

Comparison of Antihistaminic Activity of *Sirisha* and *Bhumyamalaki* with determination of Target Organ in Guinea Pig

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Abstract

In the present era human beings have to live polluted atmosphere. This has led to increase in allergic reactions directly or indirectly. These allergic reactions are manifested in the form of atopic dermatitis, hyper responsive bronchus, rhinitis etc. These days bronchial asthma is more common in every age group which is increasing by 50% every decade. *Sirisha* and *Bhumyamalaki*, both the drugs are mentioned in the Ayurveda for the management of the asthma. Guinea pig was taken to find out effect of drug on lung tissue of bronchus and lung alveoli. Histological analysis of the lungs from non-sensitized Group I showed normal lung histology. Treatment with *Sirisha* and *Bhumyamalaki* has shown reduction in tissue oedema, epithelial cell hypertrophy, infiltration of inflammatory cell and airway lumen plugging thereby decreasing inflammation and bronchoconstriction, which leads to normal lumen size. However, treatment with *Sirisha* and *Bhumyamalaki* were shown significant reduction in inflammation in comparison with standard Ayurvedic formulation. *Sirisha* has better result on bronchospasm as compared to *Bhumyamalaki* and infiltration in the lung tissue was well minimised by *Bhumyamalaki* in compare to the *Sirisha*.

Keywords *Sirisha* (*Albezzia lebbek*), *Bhumyamalaki* (*Phylanhus amarus*), Allergy, Bronchoconstriction, Infiltration



Greentree Group

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INTRODUCTION

Human body has many physiological mechanisms, which help to counteract the presentation of illness as rashes, fever, rhinitis, cough etc. Asthma is a common chronic disorder of the airways that involves a complex interaction of airflow obstruction, bronchial hyper-responsiveness and an underlying inflammation^[1]. *The fast growing urbanization and industrialization is leading to air, water and soil pollution. These etiological factors, along with food habits, smoking etc. are leading to bronchial asthma and COPDs by damaging the respiratory tract.*

Worldwide asthma cases are increasing at the rate of 50% every decade and according to WHO, by the year 2020, asthma along with COPD will become the third leading cause of death. The deaths from this condition have reached over 1, 80,000 annually.

In Ayurveda so many drugs are mentioned in the management of bronchial asthma. *Sirisha* and *Bhumyamalaki* are well known drugs mentioned in the management of respiratory disorder. The allergic reactions in the lungs proceed through infiltration, bronchospasm, cough or productive cough. The mechanism of action of the drug on the lung is important to understand the effect of medicine on specific symptoms of

disease by its Human body has many physiological mechanisms, which help to counteract the disease by its bronchus and lung tissue during allergic reaction.

Sirisha plant was mentioned in Ayurveda as the best poison eliminating drug^[2]. *Sirisha* is an important ingredient of different *Ayurvedic* preparation for the cure of respiratory disorder^[3]. *Bhumyamalaki* is mentioned in the *swashahara mahakashaya* by *Charaka*^[4]. It has well known hepatoprotective, antiviral, antihistaminic activity^[5, 6, 7, 8]. It directly gives evidence of effectiveness in the respiratory as well as on the hepatic system. *Charaka* has described *Virechana* in the management of the bronchial asthma^[9]. In *Virechana* process excess *Pitta* excreted out which has directly relation to the liver. Both the drugs seem to be effective in bronchial allergic reactions, but the mechanism of action on lung tissue is still not clear. It can be found by using a method of target organ determination for *Ayurvedic* drug. The standard guinea pig is best for the study antihistaminic activity on respiratory system. Animal was sacrificed and histopathology of bronchus and lung tissue studied and probable mode of action of *Sirisha* and *Bhumyamalaki* mentioned in the conclusion.

AIMS AND OBJECTIVES

To find out probable mode of action of Sirisha and Bhumyamalaki on histamine induced bronchospasm in guinea pig at tissue level.

MATERIALS AND METHOD

Drug material:

The test drug *Shirisha* and *Bhumyamalaki* was used for experimental purpose and administered to the experimental animals according to the dose required.

Animals:

Six GUINEA PIGS were obtained from the animal house attached to the Sree Vidyaniketan College of Pharmacy, Tirupati. They were fed with pellets feed, tap water and maintained under ambient conditions.

Procedure:

All the animals were fed with standard diet and water *ad-libitum*. Out of these four groups, six animals were taken in each group and maintained under standard laboratory conditions. Bronchospasm was induced in guinea pigs by exposing them to 1% histamine aerosol under constant pressure (160 mmHg) in an aerosol chamber (28 x 28 x 14) made up of perplex glass. Of the four groups of six animals each, group I served as control and

group II to IV Ayurvedic formulations once a day for 10 days.

Tissue processing

A fraction of the tissues (Trachea and lungs) were fixed in 10% formalin immediately after autopsy. The mixed tissues were placed in 10% saline (10% formalin in 0.9% NaCl) for one hour to rectify shrinkage due to higher concentration of formalin. They were left overnight in running water securing the mouths of the vessels with cotton gauze. The tissues were dehydrated in ascending grades of isopropanol (by immersing in 80% isopropanol overnight followed by 100% isopropanol for one hour). The dehydrated tissues were cleared in two changes of xylene, one hour each. Then these tissues were impregnated with histological grade paraffin wax (melting point 58-60°C). The wax impregnated tissues were embedded in paraffin blocks using the same grade wax. The paraffin blocks were mounted and cut with rotary microtome at 3 μ thickness. The sections were floated on a tissue floatation bath at 40°C and taken on a glass slide smeared with equal parts of egg albumin and glycerol. The sections were then melted in an incubator at 60°C and allowed to cool for 5 minutes.

Tissue Staining

The sections were deparaffinised by immersing in xylene for 10min in a staining jar. The deparaffinised sections were washed in 100% isopropanol and stained in Ehrlich's hematoxyllin for 8min. After staining in hematoxyllin, the sections were washed in tap water and dipped in acid alcohol (8.3% HCl in 70% alcohol) to remove excess stain. The sections were then placed in running tap water for 10 minutes. Then after, the sections were counter-stained with 1% aqueous solution of eosin for 1minute. The excess stain was washed in tap water and the section was allowed to dry. Complete dehydration of the stained section was ensured by placing the section in an incubator at 60°C for 5min. When the sections were cooled, they were mounted in DPX mountant. The cell architecture in the lungs was observed under high power objective in a microscope.

Result:

Sirisha and Bhumyamalaki both the drugs are significantly effective in bronchial spasm and inflammation. Sirisha has shown better antispasmodic action on bronchus and less anti-inflammatory activity than the Bhumyamalaki.

CONCLUSION

Allergic reaction mainly represent in the form of spasm, infiltration in tissue,

irritation and finally oedema. Guinea pig is best animal for the study of respiratory allergic reaction. The cough is generally dry and wet type depends upon the allergic reaction in the lung tissue. Spasm of the bronchus gives acute attack and more breathlessness in comparison to the productive type of cough. The inflammation and productive type of cough is chronic in nature and produce long term discomfort.

In the present study found that lung tissue shown more release of spasm in the alveoli and bronchus with Sirisha treated Group. It is probably more effective in the case of acute type of distress with non-productive type of cough. Sirisha is seems to be more antispasmodic activity in comparison to the Bhumyamalaki treated group.

Bhumyamalaki treated Group shown good result in decreasing the tissue infiltration associated with oedema. It shown better results as anti-inflammatory along with tissue healing property and has mild effect on spasm as compare to the Sirisha. Bhumyamalaki suppress the inflammatory reaction, which manifest in the form of less secretion and oedema.

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OBSERVATION

Table No. 1 finding under high power microscope of tracheal tissue:

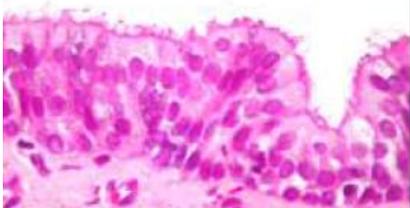
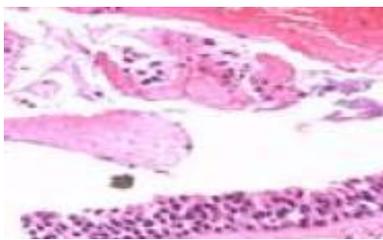
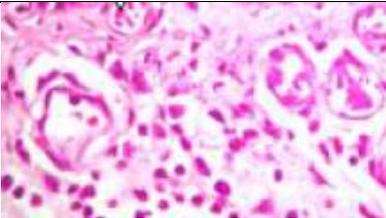
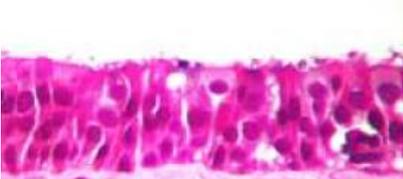
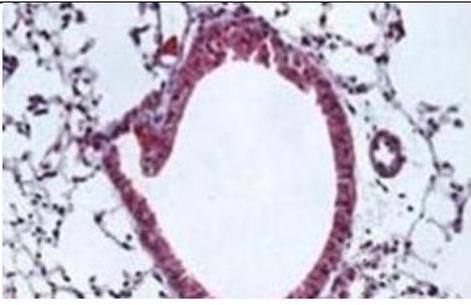
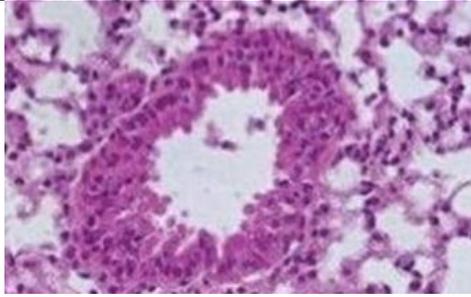
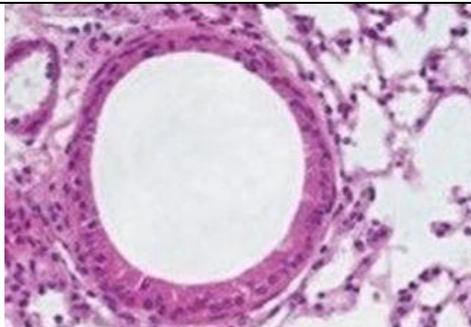
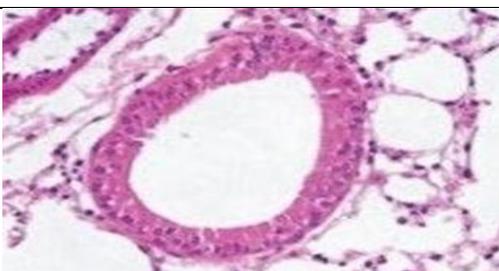
Groups	Histopathology of tracheal chain of guinea pigs	Interpretation
Control		Normal structure
SAF		Infiltration of cell in the tissue seen
Sirisha		Tissue are inflamed but less oedema
Bhumyamalaki		Tissue uniformity intact and less oedema

Table No. 2 Findings under the high power microscope of lung tissue:

Group	Sirisha	Interpretation

Control		Normal structure
SAF		Inflamed alveoli along with tissue infiltration with inflammatory cell and spasm clearly seen.
Sirisha		Spasm of alveoli markedly reduced, infiltration of inflammatory cell present but less in compare to the standard Ayurvedic formulation
Bhumyamalaki		Markedly decreased in inflammation and significant reduction spasm, infiltration of inflammatory cell very less

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