Phytochemical screening of *Vernonia cinerea* leaf extracts

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**ABSTRACT**

Plant materials are invaluable sources in treatment of various diseases and research on certain plants has opened the way to development of various therapeutic agents. Plant based natural compounds are increasingly used in agriculture, food industries and in production of certain organic compounds. The bioactive compounds in plants called as phytochemicals are synthesized as a result of plant metabolism. The beneficial effects of these constituents results from combination of secondary metabolites. The systemic screening of these phytochemicals helps in development of certain bioactive compounds. In the present study phytochemical screening of petroleum ether, ethanol and aqueous extracts of *Vernonia cinerea* was done to detect the constituents present in the plant. Leaves of *Vernonia cinerea* was shade dried and extracted with respective solvents. The findings shown evidence that extracts contain certain medically bioactive compounds.

**Keywords:** Phytochemicals, *Vernonia cinerea*, petroleum ether, ethanol, aqueous extracts.

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1. Introduction

Medicinal plants possess wide range of chemical constituents which could serve as clue for drug designing and can perform definite physiological action on human body. Plants have been known to relieve various diseases in Ayurveda and hence characterization and analysis of plant constituents are gaining interest among researchers [1].

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Plants produce various organic chemical compounds to protect themselves. These compounds are synthesized by primary and secondary metabolism of plants. Secondary metabolites are valuable chemical constituents that are used in human therapy, veterinary, agriculture and scientific research. Large number of such compounds has shown therapeutic values and is used in drug development [2].

Vernonia cinerea, also known as little ironweed is a species of perennial plants belonging to the sunflower family. The species is native to tropical Africa and Asian countries. Vernonia cinerea is an annual herb with flat topped arrays of numerous flower heads, each with pinkish ray florets and grows up to 120 cm height. The plant possesses great medicinal value in diverse traditional usage in different nations. The whole plant is used in decoction or infusion to treat fever and eye infections. It has been used as remedy for spasms of the urinary bladder and strangury, also often combined with quinine to treat malaria. Seeds are used as a source for alexipharmic and anthelmintic drugs [3]. Leaves of Vernonia cinerea have analgesic, antipyretic and anti-inflammatory effects. The whole plant is used for kidney disorders, stomach pain, diarrhoea, eczema, menstrual pains and decoction for diuretic. Juice of this plant is given to children to treat bed- wetting. Recently research is going on this plant as an aid to give up cigarette smoking. Natural products provide abundant opportunities for the formulation of novel drug. The compounds in plants are part of phytomedicines that can be derived from leaves, stem, bark, root, flowers and seeds. Analysis of these compounds provides insight into the biological activity of plants [4]. Preliminary phytochemical screening helps in the development of novel therapeutic agents. Thus the present study deals with the phytochemical screening of petroleum ether, ethanol and aqueous extracts of Vernonia cinerea for identifying their chemical constituents.

2. Materials and Methods

Collection of plant material
Fresh plants of Vernonia cinerea were collected from different areas of Kerala. It was authenticated from Botanical Survey of India, Tamil Nadu Agricultural University, Tamil Nadu.

Preparation of plant extract
Fresh leaves of Vernonia cinerea was washed thoroughly, shade dried and powdered. The plant powder was then kept in contact with petroleum ether, ethanol and distilled water separately in a stoppered container for a defined period with continuous agitation. The extract is then filtered, condensed and stored for further use of phytochemical studies.

Phytochemical Screening of Vernonia cinerea leaf extract

Test for Phlobtannins
To each plant extract 1% hydrochloric acid solution was added and boiled in a water bath. Formation of red colour precipitate indicates the presence of phlobtannins[4].

Test for alkaloids
Dragendroff’s test
Each extract was treated with Dragendroff’s reagent. Formation of red precipitate indicates positive result.

Test for proteins (ninhydrin test)
Each extract was treated with 2ml of 0.2% ninhydrin solution. Presence of violet colouration indicated amino acids and proteins.

Test for carbohydrates
Fehling’s Test
Equal volume of Fehling A and Fehling B was mixed, 2ml of this solution was added to each extract and boiled. Formation of red brick precipitate at the bottom of the test tube indicated the presence of carbohydrates.

Benedict’s Test
2ml of Benedict’s solution was added to each extract and boiled. Formation of reddish brown precipitate indicated the presence of carbohydrates.

Iodine test
2ml of iodine solution was treated with each extract. Dark blue or purple coloration indicated the presence of carbohydrates.

Test for phenols
2ml of 2% ferric chloride solution was added to each extract. Blue green or purple coloration indicated the presence of phenols.

Test for flavonoids
Alkaline reagent test
Each extract was mixed with 2ml of 2% NaOH solution. Formation of intense yellow colouration turned colourless on addition of few drops on dilute acid indicating the presence of flavonoids.

Test for saponins
Foam test
Each extract was mixed with 5ml of distilled water and shaken vigorously. Formation of stable foam indicated the presence of saponins.

Froth test
Each extract was diluted with 20ml of distilled water and shaken for 15 minutes. Formation of 1cm layer of foam indicates the presence of saponins.

Test for glycosides
Liebermann’s test
Each extract was mixed with 2ml of 0.2% ninhydrin solution. Presence of violet colouration indicated amino acids and proteins.

Salkowski’s test
2ml of chloroform was mixed with each extract. 2ml of concentrated sulphuric acid was added and shaken gently. Reddish brown colour indicated the presence of glycosides.

Test for steroids
Extracts was mixed with 2ml of chloroform and concentrated sulphuric acid. A red colour formed at the chloroform layer indicated the presence of steroids.

Test for terpenoids
2ml of chloroform was added to each extract and mixed well. 3ml of concentrated sulphuric acid was added to each tube. Formation of reddish brown colour indicates the presence of terpenoids.

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Test for tannins
Gelatin test
1% gelatine containing sodium chloride was treated with each extracts. Formation of white precipitate indicates the presence of tannins.

3. Results and Discussion
The phytochemical characteristics of petroleum ether, ethanol and aqueous extracts of Vernonia cinerea was screened and revealed the presence of certain phytocompounds which is summarized in table 1. The results revealed the presence of certain bioactive compounds in leaf extracts of Vernonia cinerea. Petroleum ether extract shown the presence of alkaloids, tannins, saponins and glycosides, other constituents like phenols, steroids flavonoids, carbohydrates, proteins, phlobatannins and terpenoids were found to be absent. Majority of the compounds like alkaloids, phenols, tannins, steroids, glycosides, flavonoids, carbohydrates and terpenoids were present in ethanolic extracts of V. cinerea. Alkaloids, phenols, saponins and phlobatannins are the compounds that were screened in aqueous leaf extracts.

4. Conclusion
Medicinal plants produce a wide range of metabolic compounds. Research on such constituents will provide light on their therapeutic properties revealing the activity of plants. Fresh leaves of Vernonia cinerea was taken and prepared the extracts with petroleum ether, ethanol and distilled water to analyze for their phytoconstituents. The screening of phytochemicals revealed the presence of medicinally active biocompounds like alkaloids, phenols, tannins, saponins, steroids, glycosides, flavonoids, carbohydrates, phlobatannins and terpenoids. More bioactive principles were found in the ethanolic extracts of Vernonia cinerea. Phytochemical analyses of medicinal plants have gained interest in research institutes and pharmaceutical industries for the development of new drug. Further studies should be done to check for its action in treatment of various ailments. Detailed research can be done on this plant to isolate, purify and characterize the compound responsible for the plant activity.

Table 1: Phytochemical Screening of Vernonia cinerea

<table>
<thead>
<tr>
<th>Compounds</th>
<th>Petroleum Ether extract</th>
<th>Ethanol extract</th>
<th>Aqueous Extract</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alkaloids</td>
<td>+</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Phenols</td>
<td>-</td>
<td>+</td>
<td>+</td>
</tr>
<tr>
<td>Tannins</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Saponins</td>
<td>+</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Steroids</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Glycosides</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Carbohydrates</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Proteins</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Phlobatannins</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Terpenoids</td>
<td>-</td>
<td>+</td>
<td>-</td>
</tr>
</tbody>
</table>

+ = presence of compound, - = absence of compound

5. References