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Phytochemical Analysis of *Parthenium hysterophorus* Leaves

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ABSTRACT

Parthenium hysterophorus L. belongs to family Asteraceae. Popularly known as Congress weed, Carrot weed, Star weed, Fever few, White top, Chatak Chandani, Bitter weed etc. The seeds have ability to germinate in any season of the year makes it a constantly flourishing components of the vegetation. The present investigation includes the phytochemical screening of *Parthenium hysterophorus* L. abundantly available weed species from the crop fields. Phytochemical tests were carried out specially for screening of secondary metabolites from the selected plant. Phytochemical surveys are now acted as the first step towards the discovery of useful drugs. Weeds are the richest resource of drugs and useful for the various biological activity. The four extracts used aqueous, acetone, ethanol and methanol of leaves of the fresh *Parthenium hysterophorus* L. were screened for the presence of different phytochemical constituents by standard procedures. Phytochemicals are certain non-nutritive plant chemicals which have a property of allelopathic effect. Therefore, it is aimed to investigate the phytochemical constituents of *Parthenium hysterophorus* L. The research findings showed that, the tested plant contains different classes of secondary metabolites such as alkaloids, carbohydrates, cardiac glycosides, flavonoids, phenols, amino acid and protein, saponin, tannins, terpenoids, quinones, coumarins etc.

***Key words*:** *Parthenium hysterophorus* L., Phytochemicals -Alkaloids, Carbohydrates, Cadiac glycosides, Phenols, Pharmaceuticals, Pharmacological drugs

Parthenium hysterophorus L. of family Asteraceae is an annual herb of neotropical origin that now has a pantropical distribution [7]. It is an invasive, annual weed which is native to central America and now it is widely distributed in Kenya, India, China, Australia [10]. It is also known as Congress weed, Carrot weed, Star 88888 weed, White top, Chatak Chandani, Bitter weed and Gajar grass [2-11]. It is notorious and obnoxious weed [6-8] and [20]. It can colonise degraded natural ecosystems and produce inhibitory effect on surrounding herbaceous vegetation *Parthenium* weed rapidly colonizes arable land, distributed areas along roadsides and heavily grazed pasture. It is found more profuse in central and western Nepal [4]. It is an erect herb with alternate, deeply dissected leaves, growing up to 2 m tall with much branched inflorescences bearing white flower heads and numerous obovoid, smooth and black achenes [11-18]. India accidently in the mid 1950's and is now available abundantly all over the India. In ancient Indian literature, it is observed that every plant on this planet is useful in industry, medicine and allelopathy. The life of each organism present in the world is based on the green vegetation which it lives around. Every organism in this universe has a specified role to play. Many plays a conservative role, among those plants are being the prime base as they are sustaining our environment. Even several countries before the invention of modernized equipment's and drugs. Plants provided cures for many several medical illnesses. Even today plant material continues to play a major role in primary health care as therapeutic remedies in many developing countries. In the recent years we were hugely depended on the commercial and synthetic drugs which have resulted in the adverse side effects, resistance among several pathogenic organisms and much more. This scenario pushed us to go back to our mother of all producers. The plant to look for effective medicine of lesser or no side effect. The ability of its seeds to germinate in any season of the year makes it a constantly flourishing component of the vegetation. It was reported to have important phytochemicals like alkaloids, saponins, tannins and phenolics etc. In ancient Indian literature it is observed that every plant on this planet is useful in industry medicine and allelopathy. The phytochemicals like alkaloids, Cardiac glycosides, flavonoids, amino acids and proteins, saponins, tannins and many other present in the plants are the great reservoirs of many new and potential drugs. Phytochemical analysis is now acted as the essential part towards the discovery of useful and novel drugs. Screenings for biological activity using simple bioassays have now been added to give better identification of the usefulness of weeds [14]. In the present investigation an attempt was made to

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evaluate the presence of different preliminary phytochemical constituents from *Parthenium hysterophorus* L.

MATERIALS AND METHODS

Collection of samples

Fresh leaves of *Parthenium hysterophorus* L. were collected in the month of July and August 2020 at flowering stage, from the study area Sangli district. The leaves are thoroughly washed through tap water, and dried under shade for 3-5 days. The dried leaves are ground to fine powder with the help of electric grinder. The ground plant samples were stored in polythene bags for further analysis.

Preparation of extracts

2 grams of dried powder of *Parthenium hysterophorus* L. leaves was packed in four separate round bottom flasks for sample extraction using four solvents namely aqueous, acetone, ethanol and methanol. The extraction was conducted with 20 ml of each solvent for a period of 24 hrs. At the end of the extraction, the respective solvents were concentrated under reduced pressure and the crude extracts were stored aseptically in refrigerator for further use [1].

Phytochemical analysis

The phytochemical screening of crude extracts from the leaves of *Parthenium hysterophorus* L. was carried out to determine the presence of active secondary plant metabolites. The plant extracts were screened for the presence of alkaloids, cardiac glycosides, flavonoids, saponins, tannins, terpenoids according to the established procedures. Phytochemical screening was carried out on the powdered samples applying the following standard procedures as outlined below [16-21].

Test for Alkaloids (Wagner's test)

1 ml of plant extract was taken and added 3-5 drops of Wagner's reagent and observed for the formation of reddish-brown precipitate or coloration indicated the presence of alkaloids.

Test for carbohydrates (Molisch's test)

1 ml of plant extract was taken and added 3-5 drops of Molisch's reagent, along with this added 1 ml of conc. Sulphuric acid (H_2SO_4) down the side of the test tube. Then allow the mixture to stand for 2-3 min. It was observed that of red or dull violet color at the interface of the two layers indicated the presence of carbohydrates [9-15].

Test for cardiac glycosides (Kellar Killani Test)

2 ml of extract was taken and added 1 ml glacial acetic acid, one drop 5% $FeCl_3$ and conc. H_2SO_4, reddish brown color appears at junction of the two liquid layers and upper appears bluish green, indicated the presence of glycosides [19].

Test for flavonoids (Alkaline reagent test)

l ml of extract was taken and treated it with 3-5 drops of 20% NaOH solution. It was observed the formation of intense yellow color which becomes colorless on addition of 0.5 ml dil. HCL indicates the presence of flavonoids.

Test for phenols (ferric chloride test)

1 ml of extract was taken and added 5-6 drops of aqueous ferric chloride solution and observed the formation of deep blue or black colour indicated the presence of phenols.

Test for amino acid and proteins (1% Ninhydrin solution in Acetone)

1 ml of extract was taken and added 2-5 drops of aqueous Ninhydrine solution and kept it in a boiling water bath for 1-2 min. It was observed for the formation of purple colour which indicated the presence of amino acid and proteins.

Test for saponin

a) *Foam test*: Small quantity of the residue was diluted with distilled water to 20 ml and shaken vigorously; formation of one cm layer of foam which was stable for 10 minutes indicated the presence of saponin.

b) To the alcoholic extract, sodium bicarbonate was added and shaken well; honey comb like frothing confirmed the presence of saponin [12].

Test for Tannins (Braymer's test)

1 ml of extract was taken and treated it with 1 ml of 10% alcoholic ferric chloride solution and observed for the formation of blue or greenish colour indicated the presence of tannins.

Test for terpenoids (Salkowski test)

1 ml of extract was treated it with 0.5 ml of conc. HCL. and observed for the formation of yellow precipitate or coloration indicates the presence of terpenoids [18].

Test for quinones

1 ml of extract was taken and added 5ml distilled water and observed the turbidity indicated the presence of quinones.

Test for coumarins

1 ml of extract was taken and added 1.5 ml of 10% NaOH. It was observed the formation of yellow color indicated the presence of coumarins.

RESULTS AND DISCUSSION

In the present study, the phytochemical analysis of *Parthenium hysterophorus* L. shown in (Table 1) indicates the presence of alkaloids, carbohydrates and cardiac glycosides in all the extracts used i.e., aqueous, methanol, acetone and ethanol. Flavonoids, saponins and tannins were found moderately in some extracts such as aqueous and methanol. Phenolic compound found absent in acetone and methanol crude extracts. Amino acids and proteins were found present in aqueous, methanol and ethanol and absent in acetone. Saponins and coumarins responded positively on average activity in aqueous extract and methanol. A noteworthy observation was about the terpenoids and coumarins which showed negative appearance among the all-crude extract used for screening. This obtained information will be helpful as a primary platform for further phytochemical and pharmacological studies.

Weeds are the richest source of drugs and useful for the various biological activities. The phytochemical screening for the presence of alkaloids, flavonoids, terpenoids etc. was carried out on aforesaid extracts and the

results are reported in (Table 1). In the present investigation, all the extracts used for screening of phytochemicals showed the presence of alkaloids, carbohydrates and cardiac glycosides in *Parthenium hysterophorus* L. It could be used for antiinflammatory, analgesic, antibacterial and cardiovascular activities [3-13]. It was followed by flavonoids and amino acids except acetone which may be accounting for anti-inflammatory and analgesic activities [5-17]. Tannins, saponin and quinone were present in some of the extracts could be used for antioxidant, antimicrobial and antiparasitic activities [4-5]. Interestingly, the tested weed showed negative response to the terpenoids and coumarins. Hence the tested weed plant *Parthenium hysterophorus* L. showed the presence of various phytochemical constituents viz., alkaloids, carbohydrates, cardiac glycosides, flavonoids and saponins etc. which have biological importance in terms of antimicrobial, anti-inflammatory, analgesic and antioxidant properties. It may be helpful for formulation of pharmaceutical and pharmacological drugs.

CONCLUSION

Leaves of *Parthenium hysterophorus* L. was a rich source of important phytochemicals such as alkaloids, carbohydrates, cardiac glycosides, flavonoids, saponins and tannins which has enable them to show varying degree of properties. It is amply indicative from the observations recorded that preliminary phytochemical constituents of aqueous, acetone, ethanol, methanol extracts of *Parthenium hysterophorus* L. showed the presence of alkaloids, carbohydrates, cardiac glycosides in all extracts. It was followed by flavonoids, saponins, tannins and quinones. A negative presence of coumarins and terpenoids was recorded in all the extracts. The tested weed plant is biologically important weed which indicates its contribution in terms of different properties viz. anti-inflammatory, analgesic, antimicrobial and cardiovascular. It could be helpful for preparation and formulation of a pharmaceutical and pharmacological drugs.

Table 1 Phytochemical constituents of *Parthenium hysterophorus* L.

Phytoconstituents	Aqueous extract	Acetone extract	Methanol extract	Ethanol extract
Alkaloids	+++	+++	+++	+++
Carbohydrates	+++	+++	+++	+++
Cardiac glycosides	+++	+++	+++	+++
Flavonoids	+++	---	+++	+++
Phenols	+++	---	---	---
Amino Acids / proteins	+++	---	+++	+++
Saponins	+++	+++	+++	---
Tannins	---	+++	+++	+++
Terpenoids	---	---	---	---
Quinones	+++	---	+++	---
Coumarins	---	---	---	---

Positive+++, Negative ---

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