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ISSN 2321 - 6328

Research Article

QUALITATIVE PHYTOCHEMICAL ANALYSIS OF MEDICINAL PLANTS IN GARHWAL REGION

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Article Received on: 26/05/15 Accepted on: 17/07/15

DOI: 10.7897/2321-6328.03435

ABSTRACT

Medicinal plants remain an important source to combat serious diseases all over the world. They are effective in treatment of various diseases while simultaneously reducing the side effects like drug resistance, allergy, headache etc. that are often associated with chemotherapeutics. Medicinal plants do not have such side effects. The potency of chemotherapy lies in the continuous search for new drugs to counter the challenge against resistant strains of pathogens. The main objective here is to evaluate the phytochemical constituents of medicinal plants which may help in designing new drugs for human ailments. Eight different plants have been collected from Garhwal region, (Uttarakhand, India) for the investigation of phytochemical constituents. The study revealed the presence of flavonoids, terpenoids, glycosides, tannins, saponins, phlobtannins in the plants leaves. Saponins are specific for having antifungal activity and they are found to be present in some plants sample. Similarly, flavonoids are used against anti-cancerous activity and terpenoids have antibacterial activity. The presence of different phytochemical constituents in the plants samples confirms their potential as medicinal plants.

Key words: Drug Resistance, Chemotherapeutics, pathogens, Antibacterial Activity.

INTRODUCTION

The medicinal plants are useful for curing of human diseases and play important role in healing because of the presence of phytochemical constituents^{[10][12]}. Phytochemicals are bioactive chemicals of plant origin^[14]. They are naturally synthesized in different parts of the plant body like, bark, leaves, root, flower, fruits, seeds etc. i.e. different part of the plant component may contain active components.^{[2][17]}

Prior knowledge of the chemical constituents of plants is desirable for the discovery of therapeutic agents as well as for disclosing new sources of such economic material such as tannins, oil, gums, precursors for the synthesis of complex chemical substances^{[3][18]}

Medicinal plants are a source of great economic value all over the world^[11]. Nature has bestowed on us a very rich botanical wealth with a large number of diverse types of plants grown in different regions of the country^{[4][19]}. The quality of medicinal plants may be affected by the number of environmental factors such as climate, altitude, rainfall and other conditions which affect the growth which in turn affect the quality of ingredients even when they are produced in the same country. These factors produce variations in the activity of bioactive compounds.

Garhwal region is rich in all the three levels of biodiversity namely, species diversity, genetic diversity and habitat diversity. In Pauri Garhwal region several species are known to have medicinal plants to cure specific ailments, which has been in vogue since long times.^[15]

Table 1: The plants undertaken here for study are

S.No	Common Name	Scientific Name
1.	Basya	<i>Eupatorium adenophorum</i>
2.	Ban pudina	<i>Mentha spicata</i>
3.	Bekhal	<i>Prinsepia utilis royle</i>
4.	Rosemary	<i>Rosamarinus officinalis</i>
5.	Morpankhi,	<i>Thuja orientalis</i>
6.	Kundju	<i>Artemisia walichiana</i>
7.	Neel kanthi	<i>Ajugabracteosa Walliach</i>
8.	Timur	<i>Zanthoxylum aramatum</i>
9.	Kingod	<i>Berberis lycium</i>
10.	Malu	<i>Bauhinia vahlii</i>

The major phytochemical substances taken into consideration in this work are tannins, carbohydrates, flavonoids, sterols, phenols, saponins, terpenoids, glycosides^[16]. Saponins are known to have antifungal activity, flavonoids are used for anti-cancerous activity^[20] whereas tannin show antimicrobial activity^{[11][3]}. The detailed

medicinal properties of eight such plants are summarized in table 1. Keeping this wide range of properties in mind which plants offer, our approach aimed in the collection, identification, extraction and phytochemical evaluation of eight such medicinal plants.

Table 2: Plant Species of Uttarakhand and Their Medicinal Properties

S.No	Name of plant species	Family	Plant part	Medicinal use
1.	<i>Berberis lycium</i> Royle	Berberidaceae	Roots	Rootstock used as antiseptic, blood purifier in conjunctivitis and urinogenital disorder.
2.	<i>Eupatorium adenophorum</i>	Asteraceae	Leaves	Leaf paste is applied on cuts and wounds. Paste mixed with mustard oil is useful for ulcer.
3.	<i>Mentha spicata</i> Linn	Mimosaceae	Leaves	Leaves used in indigenous vomiting and cough and rub for muscle and joint pain.
4.	<i>Prin sepiautilis</i> Royle	Rosaceae	Leaves	
5.	<i>Rosamarinus officinalis</i>	Lamiaceae	Leaves	Rosemary is used (applied to the skin) for preventing and treating baldness; and treating circulation problems, toothache, a skin condition called eczema, and joint or muscle pain such as myalgia, sciatica, and intercostal neuralgia. It is also used for wound healing.
6.	<i>Ajuga bracteosa</i> Walliach	Lamiaceae	Leaves	Leaf powder is given to cure ulcer of mouth and also cure diabetes and skin infections.
7.	<i>Artemisia wallichiana</i> Besser	Asteraceae	Leaves	Leaf paste is useful for skin infection, ring worm and wound. Leaf juice is also used for earache
8.	<i>Bauhinia vahlii</i>	Caesalpinaceae	Leaves	Root paste is used as toothbrush in pyorrhoea.
9.	<i>Thuja orientalis</i>	Cupressaceae	Leaves	Leaves applied directly to the skin for joint pain, and muscle pain. Its oil is also used for skin diseases, warts, and cancer; and as an insect repellent
10.	<i>Zanthoxylum aramatum</i>	Rutaceae	Leaves	Bark and leaves are used for toothache and gum troubles.

MATERIAL AND METHODS

Collection of plant materials

The plant species used in this investigation were collected from different regions of Pauri Garhwal during the month of March and April 2014. Eight medicinal plants were selected for the phytochemical analysis. The plants were taken into consideration on the basis of the survey from the local people of the same region. Fresh leaves of following plants *Eupatorium adenophorum*, *Rosamarinus officinalis*, *Thuja orientalis*, *Menthaspiata*, *Ajuga Bracteosa*, *Prinsepiautilis royle*, *Artemisia Wallichiana*, *Zanthoxylum aramatum*, *Berberislycium* and *Bauhinia vahlii* were collected.

Preparation of plant powder

The leaves of the selected plants were taken from the plants. The leaves were washed under running tap water to remove dust and then with distilled water, they were air dried for two weeks at room temperature and then crushed into powder and then stored in airtight bottles for further use.

Hot water extraction

20 gm of dried finely powdered plant leaves was taken in a beaker and 200ml of distilled water was added in it. The beaker containing the mixture was heated on a hot plate at 50°C – 60°C for 20 minutes. The water extract was then filtered through two layer of muslin cloth and then was again filtered with Whatman filter paper and the filtrate was used for the further phytochemical analysis. The aqueous extract was kept in refrigerator at 4°C for future use.

QUALITATIVE PHYTOCHEMICAL ANALYSIS

The extract was tested for the presence of the bioactive compounds by the following standard methods: [5][6][7][8]

Test for reducing sugars

Fehling's test: Fehling A and Fehling B reagents were mixed together in equal volume and 2ml of it was added to 4 ml of aqueous extract and gently heated on hot plate. A brick red

precipitate appeared at the bottom of the test tube which indicated the presence of reducing sugars.

Benedict's test: Few drops of Benedict's reagent was added to 2 ml of aqueous extract and then heated on hot plate for few minutes. A reddish brown precipitate formed which indicated the presence of the carbohydrates.

Test for proteins and amino acids:

Ninhydrin test: 2ml of aqueous extract was heated gently with 2ml of 0.2% solution of ninhydrin reagent. Violet colour appeared which indicated the presence of amino acids and proteins.

Test for tannins

2ml of aqueous extract was taken in a test tube and few drops of 0.1% ferric chloride was added. Blue black or brownish green colour indicates the presence of tannins.

Test for phenolic compounds

4ml of aqueous extract was taken in a test tube and few drops of 0.1% ferric chloride was added in it. Dark green colour was observed which indicates the presence of phenolic compounds.

Test for flavonoids

5ml of aqueous extract was taken in a test tube and mixed with 3ml of 0.1% potassium hydroxide. A dark yellow colour indicates the presence of flavonoids.

Test for terpenoids

5ml of aqueous extract was taken in a test tube mixed with 2ml chloroform followed by the addition of concentrated sulphuric acid drop-wise. A layer of reddish brown colour was observed at the interface which indicates the positive result for terpenoids.

Test for steroids

4 ml of Aqueous extract was mixed with 2ml chloroform and concentrated sulphuric acid was added carefully dropwise. A red colour in the lower chloroform layer was observed indicated the presence of steroids.

Test for phlobatannins

3ml of aqueous extract was taken in a test tube and mixed with 1% aqueous HCl and then boiled on hot plate for few minutes. Formation of red colour precipitate indicated positive result.

Test for cardiac glycosides

(keller – kilani test) 2ml of glacial acetic acid containing one drop of ferric chloride was added in 5ml of aqueous extract. 1ml concentrated sulphuric acid was added to it. Brown ring occur at the interface indicates the presence of cardiac glycosides.

Test for saponins

5 ml of aqueous extract was taken in a test tube, shaken vigorously and observed for stable froth for 5 minutes. 3 drops of olive oil was added in the froth and again shaken vigorously. Formation of emulsion will be observed.

Table 3: Phytochemical Analysis of plants for Secondary metabolites

Plant species	Fehling test	Benedict test	Terpenoids test	Steroids test	Flavonoids test	Saponins test	Tannins test	Glycosides test	Phlobatannins test	Nimhydrin test	Phenolic test
<i>Ajuga bracteosa</i> <i>Walliach</i> (Neel kanthi)	+	+	+	+	-	-	+	-	+	+	+
<i>Prin sepiatilis</i> (Bekhal)	+	+	-	+	+	+	+	+	+	-	+
<i>Artimisia walliachiana</i> (Kundju)	-	-	-	-	+	-	+	+	-	-	+
<i>Zanthoxylum aramatum</i> (Timur)	-	-	+	+	-	+	+	-	+	+	+
<i>Berberis lyceum</i> (kingod)	-	-	+	+	-	+	-	-	+	+	-
<i>Bauhinia vahlii</i> (Malu)	-	-	+	+	+	-	-	+	+	-	+
<i>Eupatorium adenophorum</i> (Basya)	-	-	+	+	-	+	+	+	+	+	+
<i>Rosmarinus officinalis</i> (Rosemary)	+	+	+	-	+	+	+	-	-	+	-
<i>Thuja orientalis</i> (Morpankhi)	+	+	+	+	+	+	+	+	-	+	-
<i>Mentha spiata</i> (Ban pudina)	-	-	-	+	-	-	+	+	+	+	+

RESULT AND DISCUSSION

The investigation revealed that plant species which were taken into consideration for phytochemicals constituents contained at least one of flavonoids, reducing sugar or carbohydrates, terpenoids, saponins, tannins, glycosides, phenolic compounds, proteins, amino acids, phlobatannins. Steroids are present in most of the plants except that for *Rosamarinus officinalis* and *Artimisia wallichiana*. Terpinoids, reducing sugars and flavonoids are present in some of the plants but not in all. Glycosides are absent in three plants i.e. *Rosamarinus officinalis*, and *Zanthaoxylum aramatum* as shown in Table 3.

CONCLUSION

The medicinal plants selected are the source of primary metabolites like carbohydrates and proteins and secondary metabolites like terpenoids, tannins, saponins, flavonoids, steroids glycosides. The secondary metabolites present in these plants are responsible for anti-cancerous, anti-fungal, anti-viral activities. The phytochemical studies of these plants are helpful in pharmaceutical industries for treating of ailments and discovering new drugs. Along with medicinal properties secondary metabolites can also be used for aroma in food industry. Phytochemical properties identified by our study can be utilized in primary phase of drug manufacturing at larger scale for serving the mankind.

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Cite this article as:

Rajak Neha, Mutahir Arisha, Rai Sumit Kumr. Qualitative phytochemical analysis of medicinal plants in Garhwal region. *J Biol Sci Opin* 2015;3(4): 163-166 <http://dx.doi.org/10.7897/2321-6328.03435>

Source of support: Nil; Conflict of interest: None Declared

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