



Research Article

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Comparative study on phytochemical parameters of *Amaranthus caudatus* and *Amaranthus hybridus*

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ABSTRACT

Screening of phytoconstituents of medicinal plants are necessary due to its immense human benefits. This information also makes easy the pharmacological studies because the mode of mechanism of plants on therapeutic effect lies on the presence of active compounds. In the present study two species of *Amaranthus* were taken and preliminary phytochemical tests were performed using two different solvents i.e. ethyl acetate as polar solvent and ethanol as non polar solvents. Finally both the results were compared. The presences of secondary metabolites were found more in ethanolic extract of those plants.

Keywords: Phytochemicals; Active compounds; *Amaranthus caudatus*; *Amaranthus hybridus*.

INTRODUCTION

Medicinal plants are universal and natural sources of active compounds which have tremendous effect in the society. Natural products either as pure compounds or as standardized plant extracts provide unlimited opportunities for new drug [1]. So the knowledge of these chemical constituents of plants is desirable not only for the discovery of therapeutic agents, but also because such information may be of great value in disclosing new sources of economic phytocompounds for the synthesis of complex chemical substances and for discovering the actual significance of folkloric remedies [2]. These bioactive phytochemical constituents in medicinal plant include alkaloids, flavonoids, phenolic compounds, tannins, anthracine derivatives and essential oils [3]. Plant produces these chemicals to protect itself but recent research demonstrates that many phytochemicals can protect humans against diseases [4].

Amaranth is a very versatile crop that is grown in a wide range of agro-climatic conditions; it resists drought, heat, and pests, and adapts readily to new environments, including some that are inhospitable to conventional cereal crops [5,6]. *Amaranthus caudatus* and *Amaranthus hybridus* are the species of Amaranthaceae family. *A. hybridus* has been used traditionally for the treatment of liver infections and knee pain and for its laxative, diuretic, and cicatrisation properties [7]. *A. caudatus* is a small herbs, known for its high anti-oxidant, anti hypercholesterolemic, anti-atherogenic, anti-arthritis and anti-microbial properties [8,9]. The present study concerns about the qualitative analysis of phytochemicals of those plants using polar and non polar solvents.

EXPERIMENTAL SECTION

Plant materials

Fresh plant leaves of *Amaranthus hybridus* and *Amaranthus caudatus* were collected from Chennai, Tamil Nadu. The leaves are thoroughly washed through tap water, dried and made powder.

Preparation of extracts

500 grams of finely dried powder of each plant were taken in three separate round bottom flask for sample extraction. Mainly two solvents namely ethyl acetate and ethanol were used. 750 ml of each solvent was taken for the solvent extraction and kept for a period of 24 hours. At the end of the extraction the respective solvents were concentrated under reduced pressure and the crude extracts were stored in refrigerator.

Phytochemical analysis

The extracts prepared were analyzed for the presence of alkaloids, saponin, tannins, steroids, flavonoids, anthraquinone, cardiac glycosides and reducing sugars based on the protocols available in the literature [10-15].

Test for alkaloids

The extract of the crude dry powder of each solvent was evaporated to dryness in boiling water bath. The residues were dissolved in 2 N Hydrochloric acid. The mixture was filtered and the filtrate was divided into three equal portions. One portion was treated with a few drops of Mayer's reagent; one portion was treated with equal amount of Dragendorff's reagent and the third portion was treated with equal amount of Wagner's reagent respectively. The creamish precipitate, the orange precipitate and brown precipitate, indicated the presence of respective alkaloids.

Test for saponins

About 0.5 g of the plant extract was shaken with water in a test tube and then heated to boil. Frothing was observed which was taken as a preliminary evidence for the presence of the saponin.

Test for tannins

About 0.5 g of extract was added was in 10 ml of water in a test tube and filtered. A few drops of 0.1% ferric chloride was added and observed for brownish green or blue-black coloration¹⁵.

Test for steroids

2 ml of acetic anhydride was added to 0.5 g of methanol extract of each sample with 2 ml sulphuric acid. The colour changed from violet to blue or green in some samples indicating the presence of steroids.

Test for flavonoids

2 ml of extract solution was treated with 1.5 ml of 50% methanol solution. The solution was warmed and metal magnesium was added. To this solution few drops of conc. Hydrochloric acid was added and the red colour was observed for flavonoides and orange colour for flavons.

Test for cardiac glycosides

0.2 g of extract was dissolved in 1 ml of glacial acetic acid containing 1 drop of ferric chloride solution. This was then under layered with 1ml of concentrated sulphuric acid. A brown ring obtained at the interface indicated the presence of a deoxysugar characteristic of cardioids.

Test for Proteins

To 2ml of protein solution 1ml of 40% NaOH solution and 1 to 2 drops of 1% CuSO₄ solution was added. A violet color indicated the presence of peptide linkage of the molecule.

Test for Amino Acids

To 2ml of sample was added to 2ml of Ninhydrin reagent and kept in water bath for 20 minutes. Appearance of purple color indicated the presence of amino acids in the sample.

Test for Tri-Terpenoids

5ml of each extract was added to 2ml of chloroform and 3ml of con. H₂SO₄ to form a monolayer of reddish brown coloration of the interface was showed to form positive result for the tri-terpenoids.

Test for Reducing Sugars

To 2 ml of extract 2drops of Molisch's reagent was added and shaken well. 2ml of conc. H₂SO₄ was added on the sides of the test tube. A reddish violet ring appeared at the junction of two layers immediately indicated the presence of carbohydrates.

RESULTS AND DISCUSSION

The phytoconstituents of *Amaranthus hybridus* and *Amaranthus caudatus* were analyzed qualitatively and the results were compared (Table1).

Table 1. Qualitative Analysis of Phytochemicals of *Amaranthus hybridus* and *Amaranthus caudatus*

Phytoconstituents	<i>Amaranthus hybridus</i>		<i>Amaranthus caudatus</i>	
	Ethanol extract	Ethyl acetate extract	Ethanol extract	Ethyl acetate extract
Alkaloids	--	--	--	--
Saponins	--	--	++	++
Tanins	++	--	++	--
Steroids	++	++	++	--
Flavonoids	++	++	++	--
Proteins	--	--	++	--
Cardiac glycosides	--	--	--	++
Tri-terpenoids	++	--	++	--
Reducing sugars	++	--	++	--
Amino acids	--	--	++	--

+ Presence, – Absence of phytoconstituents

Phytochemical analysis of two plants *Amaranthus hybridus* and *Amaranthus caudatus* was studied with ethanol and ethylacetate extract. The ethanol extract of *Amaranthus hybridus* has shown positive result to tanins, steroids, flavonoids, tri-terpenoids, reducing sugars and negative results to alkaloids, saponins, proteins, amino acids, cardiac glycosides. The Ethyl acetate extract of *Amaranthus hybridus* has shown positive result to steroids, flavonoids, and negative results to rest of the phytoconstituents. The ethanol extract of *Amaranthus caudatus* has shown positive result to saponins, tanins, steroids, flavonoids, tri-terpenoids, amino acids, reducing sugars and negative results to alkaloids, cardiac glycosides. The ethylacetate extract of *Amaranthus caudatus* has shown positive result to saponins, cardiac glycosides and negative results to rest of the phytoconstituents. The result implies that the ethanol extract of both the plants contain maximum number of secondary metabolites then the ethyl acetate extract. So this polar solvent extract of these plants can be used as different pharmacological applications.

CONCLUSION

Medicinal plants are always attracting towards its unique and universal metabolites which can be used forever. The presence of phytoconstituents for both plants were identified and compared. This indicates that these plants can be useful drugs. Further studies are going on these plants in order to isolate, identify, and characterize and elucidate the structure of the bioactive compounds.

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