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Preliminary phytochemical screening of various extracts of *Gymnopteris contaminant* (bedd.)

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Abstract: Plants are medicinally useful in treating diseases in the body and in most cases, the antimicrobial efficacy value attributed to some plants is beyond belief. The main objective of the present study was to ascertain the presence of different phytoconstitutents in the water, acetone and methanol extracts of species of pteridophytes by qualitative screening methods. The plant extracts were evaluated for the presence of secondary metabolites such as alkaloids, glycosides, flavonoids, proteins, terpenoids, saponins, phenolic compounds and cardiac glycocides following preliminary methods. Extracts with methanol and acetone revealed maximum number of phytochemicals. The results revealed the occurrence of several bioactive constituents which could be applicable for their antimicrobial purposes.

Keywords: Phytochemical, phytoconstituents, antimicrobial, extracts

1.Introduction

The plant kingdom is a store house of potential drugs and in the recent years there has been an increasing consciousness about medicinal plants. Drugs from the plants are easily accessible, inexpensive, safe and efficient and have fewer consequences. According to world health organization (WHO), more than 80% of the world's population relies on traditional medicines for their primary health care requirements.

Plants are filled with various phytochemical molecules such as vitamins, terpenoids, phenolic acids, lignins, , flavonoids, quinones, coumarins, alkaloids and other metabolites, which are rich in antioxidant and antimicrobial activity [1,2]. Researchs have shown that many of these antioxidant compounds possess anti-inflammatory, antitumor, anticarcinogeic, antibacterial, and antiviral activities [3,4]. In recent years, secondary plant metabolites (phytochemicals), previously with unknown pharmacological activities, have been extensively investigated as a source of medicinal agents [5]. Pteridophytes are not infected by microbial pathogens, which may be one of the important factors for the evolutionary success of pteridophytes and the

fact that they survived for more than 350 million years. Considering the rich diversity of Indian medicinal plants including Pteridophytes, it is expected that, the screening of plant extract for antibacterial activity may be beneficial for humans and plants diseases [6]. The aim of this study is to evaluate the phytochemicals from aqueous, acetone and methanol extracts of two species of Pteridophytes

2.Materials and Methods

2.1Collection and Storage of plant material

The plant material was collected from natural habitats in fresh form. The collected plant material was packed in polythene bags and brought to the laboratory. In the laboratory these plant materials were washed with tap water till the debris and soil particles were removed. Then these materials were washed with distilled water repeatedly. To remove extra moisture, the material was dried by pressuring in between blotting papers. The required plant material for extract preparation was taken in pestle and mortar and rest of material was wrapped in blotting papers, polythene bags and stored in freeze to prevent from drying. A voucher specimen of plants was deposited in form of herbarium for morpho-taxo anatomical studies.

2.2.Methodology

1.Extract preparation

The plant materials collected were dried on blotting paper in laboratory at room temperature to remove extra moisture. After drying, the plant materials were ground in a grinding machine. Sunlight exposure was avoided to prevent the loss of active components.

The whole plants were washed with distilled water to remove soil particles. For Aqueous extract preparation, weighted plant material was grinded in mortar and pestle with equal amount of water till the formation of fine paste. The same method was adopted for acetone and methanol extracts preparation except grinding the plant material with acetone and methanol respectively instead of water.

2.Qualitative phytochemical screening

The systemic screening of plant species with the purpose of discovering new bioactive compounds was performed in several laboratories. Plants and plant parts have been provide a good source of theraputical active compounds, such as phenolics, flavonoids, vitamins, terpenoids and some other secondary metabolites, which are rich in valuable bioactivities of antioxidant, anti-inhibitory, antimicrobial, antitumor activities.

In the continuation of our ongoing study aiming to find novel and biologically active compounds from the moisture loving plants, the aim of this study was to report the phytochemical screening of the extracts.

The extracts of *Gymnopteris contaminant* (bedd.) were subjected to various phytochemical tests. The methods of Trease and Evans (7) were used to detect the presence or absence of certain bioactive compounds.

A.Tests for flavonoids

Ferric-chloride test

Test solution (extract) was taken in test tube and added few drops of freshly prepared ferric chloride solution. Intense green colour of the solution indicated the presence of flavonoids.

Sodium hydroxide test

5ml of 20% NaOH is added to equal volume of water extract. A yellow solution indicated the presence of flavonoids**.**

Alkaline reagent test

Test solution was taken in test tube and added few drops of lead acetate (10%). Yellow precipitate indicated the presence of flavonoids.

B.Test for sterols

Salkowaski test

To test the presence of sterol, test solution was taken in test tube and added few drops of sulphuric acid. After shaking well, allowed to stand. The lower layer turned red indicating presence of sterols.

Liebermann-Burchardt test

Test solution was taken in test tube and few drops of acetic anhydride were added and mixed well. When concentrated sulphuric acid was added from the sides of test tube, it showed a brown ring at the junction of two layers and the upper layer turned green, indicated the presence of sterols.

Sulphur test

Test solution was taken in test tube and sulphure was added. Sulphur sinked down indicated the presence of sterols.

C.Test for terpenoids

Salkowaski test

To find the presence of terpenoids in the extract**,** test solution was taken in test tube and added few drops of concentrated sulphuric acid and shaking well it was allowed to stand. The lower layer turned yellow indicating the presence of terpenoids.

Liebermann-Burchardt test

Test solution was taken in test tube and added acetic anhydride, mixed well and then added concentrated sulphuric acid from the sides of the test tube. Deep red colour indicated the presence of terpenoids.

D.Test for alkaloids

Mayer's test

In a few ml of filtrate, few drops of Wagner's reagent were added by the side of test tube. A reddish-brown precipitate was not observed, hence alkaloids were not confirmed.

Hager's test

One or two ml of Hager's reagent was added in a few ml of filtrate. A prominent yellow precipitate was not found, hence alkaloids were absent.

E.Test for phenolic compounds

Ferric chloride test

In a few ml of filtrate, few drops of 5% ferric chloride solution were added. A dark green colour indicated the presence of phenolic compounds.

Lead acetate test

Few drops of 10% lead acetate solution were added in a few ml of filtrate. A bulky white precipitate indicated the presence of phenolic compounds.

F.Test for anthroquinons

Borntrager's test

About 0.5ml of extract was added with 5ml chloroform and shaken for 5 minutes. The extract was filtered and the filtrate shaken with an equal volume of 100 per cent ammonia. No layer formation indicated the absence of anthroquinons.

G.Test for cardiac glycoside

Keller killeni test

Few ml of extract was dissolved in 1ml of glacial acetic acid contaning one drop of ferric chloride solution then added 1ml of concentrate sulphuric acid, brown ring obtained at the interface indicates the presence of de-oxysugar characteristic of cardiac glycoside.

H.Test for Saponins

The extract was diluted with distilled water and made upto 20 ml. The suspension was shaken in a graduated cylinder for 15 minutes. No froath formation indicated the absence of saponins.

3.Results and Discussion

Plant extracts were investigated for their phytochemical constituents. The different solvent extracts showed the presence and absence of different phytochemicals like flavonoid, terpenoids, steroids, phenols and cardiac glycosides etc.(Table 1 and Fig. 1and 2) but there was a difference in their presence suggesting that antifungal activity was moderate to strong and it also vary from plant to plant.

Pteridophytes are a group of plants with medicinal applications that by studying their phytochemical and pharmacological properties may reveal the presence of active compounds that can be developed into novel therapeutics.(8)

The plant (whole) Ceratopteris thalictroides (L.) Brogn collected from Puthalam, Kanyakumari District, Tamil Nadu, India, were analyzed for the presence of different phytochemicals. The aim of our study is to screen the biologically active compounds in plant material, C. thalictroides. Phytochemical methods of screening proven the presence of alkaloids, steroids, coumarin, tannins, saponins, flavonoids, quinone, anthroquinone, phenol, protein, xanthoprotein, carbohydrate, glycosides, catachin, sugar and terpenoids in the extracts of the whole plants. The phytochemical composition of the whole plants indicate their medicinal properties.(9)

Table 1 Phytochemical screening of the Pteridophyte (*Gymnopteris contaminant)*

Phytochemicals	**Aqueous extract**	**Acetonic extract**	**Methanolic extract**
1.Flavanoids	+	+	+
2.Saponins	-	-	-
3.Alkaloids	-	-	-
4.Terpenoids	+	+	+
5.Sterols	+	+	+
6.Anthroquiones	-	-	-
7.Phenols	+	+	+
8.Cardiac glycosides	+	+	+

+ = Phytoconstituent present

- = Phytoconstituent absent

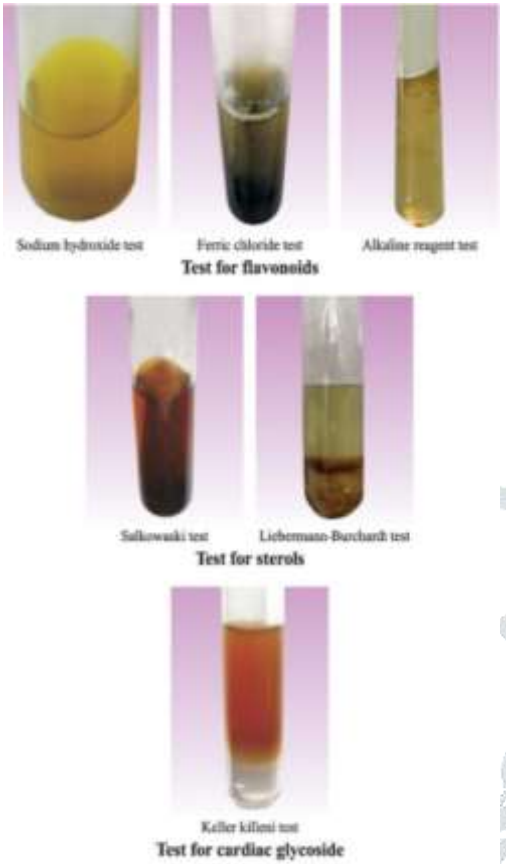

Fig.1

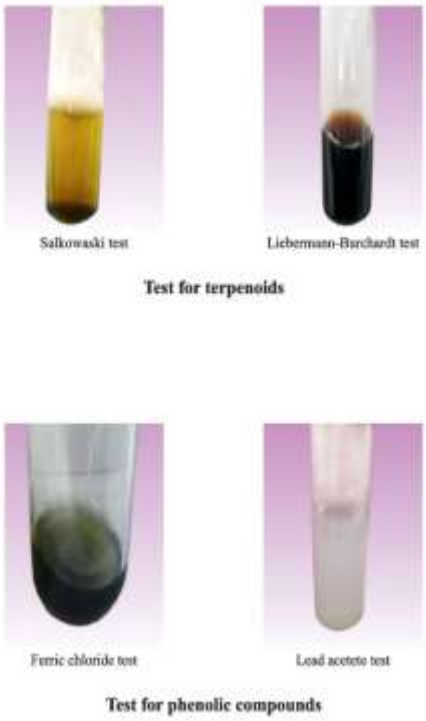

Fig.2

4.Conclusions

In the present study all the ferns extracts showed the presence of alkaloids, flavonoids and saponins. This study also leads to the further research in the way of isolation and identification of the active compound from the selected fern using chromatographic and spectroscopic techniques.

Pteridophytes are poorly understood in terms of phytochemistry, pharmacology, and pharmacognosy. To develop new drugs from underexplored plant groups, it is essential to encourage intensive scientifc research on unexplored plant species of pteridophytes.

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