kg)), and Sample D Thuja orientalis stem extract (10 mg/kg) in ethyl acetate extract. Group III received the extract of Sample A,B,C,D in petroleum ether, group IV received the Ethyl alcohol extract of Sample A,B,C,D and group V has been given Chlorophenarmine Maleate (2 mg/ kg) treatment. All formulations were mixed in 1% DMSO solution by infant feeding tube for five days 30 min prior to exposure of histamine. Animals were exposed to 1% histamine aerosol under a histamine chamber. The end point of, preconvulsive dyspnea (PCD) was determined from the time of aerosol exposure to the onset of dyspnea leading to the appearance of convulsion. As soon as PCD commenced, the animals were removed from the chamber and exposed to fresh air.

Statistical Analysis

The statistical analysis was performed by using one-way analysis of variance (ANOVA) followed by Dunnett's test for individual comparison of groups with control.

RESULTS

Results of antihistaminic activity of various groups are presented in table no 1,2,3,4. After exposing to histamine aerosol, animals started showing preconvulsive dyspnoea and time taken for precipitation of PCD was noted. Animals in control groups showed PCD at around 19.83 to 54 sec, whereas animals in test group showed delay in precipitation of PCD only in *Thuja orientalis* stem ethyl acetate extract. Whereas *Mangifera indica* extract, *Solanum melongena* root extract and *Thuja orientalis* root extract has not been showed the antihistaminic activity.

Table 1: Result of extract *Mangifera indica* on Histamine induced bronco constriction in guinea pigs

S. No.	Groups	Dose(mg/kg)	PCT in (Seconds)
1.	GP-1(Inducer Control)	-	48.16±2.12
2.	GP-2(ethyl acetate extract)	1 gm/kg	43.16±1.88^{ns}
3.	GP-3(Petroleum ether extract)	1 gm/kg	41.5±1.72^{ns}
4.	GP-4(Ethyl alcohol extract)	1 gm/kg	44.5±2.89^{ns}
5.	GP-5(CPM treatment)	2 mg/kg	123±19.85**

Table 2: Result of Root extract *Solanum melongena* on Histamine induced bronco constriction in guinea pigs

S. No.	Groups	Dose(mg/kg)	PCT in (Seconds)
1.	GP-1(Inducer Control)	-	19.83±1.24
2.	GP-2(ethyl acetate extract)	1 gm/kg	18.33±1.45^{ns}
3.	GP-3(Petroleum ether extract)	1 gm/kg	19.16±1.01^{ns}
4.	GP-4(Ethyl alcohol extract)	1 gm/kg	19.83±0.94^{ns}
5.	GP-5(CPM treatment)	2mg/kg	65.16±2.84**

Table 3: Result of Root extract *Thuja orientalis* on Histamine induced bronco constriction in guinea pigs

S. No.	Groups	Dose(mg/kg)	PCT in (Seconds)
1.	GP-1(Inducer Control)	-	54±2.56
2.	GP-2(ethyl acetate extract)	1 gm/kg	41.33±3.26^{ns}
3.	GP-3(Petroleum ether extract)	1 gm/kg	42.5±2.14^{ns}
4.	GP-4(Ethyl alcohol extract)	1 gm/kg	38±1.98^{ns}
5.	GP-5(CPM treatment)	2 mg/kg	99.5±2.61**

Table 4: Result of Stem extract *Thuja orientalis* on Histamine induced bronco constriction in guinea pigs

S. No.	Groups	Dose(mg/kg)	PCT in (Seconds)
1.	GP-1(Inducer Control)	-	39±6.86
2.	GP-2(ethyl acetate extract)	10 mg/kg	58.66±8.28*
3.	GP-3(Petroleum ether extract)	10 mg/kg	37.16±5.75^{ns}
4.	GP-4(Ethyl alcohol extract)	10 mg/kg	34.5±1.47^{ns}
5.	GP-5(CPM treatment)	2mg/kg	92.66±3.91**

n = 6; *p<0.05, **p<0.01, ns-nonsignificant compared with control group (ANOVA followed by Dennett's test)

DISCUSSION & CONCLUSION

Histamine is a central mediator in the pathogenesis of allergic and inflammatory disorders, causes bronchospasm which cause precipitation of bronchial asthma. However, production of histamine and other related autacoids which act as inflammatory mediators cause a host of changes in bronchial tissue by triggering a dramatic increase in mucous secretion and a simultaneous rapid constriction of the bronchial smooth muscle, which narrows the bronchial tubes and reduces the amount of air that can pass through them. Many classes of drugs including antihistamines used to treat the disease have their own adverse effects such as tolerance and CNS disorders. In the present study, different plants of extracts used in the treatment of allergic reactions are devoid of such side effects and may be used for chronic therapy. The outcomes of the present study showed that the *Thuja orientalis* stem ethyl acetate extract prolonged the latent period of PCD in guinea pigs following histamine aerosols. The result of this study demonstrates that the possible mechanism of action appears to be not only prevention of hyper-responsiveness in smooth muscle but also the bronchoconstriction produced by histamine was antagonized strongly by extracts.

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