



PRELIMINARY PHYTOCHEMICAL ANALYSIS OF *ADIANTUM CAUDATUM* L.

*John Peter Paul J.

Assistant Professor and Director, Centre for Advanced Research in Plant Sciences (CARPS), Research Department of Botany, St. Xavier's College (Autonomous), Palayamkottai - 627 002, Tamil Nadu, India.

***Corresponding Author: John Peter Paul J.**

Assistant Professor and Director, Centre for Advanced Research in Plant Sciences (CARPS), Research Department of Botany, St. Xavier's College (Autonomous), Palayamkottai - 627 002, Tamil Nadu, India.

Article Received on 19/01/2018

Article Revised on 09/02/2018

Article Accepted on 01/03/2018

ABSTRACT

Screening of preliminary phytochemicals of *Adiantum caudatum* L. was studied using four various solvent extracts namely methanol, acetone, benzene and hexane. The preliminary phytochemical analysis was carried out by Harborne method. In the preliminary phytochemical analysis of *Adiantum caudatum* L., the presence of twelve different types of secondary metabolites such as alkaloids, anthocyanin, anthraquinones, cardiac glycosides, coumarin, diterpenes, emodins, flavonoids, saponins, steroids, tannins and triterpenoids were reported in the various extracts. From the results, it was observed that the different extracts of *Adiantum caudatum* L. showed 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 caudatum* L.

KEYWORDS: Phytochemicals, Screening, *Adiantum caudatum*, Harborne, Metabolites.

INTRODUCTION

Medicinal plants being an effective source of both traditional and modern medicines are generally useful for primary health care. For past few decades compounds from natural sources have been gaining importance because of the vast clinical diversity that they offer. This had led to phenomenal increase in the demand for herbal medicines in the last two decades and or need has been felt for ensuring the quality, safety and efficacy of herbal drugs. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body.

The plant kingdom is a treasure house of potential drugs and in the recent years there has been an increasing consciousness about the grandness of medicinal plants. Drugs from the plants are easily accessible, inexpensive, safe and efficient. According to World Health Organization (WHO), more than 80% of the world's population relies on traditional medicines for their primary health care requirements. Since times immemorial plants and their parts (barks, leaves, flowers, roots, fruits, seeds etc) have been essential element for phytomedicines.^[1] An understanding of the chemical constituents of plants is a prerequisite for the use in medicine and also for the synthesis of complex chemical substances.^[2]

MATERIALS AND METHODS

Collection of plant materials

The plant materials used in the present study was *Adiantum caudatum* L. belonging to the family Adiantaceae. The plant materials for the present 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.^[3]

Preliminary phytochemical analysis

The different extracts (methanol, acetone, benzene and hexane) of the selected *Adiantum* species were tested for 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 methods.^[4]

Preparation of extracts

For the preparation of different 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 NH₄OH and 3ml of benzene. A red color indicates the presence of emodins.

Test for flavonoids

A few drops of 1% NH₃ 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 CHCl₃ in a test tube. 3ml Conc. H₂SO₄ 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.

RESULTS AND DISCUSSION

Medicinal plants represent an important natural assets of a particular country. They play a noteworthy role in providing primary health care services to rural people. They serve as therapeutic agents as well as chief raw materials for the manufacture of traditional and modern medicine. Considerable amount of foreign exchange can be earned by exporting medicinal plants to other countries. In this way indigenous medicinal plants play a vital role of an economy of a country (Ghani, 2003). In the preliminary phytochemical analysis of *Adiantum caudatum* L., twelve different types of secondary metabolites (alkaloids, anthocyanin, anthraquinones, cardiac glycosides, coumarin, diterpenes, emodins, flavonoids, saponins, steroids, tannins and triterpenoids) were tested in four various extracts namely methanol, acetone, benzene and hexane. Thus, totally (1x4x12) 48 tests were conducted for the presence or absence of the above compounds.

Table 1: Preliminary phytochemical analysis of different solvents of *Adiantum caudatum* L.

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

Out of 48 tests were carried out in the selected extracts of *Adiantum caudatum* L., 25 tests gave positive results and

the remaining produced negative results. The 25 positive results showed the presence of alkaloids, cardiac

glycosides, coumarin, diterpenes, flavonoids, saponins, steroids, tannins and triterpenoids. The results expressed the presence of alkaloids, saponins and triterpenoids in four different extracts, cardiac glycosides, flavonoids and tannins in three extracts, diterpenes in two extracts followed by coumarin and steroids in only one extract followed by anthocyanin, anthraquinones and emodins have no results. Among the four different extracts, the methanol extract showed the presence of the maximum number (7) of compounds. Next to methanol, acetone, benzene and hexane extracts showed the presence of six compounds each (Table 1).

CONCLUSION

From the present study, it was concluded that *Adiantum caudatum* L. showed the presence of a number of active secondary metabolites namely alkaloids, cardiac glycosides, coumarin, diterpenes, flavonoids, saponins, steroids, tannins and triterpenoids. Among the various secondary metabolites studied, alkaloids, saponins and triterpenoids in four different extracts, cardiac glycosides, flavonoids and tannins in three extracts, diterpenes in two extracts followed by coumarin and steroids in only one extract. This information may show the way to isolate and characterize these active secondary metabolites for the biological activities.

REFERENCE

1. Criagg GM, David JN. Natural product drug discovery in the next millennium. J. Pharm. Biol., 2001; 39: 8-17.
2. Parekh J, Chanda S. Phytochemicals screening of some plants from western region of India. Plant Arch, 2008; 8: 657-662.
3. Manickam VS, Irudayaraj V. Pteridophyte flora of the Western Ghats-South India. B.I. Publications Pvt. Ltd., 1991; 1-652.
4. Harborne JB. Phytochemical methods: A guide to modern techniques of plants analysis, Chapman & Hall. London, Ltd., 1998; 1-188.