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# Evaluation of the ethanolic extract of alpina calcarata rhizome for its anti-asthmatic antioxidant and anti-inflammatory activities

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**Abstract**
Alpinia calcarata is a rhizomatous perennial herb belonging to the family Zingiberaceae. It was traditionally used for the treatment of asthma, bronchitis, rheumatoid arthritis, stomachic disease, diabetes, and heart diseases. The study includes the phytochemical and pharmacological investigation of the ethanolic extract of Alpinia calcarata rhizomes. The powdered rhizomes were extracted utilizing soxhlet using the solvent ethanol. Preliminary phytochemical screening revealed the presence of carbohydrates, cardiac glycoside, protein, alkaloids, steroids, flavonoids, tannins, and phenolic compounds. These constituents may represent the presence of biological activities of the plant. The acute toxicity study revealed that there is no mortality with the ethanolic extract of Alpinia calcarata rhizomes.

**Keywords:** Alpinia, anti histaminic, anti asthmatic, antioxidant, ethanolic

## Introduction

The term “Medicinal plant” includes various types of plants used in herbalism ("herbology" or "herbal medicine"). It is the use of plants for medicinal purposes and the study of such uses. The word “herb” has been derived from the Latin word, “herba” and an old French word “herbe”. Nowadays, herb refers to any part of the plant like fruit, seed, stem, bark, flower, leaf, stigma, or root, as well as a non-woody plant. Earlier, the term “herb” was only applied to non-woody plants, including those that come from trees and shrubs. These medicinal plants are also used as food, flavonoids, medicine, or perfume and also in certain spiritual activities.

Plants have been used for medicinal purposes long before the prehistoric period. Ancient Unani manuscripts Egyptian papyrus and Chinese writings described the use of herbs. Evidence exists that Unani Hakims, Indian Vaids, and European and Mediterranean cultures were using herbs for over 4000 years as medicine. Indigenous cultures such as Rome, Egypt, Iran, Africa, and America used herbs in their healing rituals, while others developed traditional medical systems such as Unani, Ayurveda, and Chinese Medicine in which herbal therapies were used systematically.

## Materials and Methodology

### 1. Materials

❖ **Plants selection**

❖ **Chemicals and reagents used**

- Carboxy methyl cellulose (Spectrum Reagents and Chemicals Pvt. Ltd.)
- Ascorbic acid (Spectrum Reagents and Chemicals Pvt. Ltd.)
- Histamine (NICE Chemicals Pvt. Ltd.)
- Hydrogen peroxide (Spectrum reagents and Chemicals Pvt. Ltd.)
- Glacial acetic acid (Ozone International, Mumbai)
- Trichloro acetic acid (NICE Chemicals Pvt. Ltd.)
- Diclofenac sodium (Rajesh chemicals, Mumbai)

❖ **Drugs used**

- Chlorpheniramine maleate (Abbott Laboratories Pvt. Ltd.)
- Dexamethasone (Zydusbiogem, Cadila Healthcare Ltd.)

❖ **Instruments used for the study**

- UV-Visible spectrophotometer-Jasco international
- Incubator- Rotek Instruments, B&C Industries, W. Vengola.
- Centrifuge- Rotek Instruments, B&C Industries, W. Vengola.
- Histamine chamber-Orchid Scientific Innovations India Pvt. Ltd

❖ **Animals**

### 2. Methods

- Collection and authentication of Alpinia calcarata
- Preparation of plant extract
- Preliminary phytochemical screening
- Detection of carbohydrates
- Detection of protein
- Detection for Fats and oils
- Detection of glycoside
- Detection for flavonoids
- Detection of alkaloid
- Evaluation of Antiasthmatic activity
- *In vivo* anti-asthmatic activity
- *In vitro* antioxidant activity

## Results and Discussion

**Table 1:** Preliminary phytochemical analysis

| S. No | Constituents | Presence/absence |
|---|---|---|
| 1 | Carbohydrate | + |
| 2 | Proteins | + |
| 3 | Amino acids | - |
| 4 | Fats and oils | - |
| 5 | Steroids | + |
| 6 | Cardiac glycosides | + |
| 7 | Anthraquinone glycoside | - |
| 8 | Saponin glycosides | - |
| 9 | Cyanogenic glycosides | - |
| 10 | Coumarin glycosides | - |
| 11 | Flavonoids | + |
| 12 | Alkaloids | - |
| 13 | Tannins | + |
| 14 | Phenol | + |

Phytochemicals are natural bioactive compounds found in plants. They are mainly two groups, which are primary and secondary metabolites. Primary metabolites are sugars, amino acids, proteins, and chlorophyll while secondary metabolites consist of alkaloids, terpenoids, and phenolic compounds. The beneficial medicinal effect of plant material results from the combination of secondary etabolites present in the plant. So, the systematic screening of plant species is necessary for discovering new bioactive compounds.

### Ex Vivo Anti-Asthmatic Study

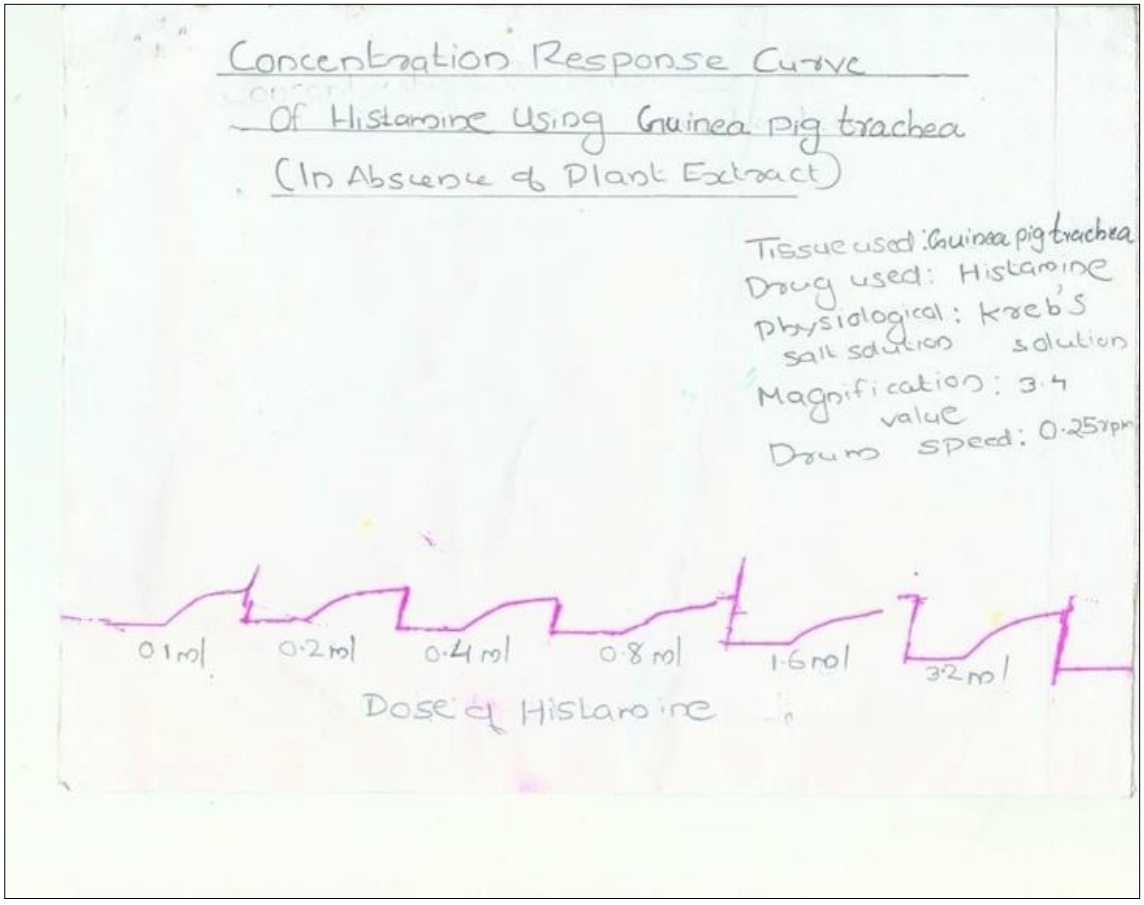


**Fig 1:** Concentration Response Curve of Histamine using Guinea Pig Tracheal Preparation (In the Absence of Plant Extract).

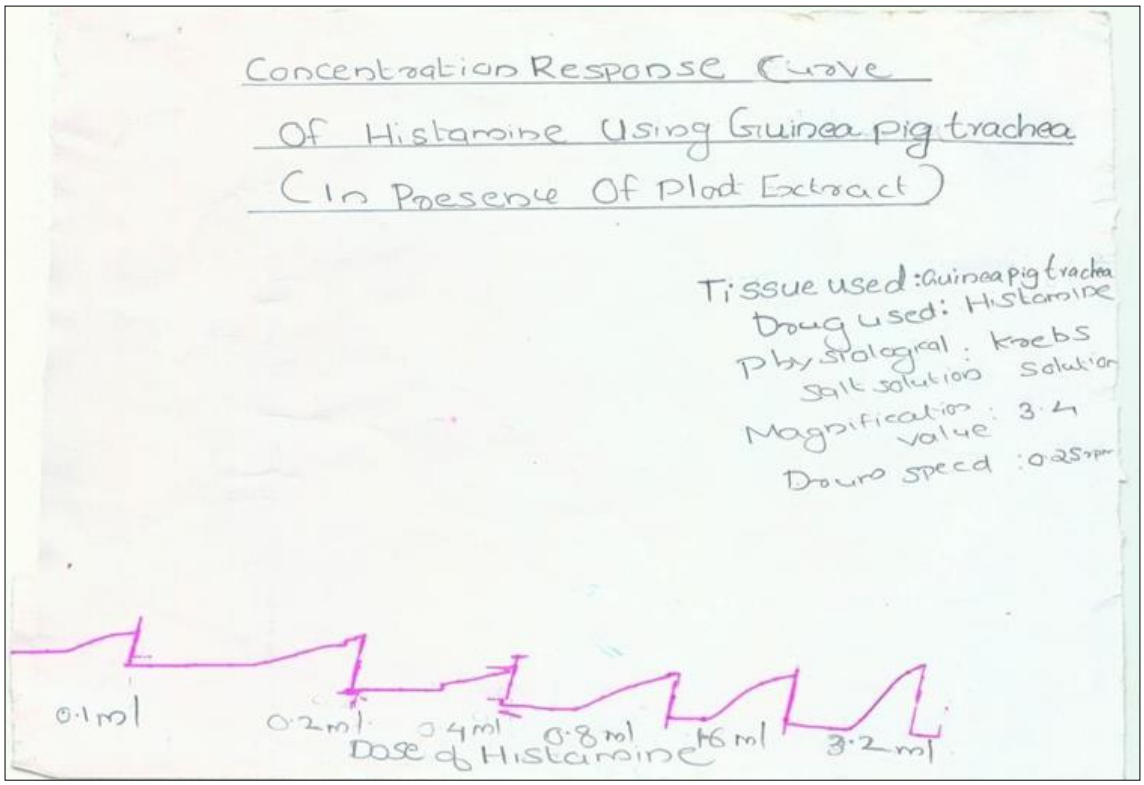


**Fig 2:** Concentration Response Curve of Histamine using Guinea pig tracheal preparation (In the Presence of Plant Extract)

It was observed that the ethanolic extract of Alpinia calcarata rhizomes inhibits contraction produced by histamine in these tissue preparations. Histamine (10 µg/ml) was taken at different dose levels and a concentration-response curve was plotted. The study revealed that the ethanolic extract of the plant Alpinia calcarata rhizome exhibited a significant percentage decreased contraction at a concentration of 0.8mg/ml.

### *In vitro* Anti-Inflammatory Activity

**Table 2:** Effect of ethanolic extract of Alpinia calcarataon protein denaturation

| S. no | Concentration(µg/ml) | Absorbance[A] | % Inhibition |
|---|---|---|---|
| 1 | 25 | 1.28±0.05 | 14 |
| 2 | 50 | 0.578±0.03 | 61.6 |
| 3 | 100 | 0.382±0.002 | 74.63 |
| 4 | 200 | 0.189±0.01 | 87.4 |
| 5 | 400 | 0.172±0.002 | 88.57 |
| 6 | Diclofenac sodium (100µg/ml) | 0.165±0.005 | 89.43 |

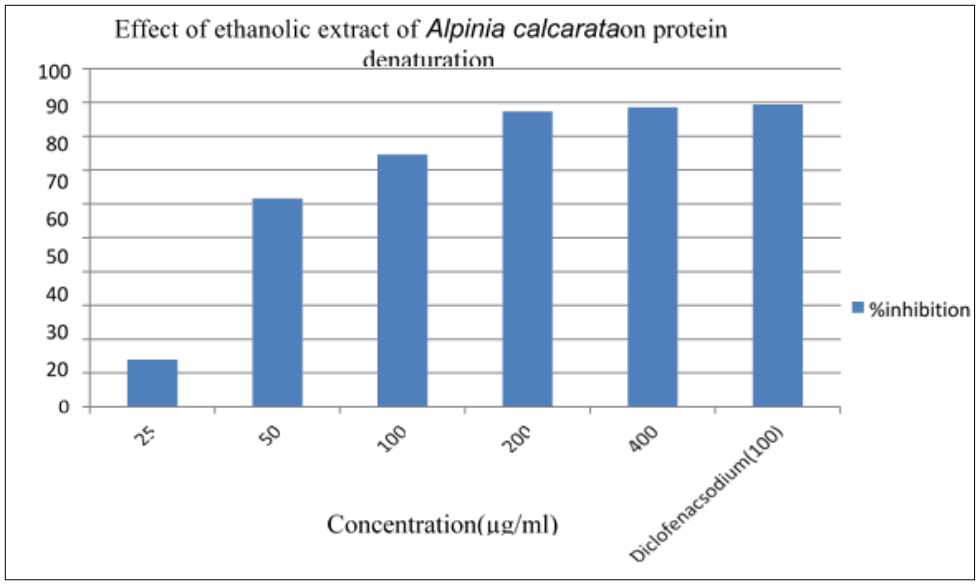


**Fig 3:** Effect of ethanolic extract of Alpinia calcarataon protein denaturation.

The ethanolic extract of plant exhibits membrane stabilization property by inhibiting hypotonicity which effectively indicates the anti-inflammatory property.
The viability of the cell depends upon the integrity of their membrane exposure of RBC to a hypotonic medium, an injurious substance results in the lysis of its membrane accompanied by haemolysis and oxidation of haemoglobin. Compounds with membrane stabilizing properties are well known for their ability to their ability to interfere with the early phase of inflammatory reactions.

**Conclusion**

The result of the investigation showed that the ethanolic extract of Alpinia calcarata rhizomes possesses anti-asthmatic activity. The antioxidant and anti- inflammatory property of the plant also supports its anti-asthmatic properties. Drugs effective in asthma are mostly steroidal. Phytochemical analysis showed the presence of flavonoids and steroids. The anti-asthmatic property shown by the plant may be because of these chemical moieties. There results obtained in the study supports the traditional and also demands further research and to isolate and characterize active principles responsible for anti-asthmatic activity.

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