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SCREENING OF PRELIMINARY PHYTOCHEMICALS OF *ADIANTUM LUNULATUM* BURM. - AN IMPORTANT PTERIDOPHYTE

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ABSTRACT

The present study was concentrated to screen the preliminary phytochemicals of *Adiantum lunulatum* Burm. using four different solvent extracts such as methanol, acetone, benzene and hexane. The preliminary phytochemical analysis was followed by Harborne method. The preliminary phytochemical study of *Adiantum lunulatum* Burm. showed the presence of ten various types of secondary metabolites such as alkaloids, cardiac glycosides, coumarin, diterpenes, emodins, flavonoids, saponins, steroids, tannins and triterpenoids. From the observations, it was found that the different extracts of *Adiantum lunulatum* Burm. possessed the presence of a number of active secondary metabolites. Hence the present report may guide to the isolation and characterization of these active secondary metabolites for the bio-efficacy and bioactivity of *Adiantum lunulatum* Burm.

KEYWORDS: Phytochemicals, *Adiantum lunulatum*, Harborne, Extracts, Metabolites.

1. INTRODUCTION

Medicinal plants contain various chemical substances in one or more of the parts that can be used for therapeutic purposes. Phytochemicals are the chemical substances which present naturally in medicinal plants. Phytochemicals protect plant cells from environmental hazards such as pollution, stress, drought, UV exposure and pathogenic attack.[1] Naturally, more than 4,000 phytochemicals have been catalogued and are classified by protective function, physical characteristics and chemical characteristics.[2] Among the various phytochemicals

have been studied in detail, such plants have medicinal value its parts including leaves, roots, rhizomes, stems, barks, flowers, fruits, grains or seeds which employed in the control or treatment of various disease condition are medically active. Unlike pharmaceutical chemicals, the phytochemicals do not have any side effects on human and animals. Since the phytochemicals cure diseases without causing any damage to human beings, these can also be considered as “manfriendly medicines”.

Phytochemicals are also available in supplementary forms, but evidence is lacking that they provide the same health benefits as dietary phytochemicals.[3] These compounds are known as secondary plant metabolites and have biological properties such as anti-oxidant activity, anti-microbial effect, modulation of detoxification enzymes, stimulation of the immune system, decrease of platelet aggregation and modulation of hormone metabolism and anti-cancer property. There are more than thousand known and many unknown phytochemicals. It is well-known that plants produce these chemicals to protect themselves, but recent researches demonstrate that many phytochemicals can also protect human against various diseases.[4] In the present study, an attempt was taken to study the preliminary phytochemicals present in the important Pteridophyte namely *Adiantum lunulatum* Burm.

2. MATERIALS AND METHODS

2.1. Collection of Plant Sample

The plant materials used in the present study was *Adiantum lunulatum* Burm. which belongs to the family Adiantaceae. The plant materials for the current study were collected from Kothiyar, located in Kanyakumari district, Tamil Nadu, India, during the month of December, 2016 and identified and confirmed by Pteridophyte flora of the Western Ghats - South India.[5]

2.2. Preliminary phytochemical analysis

The various solvent extracts namely methanol, acetone, benzene and hexane of the selected *Adiantum* species was tested for the presence of the following secondary metabolites such as alkaloids, anthocyanin, anthraquinones, cardiac glycosides, coumarin, diterpenes, emodins, flavonoids, saponins, steroids, tannins and triterpenoids. Phytochemical screening of the extracts was carried out according to the standard method of Harborne.[6]

2.3. Preparation of extracts

For the preparation of a variety of extracts, the plant specimens were washed thoroughly and placed on blotting paper and spread out at room temperature in the shade condition for drying. The shade dried samples were grounded to fine powder using a tissue blender. The powdered samples were then stored in the refrigerator for further use. 30g powdered samples were packed in Soxhlet apparatus and extracted with methanol, acetone, benzene and hexane for 8h separately.

Test for alkaloids

1ml of 1% HCl was added to the 2ml of extract in a test tube and was treated with few drops of Mayer's reagent. A creamy white precipitate indicates the presence of alkaloids.

Test for anthocyanin

2ml of extract was added with 1ml of 2N NaOH and heated for 5min. the formation of bluish green colour indicated the presence of anthocyanin.

Test for anthraquinones

2ml extract was mixed with benzene and 1ml 10% ammonia solution was added. The presence of a pink, red or violet color indicates the anthraquinones.

Test for cardiac glycosides

Take 2ml extract, 2ml of glacial acetic acid, 1ml of Conc. sulphuric acid and few drops of 5% ferric chloride. The formation of brown ring indicates the presence of cardiac glycosides.

Test for coumarins

1ml of extract was added with 1ml of 1N NaOH. The test tubes were kept in boiling water bath for few minutes and shaken well. The appearance of yellow colour indicates the presence of coumarins.

Test for diterpenes

1ml of extract was added to 1ml of distilled water and 10 drops of copper acetate solution. A emerald green color indicates the presence of diterpenes.

Test for emodins

1ml of plant extract was added to 2ml of NH_4OH and 3ml of benzene. A red color indicates the presence of emodins.

Test for flavonoids

A few drops of 1% NH_3 solution was added to 2 ml of extract in a test tube. A yellow Coloration indicates the presence of flavonoids.

Test for saponins

2ml of extract was shaken vigorously with 5ml distilled water to obtain stable persistent foam. The formation of emulsion indicates the presence of saponins.

Test for steroids

1ml extract was added with 2ml of chloroform and 1ml of sulphuric acid. The formation of reddish brown ring indicates the presence of steroids.

Test for tannins

To 2ml extract, 1ml of distilled water and 1-2 drops of ferric chloride solution was added and observed for brownish green or a blue black coloration indicates the presence of tannins.

Test for triterpenoids

2ml extract was mixed with 2ml of $CHCl_3$ in a test tube. 3ml Conc. H_2SO_4 was carefully added along the wall of the test tube to form a layer. An interface with a reddish brown coloration confirms the presence of triterpenoids.

3. RESULTS AND DISCUSSION

Various plant parts and components like roots, leaves, stem, barks and flowers have been employed in the treatment of infectious pathologies in the respiratory system, urinary tract, gastrointestinal, biliary systems and the skin.[8,9,10] Because of the medicinal property, many researchers have been performed to reveal the beneficial health effects of phytochemicals. The purpose of the present study is to provide the presence of a diverse phytochemicals in *Adiantum lunulatum* Burm. In the preliminary phytochemical analysis of *Adiantum lunulatum* Burm., twelve different types of secondary metabolites (alkaloids, anthocyanin, anthraquinones, cardiac glycosides, coumarin, diterpenes, emodins, flavonoids, saponins, steroids, tannins and triterpenoids) were tested in four different extracts (methanol, acetone, benzene and hexane). Thus, totally (1x4x12) 48 tests were conducted for the presence or absence of the above compounds (Table-1).

Table. 1: Preliminary phytochemical analysis of *Adiantum lunulatum* Burm.

Phytochemicals	Methanol	Acetone	Benzene	Hexane
Alkaloids	+	+	+	+
Anthocyanin	-	-	-	-
Anthraquinones	-	-	-	-
Cardiac glycosides	+	+	_	-
Coumarin	+	-	+	+
Diterpenes	+	-	-	+
Emodins	-	+	-	-
Flavonoids	+	+	+	+
Saponins	+	+	+	+
Steroids	+	-	+	+
Tannins	+	+	+	+
Triterpenoids	+	+	+	+

The preliminary phytochemical analysis of *Adiantum lunulatum* Burm. showed 31 positive results with the presence of ten various types of secondary metabolites such as alkaloids, cardiac glycosides, coumarin, diterpenes, emodins, flavonoids, saponins, steroids, tannins and triterpenoids. Among the various secondary metabolites, alkaloids, flavonoids, saponins, tannins and triterpenoids in four different extracts, coumarin and steroids in three extracts, cardiac glycosides and diterpenes in two different extracts, followed by emodins in only one extract and no result were found for anthocyanin and anthraquinones. Among the four different extracts, methanol extract showed the presence of the maximum number (9) of compounds. Next to methanol, hexane extract showed the presence of eight compounds, followed by acetone and benzene extracts showed the presence of seven compounds.

4. CONCLUSION

From the present study, it can be concluded that *Adiantum lunulatum* Burm. Expressed the presence of a number of active secondary metabolites namely alkaloids, cardiac glycosides, coumarin, diterpenes, emodins, flavonoids, saponins, steroids, tannins and triterpenoids. Among the various secondary metabolites, alkaloids, flavonoids, saponins, tannins and triterpenoids in four different extracts, coumarin and steroids in three extracts, cardiac glycosides and diterpenes in two different extracts, followed by emodins in only one extract and no result were found for anthocyanin and anthraquinones.

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