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Der Pharmacia Lettre, 2015, 7 (12):20-24
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Preliminary phytochemical analysis and antioxidant properties of *Gynandropsis pentaphylla*

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ABSTRACT

The phytochemical analysis and antioxidant properties of ethyl acetate extracts of *Gynandropsis pentaphylla* was performed in the present study. Phytochemical study included detection of flavonoids, alkaloids, terpenoids, saponins, tannins, steroids, quinons, proteins and cardiac glycosides. The plant was collected from paddy fields near Chengalpattu, Tamil Nadu, India. Strong presence of Alkaloids, Terpenoids and Steroids was observed whereas proteins, saponins, flavonoids and cardio glycoside were present in less amounts. Tanins were conspicuous by their absence in the plant extract. Strong antioxidant activity was observed at 5 mg concentration of plant extract.

Keywords: Phytochemicals, *Gynandropsis pentaphylla*, Ethyl acetate, Antioxidant.

INTRODUCTION

Medicinal plants contain some organic compounds which provide definite physiological action on the human body and these bioactive substances include tannins, alkaloids, carbohydrates, terpenoids, steroids and flavonoids [1, 2, 3, 4]. Knowledge of the chemical constituents of plants is desirable because such information will be of value for synthesis of complex chemical substances and in medical formulations [5, 6, 7].

Gynandropsis pentaphylla (synonyms: *Gynandropsis gynandra* L. or *Cleome gynandra* L.(Briq) belongs to the family Capparidaceae. This herb is edible and grows upto 60cm height. The common Indian name of this plant is *Hurhur*. This plant has several applications in Indian traditional medical practice. The leaves are good disinfectants.

Inhalation of the leaves also relieves headache, leaf juice and oil are used for earache and eye wash. In previous studies its anthelmintic and antimicrobial properties have been reported from different countries [8, 9].

Gynandropsis pentaphylla plant has been traditionally used as anthelmintic, rubefacient and used internally for expulsion of round worms & externally as counter-irritant [10, 11]. This plant is also used in cough and as ant scorbutic, diaphoretic; emollient. It also finds application on wounds and cobra bites [12].

In the present work, qualitative phytochemicals analysis and antioxidant properties of ethyl acetate extracts of *Gynandropsis pentaphylla* was carried out.

MATERIALS AND METHODS

2.1. Collection of samples

The medicinal plants used for the experiment were whole plants of *Gynandropsis pentaphylla* collected from the nearby Chengalpattu in TamilNadu.

2.2. Preparation of extracts

500 grams of dried powder of *Gynandropsis pentaphylla* whole plant was packed in separate round bottom flask for sample extraction using ethyl acetate as solvent. The extraction was conducted by 750 ml of the solvent for a period of 72 hours. At the end of the extraction the solvent were concentrated under reduced pressure and the crude extracts were stored in refrigerator.

2.3 Phytochemicals analysis

The extracts prepared were analyzed for the presence of alkaloids, saponins, tannins, steroids, flavonoids, anthraquinones, cardiac glycosides and reducing sugars based on the protocols available in the literature [13, 14, 15].

Test for alkaloids

The extract of the crude dry leaf powder of each solvent was evaporated to dryness in boiling water bath. The residues were dissolved in 2 N Hydrochloric acids. 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 appearance of creamish precipitate, the orange precipitate and brown precipitate indicated the presence of respective alkaloids.

Test for saponins

About 0.5 g of the plant leaf extract was vigorously 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 saponins.

Test for tannins

About 0.5 g of plant leaf 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 coloration.

Test for steroids

2 ml of acetic anhydride was added to 2 ml of plant leaf extract of each sample along 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 flavonoids and orange colour for flavones.

Test for quinones

About 0.5 g of extract was taken in a dry test tube and 5 ml of chloroform was added and shaken for 5 min. The extract was filtered and the filtrate shaken with equal volume of 10% of ammonia solution. A pink violet or red colour in the ammonical layer indicates the presence of quinones.

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 colour indicated the presence of peptide linkage of the molecule.

Test for 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 terpenoids.

RESULTS

A. The various phytochemicals present in the ethyl acetate extraction of the plant, *Gynandropsis pentaphylla* is indicated in Table 1. The antioxidant properties were strongly indicates at 5 mg of plant extract which is shown in Table 1.

Table 1. The details of phytochemical analysis of *Gynandropsis pentaphylla* ethyl acetate extract

S.No	Contents	<i>Gynandropsis pentaphylla</i>
1.	Tanins	-
2.	Alkaloids	+++
3.	Proteins	+
4.	Quinones	-
5.	Saponin	+
6.	Terpenoid	+++
7.	Steroid	+++
8.	Flavonoids	+
9.	Cardio glycosides	+

'+' - Present, '-' - Absent

3. B Antioxidant Assay

Chemicals. 1, 1-diphenyl-2-picrylhydrazyl (DPPH), Butylated hydroxyl toluene (BHT) and Methanol

Reagents

DPPH – 1mg/ml in methanol

BHT (Standard) – 1.6mg/ml in methanol

Procedure

3.7 ml of aliquot with absolute methanol in all test tubes were arranged along with blank. Then 100µl of absolute methanol was added to the blank. 100 µl of BHT was added to tube marked as standard and 100 µl of respective samples to all other tubes marked as tests. Finally 200 µl of DPPH reagent was added to all the test tubes including blank.

All the test tubes were kept at room temperature and incubated in dark condition for minimum of 30 minutes. Absorbance of all samples at 517nm monochromatic light was observed and recorded (Table 2, Figure 1).

Table 2. Indicate the antioxidant properties of *Gynandropsis pentaphylla*.

S.no	Reagents	Blank	Standard	Plant				
				1mg	2mg	3 mg	4 mg	5mg
1	Methanol Ml	3.8ml	3.7ml	3.7ml	3.7 ml	3.7ml	3.7ml	3.7ml
2	BHT ml	-	0.1	0.1	0.1	0.1	0.1	0.1
3	Sample ml	-	100 µl	100 µl	100 µl	100 µl	100 µl	100 µl
4	DPPH ml	200 µl	200 µl	200 µl	200 µl	200 µl	200 µl	200 µl
Incubation at dark for 30 mins								
	OD at 517nm	0.23	0.00	0.21	0.16	0.13	0.11	0.08
	% of antioxidant activity	-	100	8.6	30.4	43.4	52.1	65.2

The antioxidant activity was calculated from the formula: =

$$\% \text{ Antioxidant activity} = \{(\text{absorbance at blank}) - (\text{absorbance at test}) / (\text{absorbance at blank})\} \times 100$$

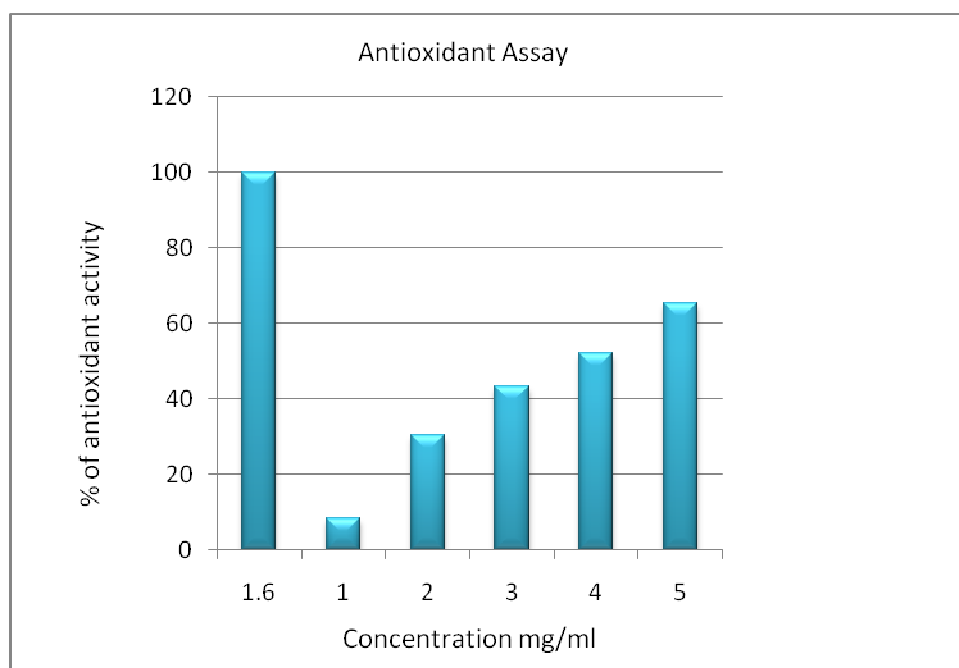


Figure I. The bar diagramme indicates the comparative antioxidant property of *Gynandropsis pentaphylla*

DISCUSSION

About 1500 species of medicinal plants are used in Aurveda, sidha and Unani systems of medicine. These plants have high curative value and about 70 percent of the allopathic medicines find their origin in plants. Thus the analysis of plants for their phytochemical and also their various medicinal properties like, antibacterial, antifungal and antioxidants is of great interest. The phytochemical analysis of *Gynandropsis pentaphylla* indicated the strong presence of alkaloids, terpenoids and steroids. proteins, saponins, flavonoids and cardio glycoside were present in less amounts. Tanins were conspicuous by their absence. The strong presence of alkaloids, terpenoids and steroids could be the reason for the curative properties of this plant. The antioxidant property of the plant could be due to the presence of the phytochemicals, which was strongly indicated at 5 mg of plant extract. The antioxidant properties of many plants were reported [16, 17, 18]. Dudonne *et al*, 2009 have found high antioxidant properties in some 30 plant species which was directly correlating to their high phenolic content [19]. In the present study the high content of alkaloids, Terpenoids and steroids seem to have played a vital role in the antioxidant activity of this plant.

The use of natural products for cure of diseases has to be taken seriously due to the side effects caused by allopathic drugs. It was estimated that 2.22 million hospitalised patients had serious Adverse Drug Reactions (ADR) and 106, 000 patients died in a single year in the USA due to this. The use of folk medicines has other advantages like their easy availability, easy identification and cost effectiveness [20].

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