

Phytochemical screening (qualitative) of certain medicinal plants of Saharanpur city

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Abstract

Saharanpur city is situated close to the borders of Haryana and Uttarakhand states; the city is surrounded by a fertile agricultural region. Medicinal plants are the major source of raw materials and good resources for pharmaceutical industry. These are the good source of primary and secondary metabolites. In present study phytochemical screening of three medicinal plants of Saharanpur city i.e. *Achyranthus aspera*, *Euphorbia hirta* and *Parthenium hysterophorus* were carried out by using standard methods for conducting Qualitative phytochemical analysis and studying the presence of active compounds like Alkaloids, Tannins, Saponins, Glycosides, Phenols, Flavonoids, Anthroquinone, Terpenoids and Steroids. *Achyranthus aspera* showed maximum of these phytochemicals in ethanolic extract. Ethanolic extracts of all plant species revealed the presence of most of the phytochemicals.

Keywords: Primary metabolites, Ethanolic extracts, Qualitative phytochemical analysis.

1. Introduction

The history of medicine in India can be traced to the remote past. The earliest mention of the medicinal use of plants is to be found in Rig-Veda [1]. Medicinal plants synthesize primary & secondary metabolites by different pathways, which are known as phytochemical compounds or bioactive compounds. Knowledge of the chemical constituents of plants is desirable for the discovery of therapeutic agents [2].

Now a day the analysis of phytochemicals is carried out by using different latest techniques along with chemotaxonomy. Indian pharmaceutical industries are using these phytochemicals on large scale, for the same it is essential to find out the phytochemicals in medicinal plants.

Hence during the present investigations phytochemical screening of certain plants of Saharanpur

city is carried on with a view to analyse the presence of chemical constituents that included primary & secondary metabolites.

2. Materials and methods

2.1 Collection of plant materials

The whole plant parts in this investigation were collected from different localities of Saharanpur city during the flowering period. The plant materials were taxonomically identified and authenticated by Dr. S.K. Upadhyaya (Well known Botanist of India) as *Achyranthus aspera* (*Amaranthaceae*), *Euphorbia hirta* (*Euphorbiaceae*), *Parthenium hysterophorus* (*Compositae*). Fresh plant materials were washed with tap water and with distilled water, air dried material grounded to fine powder and stored in airtight bottles with proper labelling.

2.2 Preparation of Extracts

25 g of crude powder of the medicinal plants were taken with 150 ml of organic solvents (Ethanol and Acetone) and kept into the Soxhlet apparatus which was run up to 48 hrs till the green colour of the plant material disappeared. Then both aqueous (crude) & solvent extracts were collected and stored at 4°C in air tight bottles and tested for various phytochemicals qualitatively.

2.3 Qualitative phytochemical analysis: [3,4]

2.3.1 Alkaloids:

About 2.5 g of plant material was extracted with solvent and evaporated to dryness; the residue was heated on a boiling water bath with 2N HCl (5ml). After cooling, the mixture was filtered and treated with few drops of Mayer's reagent. Turbidity of the resulting precipitate was taken as evidence for the presence of alkaloids.

2.3.2 Flavonoids:

5 ml solvent extract (corresponding to 1 g of plant material) was treated with few drops of concentrated HCl and magnesium turnings (0.5 g). The presence of flavonoids was indicative if pink or magenta – red colour developed within 3 min.

2.3.3 Glycosides:

Keller-kilani test:

0.5 g of solvent extract was mixed with 2ml of glacial acetic acid containing 1-2 drops of 2% solution of FeCl₃. The mixture was then poured into another test tube containing 2ml of concentrated H₂SO₄. A brown ring at the interphase indicated the presence of cardiac glycosides.

2.3.4 Phenols:

The Solvent plant extract was treated with few drops of neutral FeCl₃ solution 5%, intense colour developed indicates the presence of phenols.

2.3.5 Terpenoids:

The Solvent extract of plant material was taken in a test tube and then added few pieces of tin and 3 drops of thionyl chloride, origin of violet or purple color indicated the presence of terpenoids.

2.3.6 Anthraquinones:

Borntrreger's test:

5 g of plant extract was shaken with 10 ml of C₆H₆ and filtered, 5.0 ml of 10% ammonia solution was added to the filtrate. The mixture was shaken and the presence of violet colour indicated the presence of free hydroxyl anthraquinones.

2.3.7 Steroids:

Liebermann Burchard reaction:

200 mg plant extract in 10 ml chloroform, filtered and concentrated H₂SO₄ was added sidewise. A red colour produced in the lower chloroform layer indicated the presence of steroids. Another test was performed by mixing crude extract with 2ml of chloroform. Then 2ml of each of concentrated H₂SO₄ and acetic acid were poured into the mixture. The development of a greenish coloration indicated the presence of steroids.

2.3.8 Tannins:

1 g of plant material was extracted with solvent and evaporated. The residue was extracted by 10ml of hot 0.9% NaCl solution, filtered and divided into 3 equal portions, (1) NaCl solution was added to one portion of the test extract, (2) 1% gelatine solution to a second portion (3) gelatine-salt reagent to a third portion. Precipitation with the latter reagent or with both the second and third reagent is indicative of the presence of tannins. Positive tests are confirmed by the addition of FeCl₃ solution to the extract and that resulted in a characteristic blue – black, green or blue green colour and precipitate.

2.3.9 Saponins:

About 2.5 g of the plant material was extracted with boiling water. Crude extract was mixed with 5ml of distilled water in a test tube and it was shaken vigorously. The formation of stable foam was taken as an indication for the presence of saponins.

3. Results and discussion

The results of analysis are tabulated in Table 01, Table 02 and Table 03. The phytochemical study reveals the presence of various phytochemicals in aqueous and solvent extracts.

In the Ethanol extract of *Achyranthus aspera*, various phytochemicals as Alkaloids, Flavonoids, Saponins, Glycosides, Phenols, Anthraquinones, Terpenoids & Steroids were present except Tannins.

Ethanol extract of *Euphorbia hirta* showed the presence of all phytochemicals analysed except Phenols.

In the Ethanolic extract of *Parthenium hysterophorus* Alkaloids, Tannins and Flavonoids were present, rest of the compounds like Saponins, Glycosides, Phenols, Anthraquinones, Terpenoids and Steroids were absent. (Table 01)

Table 01: Qualitative analysis of various phytochemicals

Plant Name	<i>Achyranthus aspera</i>	<i>Euphorbia hirta</i>	<i>Parthenium hysterophorus</i>
Local Name	Chirchita	Dudh ghas , dudhi	Gajor Ghass
Family	<i>Amaranthaceae</i>	<i>Euphorbiaceae</i>	<i>Compositae</i>
Alkaloids	+	+	+
Flavonoids	+	+	+
Glycosides	+	+	-
Phenols	+	-	-
Terpenoids	+	+	-
Anthraquinone	+	+	-
Steroids	+	+	-
Tannins	-	+	+
Saponins	+	+	-

Solvent Used for Extraction: Ethanol

Note: Analysis is the average of three Independent Determinations.

In Acetone extract of *Achyranthus aspera*, Saponins & Tannins were absent and other compounds were found to be present.

In Acetone extract of *Euphorbia hirta* showed the presence of Glycosides, Phenols, Flavonoids and Steroids and rest of the Phytocompounds were absent.

In Acetone extract of *Parthenium hysterophorus* showed the presence of Alkaloids, Glycosides, Flavonoids, Terpenoids and Steroids whereas Tannins, Saponins, Phenols and Anthroquinons were absent. (Table 02)

Table 02: Qualitative analysis of various phytochemicals

Plant Name	<i>Achyranthus aspera</i>	<i>Euphorbia hirta</i>	<i>Parthenium hysterophorus</i>
Local Name	Chirchita	Dudh ghas , dudhi	Gajor Ghass
Family	<i>Amaranthaceae</i>	<i>Euphorbiaceae</i>	<i>Compositae</i>
Alkaloids	+	-	+
Flavonoids	+	+	+
Glycosides	+	+	+
Phenols	+	+	-
Terpenoids	+	-	+
Anthraquinone	+	-	-
Steroids	+	+	+
Tannins	-	-	-
Saponins	-	-	-

Solvent Used for Extraction: Acetone

Note: Analysis is the average of three Independent Determinations.

Table 03: Qualitative analysis of various phytochemicals

Plant Name	<i>Achyranthus aspera</i>	<i>Euphorbia hirta</i>	<i>Parthenium hysterophorus</i>
Local Name	Chirchita	Dudh ghas , Dudhi	Gajor Ghass
Family	<i>Amaranthaceae</i>	<i>Euphorbiaceae</i>	<i>Compositae</i>
Alkaloids	-	-	-
Flavonoids	-	+	-
Glycosides	+	+	+
Phenols	-	-	-
Terpenoids	+	+	+
Anthraquinone	+	-	-
Steroids	+	+	+
Tannins	-	+	-
Saponins	-	+	-

Solvent Used for Extraction: Water

Note: Analysis is the average of three Independent Determinations.

In Aqueous extract of *Achyranthus aspera* only Glycosides, Terpenoids, Anthroquinones and Steroids were found to be present, while the rest of the compounds were found to be absent.

In Aqueous extract of *Euphorbia hirta*, Tannins, Saponins, Glycosides, Flavonoids, Terpenoids and Steroids were present, whereas Alkaloids, Phenols and Anthroquinones were found to be absent.

In Aqueous extract of *Parthenium hysterophorus* the aqueous extract showed the presence of only Glycosides, Terpenoids and Steroids, rest of the compounds were found to be absent. (Table 03)

Medicinal plants have a wide variety of chemical compounds, which can be sorted as primary & secondary metabolites [5]. Traditionally, the plant is used in asthma and cough. It is pungent, antiphlegmatic, antiperiodic, diuretic, purgative and laxative, useful in oedema, dropsy and piles, boils and eruptions of skin etc. Crushed plant is boiled in water and is used in pneumonia. Infusion of the root is a mild astringent in bowel complaints. The flowering spikes or seeds, ground and made into a paste with water, are used as external application for bites of poisonous snakes and reptiles, used in night blindness and cutaneous diseases[6]. The plant is used in dropsy, piles, and skin eruptions, colic, as diuretic, astringent and purgative [7- 9].

E. hirta possesses antibacterial, anthelmintic, antiasthmatic, sedative, antispasmodic, antifertility, antifungal, and antimalarial properties. Roots are also used for snake bites. [10]. *E. hirta* is reported to have an antiasthmatic activity due to the relaxation effect on the bronchial tubes and a depressant action on respiration [1].

The decoction of *P. hysterophorus* has been used in traditional medicine to treat fever, diarrhoea, neurologic disorders, urinary tract infections, dysentery, malaria and as emmenagogue [11]. *Parthenium hysterophorus* has been found to be pharmacologically active as analgesic in muscular rheumatism, therapeutic for neuralgia and as vermifuge [12]. In book 'Dictionary of Economic Plants in India' *Parthenium hysterophorus*, is described as weed found in Poona and is reported to be used as tonic, febrifuge and emmenagogue. The decoction of root is useful in dysentery [13]. *Parthenium* is also reported as promising remedy against hepatic amoebiasis [14]. In Jamaica, the decoction is used as a Flea-repellent both for dogs and other animals [15].

The preliminary phytochemical tests lead the quantitative estimation to locating the source of bioactive chemical compounds. The Qualitative phytochemical studies during the present analysis revealed that *Achyranthus aspera* and *Euphorbia hirta* are mainly constituted of various primary & secondary metabolites whereas in *Parthenium hysterophorus* we reported various

phytochemicals in acetone extraction which can be quantified for the use in pharmaceutical industry and other plants can also be quantified.

4. Conclusion

This study of the qualitative phytochemical analysis revealed that these phytochemicals are mainly present in the Ethanolic extract as compared to Acetonic or Aqueous extract in *Achyranthus aspera* and *Euphorbia hirta* as shown in Tables. So the Ethanolic extract of the samples of plant material were found to contain the required major phytochemicals and other nutritive compounds needed by the pharmaceutical companies as well as in food supplements. We also found various phytochemicals in acetone extraction of *Parthenium hysterophorus*. The quantitative analysis of these phytochemicals will be an interesting area for further study.

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