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RESEARCH ARTICLE
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PHARMACOLOGICAL EVALUATION FOR THE ETHANOLIC EXTRACT OF *ALPINIA CALCARATA* RHIZOME FOR IT'S ANTI ASTHMATIC ACTIVITIES

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Abstract:
The term "**medicinal plant**" include 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"*. These medicinal plants are also used asfood, flavonoid, medicine or perfume and also in certain spiritual activities.
The forest in India is the principal repository of large number of medicinal and aromatic plants, which are largely collected as raw materials for manufacture of drugsand perfumery products. About 8,000 herbal remedies have been codified in AYUSH systems in INDIA. Ayurveda, Unani, Siddha and Folk (tribal) medicines are the major systems of indigenous medicines. Among these systems, Ayurveda and Unani Medicine are most developed and widely practiced in India.
Medicinal plants such as *Aloe, Tulsi, Neem, Turmeric* and *Ginger* cure several common ailments. These are considered as home remedies in many parts of the country. It is known fact that lots of consumers are using Basil (*Tulsi*) for making medicines, black tea, in *Pooja* and other activities in their day to day life.
In several parts of the world many herbs are used to honour their kings showing it asa symbol of luck. Now, after finding the role of herbs in medicine, lots of consumers started the plantation of tulsi and other medicinal plants in their home gardens.
Medicinal plants are considered as a rich resources of ingredients which can be used in drug development either pharmacopoeial, non- pharmacopoeial or synthetic drugs.A part from that, these plants play a critical role in the development of human culturesaround the whole world.. Some of these plants include ginger, green tea, walnuts, aloe, pepper and turmeric etc. Some plants and their derivatives are considered as important source for active ingredients which are used in aspirin and toothpaste etc.
Recipes for the treatment of common ailments such as diarrhoea, constipation, hypertension, low sperm count, dysentery and weak penile erection, piles, coated tongue, menstrual disorders, bronchial asthma, leucorrhoea and fevers are given by the traditional medicine practitioners very effectively.
Over the past two decades, there has been a tremendous increase in the use of herbal medicine; however, there is still a significant lack of research data in this field.

Key words: ***ALPINIA CALCARATA,***Medicinal plants, flavonoid, *Turmeric* and *Ginger*

Introduction: The term "**medicinal plant**" include 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"*. These medicinal plants are also used asfood, flavonoid, medicine or perfume and also in certain spiritual activities.

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Apart from the medicinal uses, herbs are also used in natural dye, pest control, food, perfume, tea and so on. In many countries different kinds of medicinal plants/ herbs are used to keep ants, flies, mice and flee away from homes and offices. Now a day'smedicinal herbs are important sources for pharmaceutical manufacturing.

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Importance of some herbs with their medicinal values

- Herbs such as black pepper, cinnamon, myrrh, aloe, sandalwood, ginseng, redclover, burdock, bayberry, and safflower are used to heal wounds, sores and boils.
- Basil, Fennel, Chives, Cilantro, Apple Mint, Thyme, Golden Oregano,Variegated Lemon Balm, Rosemary, Variegated Sage are some important medicinal herbs and can be planted in kitchen garden. These herbs are easy to grow, look good, taste and smell amazing and many of them are magnets for bees and butterflies.
- Many herbs are used as blood purifiers to alter or change a long-standing condition by eliminating the metabolic toxins. These are also known as 'blood cleansers'. Certain herbs improve the immunity of the person, thereby reducing conditions such as fever.
- Some herbs are also having antibiotic properties. Turmeric is useful in inhibiting the growth of germs, harmful microbes and bacteria. Turmeric is widely used as a home remedy to heal cut and wounds.
- To reduce fever and the production of heat caused by the condition, certain antipyretic herbs such as *Chirayta*, black pepper, sandal wood and safflower are recommended by traditional Indian medicine practitioners.

- Sandalwood and Cinnamon are great astringents apart from being aromatic. Sandalwood is especially used in arresting the discharge of blood, mucus etc.
- Some herbs are used to neutralize the acid produced by the stomach. Herbs such as marshmallow root and leaf. They serve as antacids. The healthy gastric acid needed for proper digestion is retained by such herbs.
- Indian sages were known to have remedies from plants which act against poisons from animals and snake bites.
- Herbs like Cardamom and Coriander are renowned for their appetizing qualities. Other aromatic herbs such as peppermint, cloves and turmeric add apleasant aroma to the food, thereby increasing the taste of the meal.
- Some herbs like aloe, sandalwood, turmeric, sheet raj hindi and khare khasak are commonly used as antiseptic and are very high in their medicinal values.
- Ginger and cloves are used in certain cough syrups. They are known for their expectorant property, which promotes the thinning and ejection of mucus from the lungs, trachea and bronchi. Eucalyptus, Cardamom, Wild cherry and cloves are also expectorants.
- Herbs such as Chamomile, Calamus, Ajwain, Basil, Cardamom, Chrysanthemum, Coriander, Fennel, Peppermint and Spearmint, Cinnamon, Ginger and Turmeric are helpful in promoting good blood circulation. Therefore, they are used as cardiac stimulants.
- Herbal medicine practitioners recommend calmative herbs, which provide a soothing effect to the body. They are often used as sedatives.
- Certain aromatic plants such as Aloe, Golden seal, Barberry and Chirayata areused as mild tonics. The bitter taste of such plants reduces toxins in blood. They are helpful in destroying infection as well.
- Certain herbs are used as stimulants to increase the activity of a system or an organ, for example herbs like Cayenne (Lal Mirch, Myrrh, Camphor and Guggul).
- A wide variety of herbs including Giloe, Golden seal, Aloe and Barberry are used as tonics. They can also be nutritive and rejuvenate a healthy as well as diseased individual.
- Honey, turmeric, marshmallow and liquorice can effectively treat a fresh cut and wound. They are termed as vulnerary herbs.

As our lifestyle is now getting techno-savvy, we are moving away from nature. While we cannot escape from nature because we are part of nature. As herbs are natural products they are free from side effects, they are comparatively safe, eco-friendly andlocally available. Traditionally there are lot of herbs used for the ailments related to different seasons. There is a need to promote them to save the human lives.

Asthma is a chronic inflammatory lung disease that can cause repeated episodes of cough, wheezing and breathing difficulty.

During an acute asthma episode, the airway lining in the lungs becomesinflamed and swollen. In addition, mucus production occurs in the airway and muscles surrounding the airway spasm. Combined, these cause a reduction in air flow. [1]

Asthma is characterized by:

- Airway inflammation: The airway lining becomes red, swollen, and narrow.
- Airway obstruction: The muscles encircling the airway tighten causing theairway to narrow making it difficult to get air in and out of the lungs.
- Airway hyper-responsiveness: The muscles encircling the airway respondmore quickly and vigorously to small amounts of allergens and irritants.

Common signs and symptoms of an acute asthma episode include:

- Coughing
- Wheezing
- Breathlessness
- Respiratory rate increased
- Chest tightness
- Chest or abdominal pain
- Fatigue, feeling out of breath
- Agitation
- Increased pulse rate

Causes

- Allergens from nature, typically inhaled, which include waste from commonhousehold pests.
- Indoor air pollution from volatile organic compounds.
- Medications, aspirin,βadrenergic antagonists (beta blockers), and penicillin.
- Food allergies such as milk, peanuts, and eggs.

Pathophysiology and pathogenesis of asthma

Airflow limitation in asthma is recurrent and caused by a variety of changes in theairway. These include:

- **Bronchoconstriction**

In asthma, the dominant physiological event leading to clinical symptoms is airway narrowing and a subsequent interference with airflow. In acute exacerbations of asthma, bronchial smooth muscle contraction (bronchoconstriction) occurs quickly to narrow the airways in response to exposure to a variety of stimuli including allergens or irritants. Allergen-induced acute bronchoconstriction results from an IgE-dependent release of mediators from mast cells that includes histamine, tryptase, leukotrienes and prostaglandins that directly contract airway smooth muscle.

- **Airway edema**

As the disease becomes more persistent and inflammation more progressive, other factors further limit airflow. These include edema, inflammation, mucushypersecretion and the formation of inspissated mucus plugs, as well as structuralchanges including hypertrophy and hyperplasia of the airway smooth muscle. These latter changes may not respond to usual treatment.

- **Airway hyper responsiveness**

This is an exaggerated bronchoconstrictor response to a wide variety of stimuliis a major, but not necessarily unique, feature of asthma.

- **Airway remodeling**

In some persons who have asthma, airflow limitation may be only partially reversible. Permanent structural changes can occur in the airway; these are associated with a progressive loss of lung function that is not prevented by or fully reversible by current therapy. Airway remodeling involves an activation of many ofthe structural cells, with consequent permanent changes in the airway that increase airflow obstruction and airway responsiveness and render the patient less responsive to therapy.[2]

Inflammatory Cells

- **Lymphocytes**

An increased understanding of the development and regulation of airway inflammation in asthma followed the discovery and description of subpopulations of lymphocytes, T helper1 cells and T helper2 cells with distinct inflammatory mediator profiles and asthma as a Th2 disease, recognizing the importance of number of families of cytokines and chemokines has advanced our understanding of the development of airway inflammation effects on airway function. After the discovery of these distinct lymphocyte subpopulations in animal models of allergic inflammation, evidence emerged

that, in human asthma, a shift, or predilection, toward the Th2-cytokine profile resulted in the eosinophilic inflammation characteristic of asthma. In addition, generation of Th2 cytokines (e.g., interleukin-4 (IL-4), IL-5 and IL-3) could also explain the overproduction of IgE, presence of eosinophils, and development of airway hyperresponsiveness.

- **Mast cells**

Activation of mucosal mast cells releases bronchoconstrictor mediators (histamine, cysteinyl-leukotrienes, prostaglandin D_2). Although allergen activation occurs through high affinity IgE receptors and is likely the most relevant reaction, sensitized mast cells also may be activated by osmotic stimuli to account for exercise induced bronchospasm (EIB). Eosinophils

Increased numbers of eosinophils exist in the airways of most, but not all, personswho have asthma. These cells contain inflammatory enzymes, generate leukotrienes, and express a wide variety of pro-inflammatory cytokines. Increases in eosinophils often correlate with greater asthma severity. In addition, numerous studies show that treating asthma with corticosteroids reduces circulating and airway eosinophils in parallel with clinical improvement. However, the role and contribution of eosinophils to asthma is undergoing a reevaluation based on studies with an anti-IL-5 treatment that has significantly reduced eosinophils but did not affect asthma control. Therefore, although the eosinophil may not be the only primary effector cell in asthma, it likely has a distinct role in different phasesof the disease.

- **Dendritic cells**

These cells function as key antigen-presenting cells that interact with allergens from the airway surface and then migrate to regional lymph nodes to interact with regulatory cells and ultimately to stimulate Th2 cell production from naive T cells.

- **Macrophages**

Macrophages are the most numerous cells in the airways and also can be activated by allergens through low-affinity IgE receptors to release inflammatory mediators and cytokines that amplify the inflammatory response.[4]

Treatment

There are number of treatments that can help effectively control or sooth the asthmatic condition. Treatment is based on two important goals, which are (i) specific regimens for the treatment of acute attack by opening swollen airways that arelimiting breathing and (ii) prophylactic measures to reduce the inflammation andairway resistance and to maintain airflow. Treatment and prevention involves a combination of medicines, life style advices and identifying and then avoiding potential asthma triggers.

Drugs which are indicated for the treatment of asthma includes the classes of beta2 agonists, corticosteroids, leukotriene inhibitors and xanthenes. They are available in the forms of inhalations, tablets, capsules and injections are used based on medical condition and supervision. Inhalation preparation includes solutions for nebulization, metered dose inhalers and powdered inhalers. Asthma medicines are usually given by inhalers, which are the devices that deliver the drug directly into the airways through your mouth when you breathe.

Drugs for treating asthma are divided into two categories:
(1) Quick-reliefmedications (which are used to relief acute asthma) and
(2) Long-term asthma control medications (which are used as prophylactic measures).

1. Quick-relief medications: they are used as needed for rapid, short-term symptom relief during an asthma attack. Types of quick-relief medications are

a) Short-acting $beta_2$ agonists: these inhaled, quick-relief bronchodilators act within minutes to rapidly ease symptoms during an asthma attack. Short-acting $beta_2$ agonists can be taken using a portable, hand-held inhaler or a nebulizer. Examples are salbutamol and terbutaline.
b) Antimuscarinics: these inhaled antimuscarinics act quickly to immediately relaxthe airways, like

other bronchodilators, making it easier to breathe. Examples are ipratropium and tiotropium.

2. Long-term asthma control medications: they work to reduce the amount of inflammation in the airways and prevent asthma attacks occurring.

a) Inhaled corticosteroids: they are the most effective preventers, however, you may need to use these medications for several days to weeks before they reach their maximum benefit. Examples are fluticasone and budesonide.
b) Long-acting $beta_2$ agonists: these inhaled medications open the airways. Some research shows that they may increase the risk of a severe asthma attack, unless they are used in combination with an inhaled corticosteroid. Examples are salmeterol and formoterol.
c) Leukotriene inhibitors: they act against one of the inflammatory components of asthma and provide protection against bronchoconstriction when taken before exercise or exposure to allergen or to cold air. Examples of leukotriene inhibitors include montelukast and zafirlukast.
d) Xanthines : apart from the relaxiation of bronchial muscle and bronchial spasmthey can stimulant effect on respiration and have anti-inflammatory effects. Example is theophylline.[6]

1.2. INFLAMMATION

Inflammation is defined as the local response of living mammalian tissue to injury due to any agent. It is a body defense reaction in order to eliminate or limit the spread of injurious agent.

Causes of inflammation

- Infective agents. E.g.: Bacteria, viruses and their toxins.
- Immunological agents. E.g.: Cell mediated and antigen antibody reaction.
- Physical agents. E.g.: Heat, cold, radiation, mechanical trauma.
- Chemical agents. E.g.: Organic and inorganic poisons

Signs of inflammation

The main signs of inflammation are

- Redness (Latin rubor)
- Heat (calor)
- Swelling (tumor)
- Pain (dolor)

Inflammation may be classified as

A) Acute inflammation
B) Chronic inflammation

A. Acute inflammation

Acute inflammation is immediate and early response to tissue. Main features arelisted below

a) Vasodilation
b) Vascular leakage and edema
c) Leukocyte emigration

a) Vasodilation

Brief arteriolar vasoconstriction followed by vasodilation

- Accounts for warmth and redness.
- Opens microvascular beds.
- Increased intravascular pressure causes an early transudate into interstitium.

b) Vascular leakage

- Transudate gives way to exudate (protein-rich)
- Increases interstitial osmotic pressure contributing to edema (water and ions)Five mechanisms known to cause vascular leakiness

1. Histamines, bradykinins, leukotrienes cause an earl, brief (15-30 min) immediate transient response, in the form of endothelial cell contraction that widensintercellular gaps of venules.
2. Cytokines mediators (TNF, IL-1) induce endothelial junction retraction through cytoskeleton reorganization.
3. Severe injuries may cause immediate direct endothelial cell damage (necrosis, detachment) making them leaky until they are repaired (immediate sustained response), or may cause delayed damage as in thermal or UV injury.
4. Marginating and endothelial cell adherent leukocytes may pile-up and damage the endothelium through activation and release of toxic oxygen radicals and proteolytic enzymes.
5. Some bacterial toxins.[7]

c) Leucocyte emigration

Leukocytes leave the vasculature routinely through the following sequence of events:

- Margination and rolling
- Adhesion and transmigration
- Chemotaxis and activationChemical mediators
- Plasma-derived:

➢ Complement, kinins, coagulation factors
➢ Many in "pro-form" requiring activation (enzymatic cleavage) [8]

- **Cell-derived:**

➢ Preformed, sequestered and released (mast cell histamine)
➢ Synthesized as needed (prostaglandin)[9]

B. Chronic inflammation

Chronic inflammation is defined as prolonged process in which tissue destruction and inflammation occurs at the same time. The characteristic features of chronic inflammation are the presence of chronic inflammatory cells such as lymphocytes, plasma cells and macrophages.[10]

Causes of chronic inflammation

- Chronic inflammation following acute inflammation
- Recurrent attacks of chronic inflammation

Characteristic features

- Necrosis
- Mononuclear cell infiltration
- Proliferative changes

Types of chronic inflammation

a. Non specific

This type of chronic inflammation is occurred with the formation of granulationtissue E.g: chronic ulcer.

b. Specific

When the injurious agent causes a characteristic histologic tissue responseE.g: syphilis[11]

Granulomatous inflammation

Granuloma is defined as the tiny lesion about 1 mm diameter, composed predominantly of collection of modified macrophages called epithelioid cells andrimmed at periphery by lymphoid cells.

Examples of granulomatous Inflammation-Tuberculosis, leprosy, fungal Table No.1: Various reactive oxygen species (ROS) and corresponding neutralizingantioxidants

ROS	NEUTRALIZING ANTIOXIDANTS
Hydroxyl radical	Vitamin C, glutathione, lipoic acid
Superoxide radical	Vitamin C, glutathione, flavonoids
Hydrogen peroxide	Glutathione, beta carotene, vitamin E
Lipid peroxides	Beta carotene, vitamin E, ubiquinone

Dietary antioxidants

Vitamin C, vitamin E, and beta carotene are among the most widely studied dietary antioxidants. Vitamin C is considered the most important water-soluble antioxidant in extracellular fluids.. Vitamin E, a major lipid-soluble antioxidant, is the most effective chain-breaking antioxidant within the cell membrane where it protects membrane fatty acids from lipid peroxidation. Vitamin C has been cited as being capable of regenerating vitamin E.[21,22]

1.2.2. Antioxidant system in our body

The body has developed several endogenous antioxidant systems to deal withthe reactive oxygen species.

- **Non-enzymatic system**

This include both lipid soluble vitamins and water soluble vitaminsE.g.: Lipid soluble vitamins-α- tocopherol (vitamin E), carotenes

Water soluble vitamins-ascorbic acid.

- **Enzymatic systems**

E.g.: Super oxide dismutase, catalase, peroxidase.[27,28]

Herbs are found out to be a source of various phytochemicals which possessantioxidant property.

1.3. HERBAL DRUGS USED IN ANTI – ASTHMATIC STUDY

List of Herbal Drugs used in Anti – asthmatic study

SL.NO	PLANT	FAMILY	PART	EXTRACT	MODEL	AUTHORS
1	*Aerva lanta*	*Amaranthaceae*	Aerialparts	Ethanol	1) 100 µg/mL in the isolatedgoat tracheal chain preparation model. 2) 30 and 60mg/kg dosesorally in clonidine-	Kumar D, Prasad DN, Parkash J, Bhatnaga.S.P, Kumar.D.[65]
					induced catalepsy. 3) Mast cell degranulation in mice possesses anti-asthmatic activity	
2	Ageratum conyzoides	Asteraceae	Leaves	Hydro alcoholic	1) Inhibiting clonidine induced catalepsy in mice	Tote MV, Mahire NB, Jain AP, Bose S, Undale VR, Bhosale 66
3	Asystasia	Acanthaceae	Leaves	Evaluated	1)Anti-	Akah PA,
	gangetica			hexane, ethyl	asthmatic activity using	Ezike AC,
				acetate,	guinea pig	Nwafor SV,
				and	trachea,	Okoli CO,
				methanol extracts	2) Rat stomach strip,	Enwerem. NM67
					3) Guinea pig	
					ileal	
					preparation,	
					3) Egg	
					albumin-	

					induced acute	
					inflammation.	
4	Bacopa monnieri	Scrophulariaceae	Leaves	Evaluated petroleum ether, chloroform, methanol and water extracts	1)Mast cell stabilizing activity in rats.	Samiulla DS, Prashanth.D , Amit A 68
5	Cassia sophera	Caesalpiniaceae	Leaves	Ethanol	1) Anti- asthmatic activity in carrageenan induced paw edema,	Nagore DH, Ghosh VK, Patil MJ.69
					2) Histamine induced bronchoconstr iction,	
					3) Clonidine and haloperidol induced catalepsy,	
					4) Milk induced leukocytosis, and eosinophilia,	
					5)Passive paw anaphylaxis animal- models.	
6	Casuarina equisetifolia	Casuarinaceae	Wood & Bark	Methanol	1)Antihistami- nic activity by	Aher AN,
					inhibiting the	Pal SC,
					histamine induced	Pati UK,
					contraction of	Yadav SK,
					trachea (10-80	
					mcg/mL), 2) Clonidine	Bhattacharya S.70
					induced	
					catalepsy and	
					mast cell	
					degranulation	
					at doses 100	
					mg/kg.	
7	Clerodendrum Serratum	Verbenaceae	Roots	Ethanol	1)Anti-	Bhujbal SS,
					asthmatic	Kewatkar
					activity using	SM,
					isolated goat tracheal chain	Kumar.D,
					preparation,	Mudgade.SC
					2) Clonidine	, Patil MJ.71
					induced	
					catalepsy,	
					3) Milk	
					induced	
					leukocytosis	
					and	
					eosinophilia in	
					mice.	
8	Cnidium monnieri	Umbelliferae	Fruits	Ethanol	1) In passive cutaneous anaphylaxis in rats.	Matsuda H, Tomohiro N, Yasuko,
						Kubo M.72
9	Curculigo orchioides	Amaryllidaceae	Rhizome	Alcoholic	1) Induced mast cell	Venkatesh.P ,Mukherjee.
					degranulation	PK,
					and systemic anaphylaxis,	Satheesh Kumar N,
					2) Inhibited	Neelesh K
					histamine-induced	Nema,
					contraction in	
					goat trachea,	Bandyopadh
					guinea pig	yay A,
					ileum,	Hiroyuki
					3)Bronchocon	Fukui 73
					striction in	Pandit P,
					guinea pigs,	
						Singh A,
					3)Egg albumin	
					induced	Bafna AR,
					passive paw	Kadam PV,
					anaphylaxis in	
					rats,	Patil MJ 74
					4) Milk	
					induced	

					leukocytosis	
					and	
					eosinophilia,	
					5) Clonidine	
					induced	
					catalepsy in	
					mice.	
10	Euphorbia hirta	Euphorbiaceae	Whole aerial part	Ethanol	1) Inhibited the passive cutaneous	Youssouf MS, Kaiser.P,
					anaphylaxis and paw	Tahir M,
					anaphylaxis	Singh GD,
					reaction,	Singh S,
					2) Protection	Sharma
					of mast cell	VK75.
					from	
					degranulation.	
11	Hemidesmus indicus	Asclepiadaceae	Roots	Ethanol	1) Isolated goat tracheal chain preparation,	Bhujbal SS, Kumar D, Deoda RS,
						Deore TK,
					2) Passive paw anaphylaxis in rat,	Patil MJ.76
					3) Clonidine- induced catalepsy in mice.	
12	Ficus bengalensis	Moraceae	Bark	Ethyl acetate, ethanol and aqueous extracts.	1)Antihistami- nic activity by inhibiting clonidine induced catalepsy in mice.	Taur DJ, Nirmal SA, Patil RY77,78

PLANT PROFILE

Alpinia calcarata – PLANT

: Rhizome.

PLANT DESCRIPTION

Selected plant : *Alpinia calcarata*

Classification

Kingdom : Plantae
Division : Mangnoliphyta
Class : Liliopsida
Order : Zingiberales
Family : *Zingiberaceae*
Genus : Alpinia
Species : *Alpinia calcarata*

Synonyms

Alpinia calcarata Rosk., Alpinia erecta Lodd. and Steud., Alpinia bracheata Rosk., Alpinia cerrnta Sims., Renealmia calcarata Haw., Globba eracta Retx., Languascalcarata Mem.[31]

Selected Vernacular Names

Sinhala- Heen aratta, Aratta English- Galanga, Small galangaTamil- Amkolinji
Sanskrit- Rasna[32]

Distribution`

It is native to India. Occurs in Southern Malay Peninsula and Sri Lanka. It iscommon in village gardens in Sri Lanka.[33]

COLLECTION & AUTHENTIFICATION OF *ALPINIA CALCARATA* RHIZOME

The rhizomes of *Alpinia calcarata* were collected and authentified.

EXTRACTION OF PLANT MATERIAL

Alpinia calcarata rhizomes were collected, washed and shade dried. Dried rhizomes were crinkled in to powdered form, weighed out. Extraction of coarse powder was done by soxhlet extraction with ethanol. The percentage yield of the product was found to be 17 % w/w.

PRELIMINARY PHYTOCHEMICAL SCREENING OF ETHANOLIC EXTRACT OF *ALPINIA CALCARATA* RHIZOMES (EEAC)

The phytochemical screening of the ethanolic extract of the *Alpinia calcarata* rhizomes indicate the presence of carbohydrate, cardiac glycoside, protein, alkaloids, steroids, flavonoids, tannins and phenolic compounds.

Table No.3: Preliminary phytochemical analysis

Sl. 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	+

6.1. (+: presence, -: absence) DISCUSSION

6.1.1. Preliminary phytochemical screening of ethanolic extract of *Alpinia calcarata* rhizome.

The ethanolic extract of *Alpinia calcarata* rhizomes were subjected to phytochemical screening. The result indicated that, rhizome extract shows the presence of carbohydrate, proteins, cardiac glycosides, flavonoid, tannins and phenol. The knowledge of chemical constituents of plant is desirable because such informationwill be valuable for synthesis of complex chemical substances and to screen for biological activities.

metabolites present in the plant. So the systematic screening of plant species is necessary for the purpose of discovering new bioactive compounds.

The phenolic compounds and flavonoids are secondary metabolites in plants having antioxidant activity. They have wide range of biological activities as cardio protection, cell proliferation and anti-aging. Tannins are potential toxic agents to fungi, bacteria and viruses in plants. They are currently investigated for human medicinal use, in order to reduce the risk of coronary heart diseases.

CONCLUSION

The result of the investigation showed that the ethanolic extract of *Alpinia calcarata* rhizomes possess anti asthmatic activity. The antioxidant and anti- inflammatory property of the plant also supports its anti-asthmatic property. Drugs effective in asthma are mostly steroidal in nature. Phytochemical analysis showed presence of flavonoid and steroids. The anti-asthmatic property showed by the plant may be because of these chemical moieties. The 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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