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PHYTOCHEMICAL STUDIES IN THE LEAVES OF *ECBOLIUM LINNEANUM*- THE MEDICINAL PLANT

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ABSTRACT

The Medical plant, Ecbolium Linneanum, belongs to the botanical family of acanthaceae. All the parts of this plant have traditional medicinal values. In the present work, the extracts from the different solvents (ethanol, water, chlototorrm) can be subjected to the separation of compounds like, xanthoprotein, alkaloid, reducing sugar, steroids, saponins, tannins, phenolic compounds and carbohydrate. Quantitative determinations like moisture content, total ash, acid insoluable ash, water soluble ash and residue on ignition can also be determined. From the results, it is cleat that ethanol is the best solvent to show chemical constituents than the other solvents.

Keywords: *Ecbolium Linneanum*, extract, solvents, Acanthaceae)

INTRODUCTION

Medicinal plants are a source of great economic value all over the world. Nature has bestowed on us a very rich health, wealth and a large number of diverse plants grown in different parts of the country. India is one of the richest countries in the world with regard to the diversity of medicinal plants.

The importance of medicinal plants has been emphasized from time to time due to their more safety and less side effects. Many infectious diseases are known to be treated with herbal remedies throughout the history of mankind. Medicinal plants are claimed to be useful for wound healing in the traditional system of medicine. The discipline of medicines in medicinal chemistry is devoted to the discovery and development of new agents for treating diseases.

Large numbers of medicinal plants are constantly being screened for their possible pharmacological value particularly of their anti- inflammatory, hypersensitive, hypoglycemic, anti- fertility, anti biotic and cytotoxic properties.

Chemical constituents

Chemical constituents of herb may be therapeutically active or inactive. The curative actions of the medicinal plants are also to be identified for the therapeutic value of the bioactive ingredients which are characterized. The most important of these bioactive compounds of plants are Alkaloids, Phenolic compounds, Flavannoids, Tannins and Saponins.

Alkaloids

Alkaloids are a structurally diverse group of over 12,000 cyclic nitrogen containing compounds that are found in over 20% of plant species. Alkaloids are very important in medicines and they constitute most of the valuable drugs. They have physiological effect on the human body, For instance, individual alkaloids act as agonists and antagonists to a variety of neurotransmitter systems. The specific biological functions of alkaloids are (i) They may act as reserved substances to supply nitrogen (ii) They may be the end products of detoxification mechanisms (iii) They may act as poisonous substances which afford plants safely from herbivores and insects, (iv) They may act as reservoirs for protein synthesis.

Phenolic Compounds

Phenolic compounds are widely distributed in the plant kingdom. Presence of phenols is considered to be potentially

toxic to the growth and development of pathogen. Most of these chemical groups are expectorants and emulsifying agents, Phenols are found across the plant kingdom, with 10,000 structures identified to date with a few notable exceptions.

Flavanoids

Flavanoids represent the largest and the most diverse groups, encompassing some 6000 compounds, all of which share a common underlying structure of two hexagonal rings, with a 3 - carbon bridge, which usually forms a third ring. Flavanoids can then be subdivided according to modification of this basic skeleton into chalcones, flavones, flavanones, isoflavones, flavan - 3- ols and anthocyanins. Flavanoid are 15 - carbon compounds generally distributed throughout the plant kingdom. Flavanoids constitute one of the most characteristic classes of compounds in higher plants. Many flavanoids are easily recognized as flower pigment in most angiosperm families. Flavanoids are the most important plant pigment for flower coloration producing yellow or red / blue pigmentation in petals designed to attract pollinator animals.

Tannins

Tannins are fairly potent bioactive compounds of vegetable origin found in medicinal plants frequently encountered in food products of plant parts such as tea leaves and fruits, that can be used for therapeutic purposes. Tannins have molecular weights ranging from 500 to over 3000 (gallic acid esters) and upto 20,000 (proanthocyanidins). They are commonly found in both gymnosperms as well as Angiosperms. Tannins are mostly located in the vacuoles or surface wax of plants these storage sites keep tannins active against plant predators, but also keep some tannin from affecting plant metabolism while the plant tissue is alive; it is only after cell breakdown and death that the tannins are active in metabolic effects.

Saponins

Saponins are a class of chemical compounds one of many secondary metabolites found in natural sources, with saponins found in particular abundance in various plant species. The aglycone (glycoside - free portion) of the saponins are termed as sapogenins. The number of saccharide chains attached to the sapogenin / aglycone core can vary, giving rise to another dimension of nomenclature as can the length of each chain. Aglycone derivatives can also incorporate nitrogen,

so that some saponins also present chemical and pharmacologic characteristics of alkaloidal products

A lot of medicinally important attributes have been assigned to this family of plants, to which Ecbolium Linneanum belongs. The Taxonomic classification of Ecbolium Linneanum is Vital in furthur understanding their accurate botanical description and to the magnitude of their diversity and usefulness

Taxonomical classification

Kingdom: Plantae

Class: Angiosperm

Phylum: Eudicots

Order: Lamiales

Family: Acanthaceae

Genum: *Ecbolium*

Species: *Linneanum*

Binomial Name: *Ecobolium Linneanum*

Common Name: Blue fox tail

Ecbolium Linneanum (Family: Acanthaceae)

It is an indigenous Indian plant that grows naturally along the eastern parts of India. It has been found in Africa and tropical Asia and also in Mumbai and konkan region. It is a shrubby plant with 4 sides flower spikes at the end of branches. Bracts are oval, entire and mucronate leaves are elliptic, oblong narrowed at both ends, velvety. Flowers are large, greenish blue in color. Upper lip of the flower is linear, reflexed. It is an erect shrub with smooth, hairless stems and leaves.

Physical Characteristics

The plant prefers light (sandy) and medium (loamy) soils and requires well - drained soil. The plant prefers neutral and basic (alkaline) and can grow in very alkaline soil. It cannot grow in the shade. It requires dry and moist soil.

Uses

The medicinal uses of this plant are that, it is used in the treatment of cancer, cardiovascular disease and weak immune system. The roots of this plant are used to cure jaundice, menorrhagia and rheumatism. It is also used as an anti inflammatory activity. Root juice is used as antihelmintic and also to treat premenstrual colic. It possess some pharma cological properties, they may be toxic or mutagenic leaves are used as wound healing and also used as an anticancer agent.

MATERIALS AND METHODS

Ecbolium Linneanum was collected from Marthandam in Kanyakumari District. The leaves of *Ecbolium Linneanum* were washed with water and air dried over a period of two weeks. The dries leaves were finally powdered and extracted with various solvents such as ethanol, water and chloroform for the determination of phytochemical characters.

Table -1

S.No	Experiment	Observation	Inference
1.	Test Solution + minimum amount of $CHCL_3$ +3 drops of Conc. H_2SO_4.	Purple colour changes to blue or green	Presence of steroids
2.	Test solution + equal volume of Fehling solution A and Fehling solution B and heated in a water bath.	Red CU_2O precipitate is formed	Presence of reducing sugars.
3.	Test solution + 10% NaOH solution and heated	Solution is burned	Presence of carbohydrate
4.	Test solution is shaken with 2N HCl. A queous layer formed is separated and to which one or two drops of mayer's reagent are added	White precipitate is formed	Presence of Alkaloids
5.	Test Solution + conc. HNO_3+ Excess of NH_3.	Reddish orange precipitate is formed	Presence of Xanthoproteins
6.	Water soluble portion of the extract is treated with lead acetate solution	White precipitate is formed.	Presence of Tannins.
7.	Test Solution + Mg powder and treated with con. HCl while cooling the test tube under running water.	Orange colour is formed	Presence of Flavanoids
8.	Test solution + Tollens reagent	Silver mirror	Presence of Reducing sugars
9.	Test solution + Molisch's reagent	Purple colour	Presence of Reducing Sugars
10.	Test solution + Water + Shaken well	Foamy lather	Presence of saponins
11.	Test solution + neutral $Fecl_3$+1ml ethanol	Any changes	Presence of Phenol

Quantitative determination

The percentage of moisture content on leaves, total ash, acid insoluble ash, water soluble ash and residue on ignition were obtained by employing standard method of analysis described in pharmacopoeia of India (1966).

Determination of moisture content

A known quantity of leaves were weighed and allowed to dry under shade until a constant weight was obtained. From the initial and final weights, the loss of weight on drying was calculated.

Determination of total ash

A known quantity of dried samples of the leaves of *Ecbolium Linneanum* was taken in previously weighed silica crucible and ignited carefully not exceeding dull red heat until the ash was free from carbon. The crucible was cooled and weighed. The percentage of ash with reference to the air - dried was calculated.

Determination of acid - insoluble ash

A known weight of ash (about 0.lg) was boiled with 25ml of dilute hydrochloric acid (2N). The insoluble matter was collected in a previously weighed sintered crucible, washed with hot water, dried to constant weight and weighed. The percentage of acid insoluble ash with reference to the air - dried sample was calculated.

Determination of water soluble ash

A known weight of the ash (0.2g) was boiled with 25ml of distilled water. The insoluble matter was collected in a previously weighed sintered crucible, washed with hot water, dried to a constant weight and weighed. The percentage of water soluble ash with reference to the air - dried sample was calculated.

Determination of residue on ignition

A known weight of the air dried samples (2g) was taken in a previously weighed silica crucible and carefully incinerated till the ash was strongly ignited, cooled and weighed. The percentage of ignited ash with reference to the air dried sample was calculated.

Extraction method

Chemical method

Extractive value of the leaves of *Ecbolium Linneanum* in water, ethanol and chloroform were determined by employing the methods of analysis in pharmacopoeia of India (1996). About 1g of air dried samples were taken in a stopper flask, 20ml of the solvent was added, shaken well and allowed to stand for a hour with occasional shaking, then the content was filtered. 10ml of the filtrate was pipette out

into a clean previously weighed china dish and evaporated in a water bath. Finally it was dried at 105°C cooled and weighed. The percentage of solvent soluble extract with reference to the air dried sample was calculated.

RESULTS AND DISCUSSION

The systematic chemical analysis and phytochemical investigations were carried out on the leaves of *Ecbolium Linneanum*

All the tests shows that the leaves contain predominant amount of ash total (9.4%), acid - insoluble ash (30%), water soluble ash (38.5%) and residue on ignition contents (12.15%) and moisture content (44%).

Table -2

Sl. No	Particulars	Leaves (%)
1	Moisture content	44%
2	Total ash	9.4%
3	Acid insoluble ash	30%
4	Water soluble ash	38.5%
5	Residue on ignition	12.15%

Table -3

Sl. No	Solvents	Leaves (%)
1	Water	33.20
2	Ethanol	43.14
3	Chloroform	15.8%

The above results show that the amount of extract is larger in Ethanol as a solvent than the other solvents.

Table – 4

Preliminary Phytochemical Analysis of the leaves of *Ecobolium Linneanum*

S.No	Extracts	Steroids	Reducing Sugars	Alkaloids	Phenolic Compounds	Saponins	Xantho Proteins	Tannins	Flavanoids	Carbohydrates
1	Water	-	+	-	+	+	-	-	-	-
2	Ethanol	-	-	+	+	-	-	-	+	-
3	Chloroform	+	-	-	+	-	-	-	-	-

+ present; - absent

The water as the solvent shows the presence of saponins, reducing sugars and phenols. The test for steroids, tannins, flavanoids, alkaloids gave negative results i.e, the group of compounds are absent in water extract. The ethanol extract gave the positive results for Alkaloids, Flavanoids and phenolic compounds, while the other compounds are absent.

The chloroform extract indicates the presence of phenols and steroids. The test for tannins, Reducing sugars and alkaloids gave negative results i.e, the group of compounds are absent in chloroform extract. It is found that the water and chloroform is failed to extract the alkaloids, whereas ethanol extracted it. From the table, it is clear that from the leaves of *Ecbolium Linneanum* , Ethanol is

the better extracting solvent than the other two solvents.

CONCLUSION

The Medicinal plant, *Ecbolium Linneanum* belongs to the botanical family of Acanthaceae. All the parts of these plants have traditional medicinal values. The extracts from the different solvents can also be subjected to the separation of compounds like xanthoprotein, alkaloids, reducing sugar, Steroids, saponins, tannins, phenolic compounds and carbohydrate.

In the present work, the extraction, characterisations of the leaves of *Ecbolium Linneanum* were carried out. From the above discussion, it is clear that ethanol is the best extracting solvent than the other solvents. However, further work is needed to isolate the chemical constituents from the plant extract and to carry out pharmaceutical studies.

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