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PHYTOCONSTITUTENTS OF MEDICINALLY IMPORTANT PLANT *ANDROGRAPHIS PANICULATA* NEES

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ABSTRACT: *Andrographis paniculata* Nees is a plant that has been effectively used in traditional Asian medicines for centuries. It's perceived "blood purifying" property and also for medicinal properties. The present paper deals to study the phytochemical screening of *Andrographis paniculata* for various medicinally important compounds. In the present investigation, it was found that phenols, alkaloids, tannins, flavonoids are present in leaves, stem, and root of the plant. Saponin is absent.

INTRODUCTION: Over the past twenty years, interest in medicinal plants has grown enormously from the use of herbal products as natural cosmetics and for self-medication by the general public to the scientific investigations of plants for their biological effects in human beings. Beyond this pharmaceutical approach to plants, there is a wide tendency to utilize the herbal product to supplement the diet, mainly with the intention of improving the quality of life and preventing the diseases of elderly people [1]. India has been identified as a major resourceful area in traditional and alternative medicines globally. Medicinal plants constitute an important component of flora and are wildly distributed in India.

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Andrographis paniculata Nees is one of the wildly distributed medicinal plants in India and using since ancient times in traditional ayurvedic systems of medicines. *Andrographis paniculata* Nees is a medicinal plant belonging to the family of Acanthaceae. Diterpenoids and flavonoids are the main chemical constituents of *A. paniculata,* and these compounds are believed to be responsible for the biological activities of the plant [2, 3].

It is widely used in Chinese and Ayurvedic medicine for the treatment of gastric disorders, infectious diseases, and common colds. It has multiple pharmacological properties such as antiprotozoal, hepatoprotective, anti-HIV, anti-inflammatory [4], antipyretic, anticancer [5], antitumor, hypoglycaemic [6], hypotensive activities and has been used for the treatment of snake bites.

The primary modern use of *A. paniculata* is for the prevention and treatment of the common cold. It appears to have antithrombotic actions, suggesting a possible benefit in cardiovascular disease [7].

Pharmacological and clinical studies suggest the potential for beneficial effects in diseases like Cancer [8-12] and HIV infections [13]. *A. paniculata* has been reported as having antibacterial, antifungal, antiviral, choleretic, hypoglycemic, hypocholesterolemic, and adaptogenic effects [14].

MATERIALS AND METHODS:

Collection of Plant Material: The fresh parts of *Andrographis paniculata* Nees. were collected in the flowering period from Amrutkund Tq. Basavkalyan, Dist. Bidar near Maharashtra-Karnataka border. The plant material was properly washed with tap water and then rinsed with distilled water.

Extraction:

Preparation of Ethanolic Extracts Callus: Fresh leaves, stem, and roots of *Andrographis paniculata* were washed thoroughly under running tap water, shade dried and used for extraction. Dried leaves stem and roots were homogenized to a fine powder and stored in airtight bottles. 10 gm of leaves, stem, and seeds powders were extracted with 100 ml of different solvents (absolute alcohol, methanol, and chloroform) for 72 h. After 72 h of extraction, each extract was filtered through Whatman's filter paper no. 1. The filtrate was evaporated to dryness at room temperature & store at 5 ºC in the refrigerator. Extracts were used for different tests.

Qualitative Analysis: Extracts were tested for the presence of active principles. Following standard procedures were used [15 16].

Test for Alkaloids: Ethanolic extract was warmed with 2% H_2SO_4 for two minutes. It is filtered, and a few drops of reagents were added and indicated the presence of alkaloids.

Mayer's Reagent: A creamy- white colored precipitation positive.

Wagner's Reagent: A reddish-brown precipitation positive.

Picric Acid (1%): A yellow precipitation positive.

Test for Steroids Terpenoid and Triterpenoids:

Liebermann Burchard Test: The crude extract was mixed with few drops of acetic anhydride, boiled and cooled. Concentrated sulphuric acid was then added from the sides of the test tube and observed for the formation of a brown ring at the junction of two layers. Green coloration of the upper layer and the formation of deep red color in the lower layer would indicate a positive test for steroids terpenoid and triterpenoids respectively.

Salkowski Test: The extract was mixed with 2 ml of chloroform and concentrated H_2SO_4 (3 ml) is carefully added to form a layer. A reddish-brown coloration of the interface is formed to show the positive result of the presence of steroids terpenoid and triterpenoids respectively.

Test for Saponins: The 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.

Test for Phenols and Tannins: The crude extract was mixed with 2 ml of 2% solution of $FeCl_3$. A blue-green or black coloration indicated the presence of phenols and tannins.

Test for Flavonoids: A small quantity of the extracts is heated with 10 ml of ethyl acetate in boiling water for 3 min. The mixture is filtered differently, and the filtrates are used for the following test.

Ammonium Test: The filtrate was shaken with 1 ml of dilute ammonia solution (1%). The layers were allowed to separate. A yellow coloration was observed at ammonia layer. This indicates the presence of the flavonoid.

Aluminum Chloride Test: The filtrates were shaken with 1 ml of 1% aluminum chloride solution and observed for light yellow color. It indicated the presence of flavonoid and diluted NaOH and HCl was added. A yellow solution that turns colorless indicated positive.

Test for Carbohydrate:

Benedict's test: The test solution was mixed with few drops of Benedict's reagent (alkaline solution containing cupric citrate complex) and boiled in a water bath, observed for the formation of reddish-brown precipitate to show a positive result for the presence of carbohydrate.

Test for Glycosides:

Fehling's Test: An equal volume of Fehling A and Fehling B reagents were mixed, and 2 ml of it was added to the crude extract and gently boiled. A red brick precipitate appeared at the bottom of the test tube indicated the presence of reducing sugars.

Test for Proteins:

Millon's Test: Crude extract when mixed with 2 ml of Millon's reagent, a white precipitate appeared which turned red upon gentle heating that confirmed the presence of protein.

Test for Free Amino Acids: [19]

Ninhydrin Test: Test solution when boiled with 0.2% solution of Ninhydrin, would result in the formation of purple color suggesting the presence of free amino acids.

Test for Vitamin C: [18]

DNPH Test: The test solution was treated with Dinitrophenylhydrazine dissolved in concentrated sulphuric acid. The formation of yellow precipitate would suggest the presence of Vitamin C. For Carboxylic acid, test for NH_2, Nitrogen, Sulphur, Halogen, Amides, test for unsaturation, test for Aromaticity [17].

RESULT AND DISCUSSION: The preliminary phytochemical screening tests may be useful in the detection of the bioactive principles and subsequently may lead to drug discovery and development. The phytochemical analysis of *Andrographis paniculata* Nees tested was summarized in **Table 1**, which revealed that the presence of a medicinally active compound in plant Leaf, stem and roots.

TABLE 1: PHYTOCHEMICAL SCREENING FOR DIFFERENT EXTRACTS OF *ANDROGRAPHIS PANICULATA*

S. no.	Compound	Test	Plant part								
			Leaf extract			Stem extract			Root extract		
			E	M	C	E	M	C	E	M	C
1	Alkaloid	Mayer's reagent	++	+	−	++	+	++	++	+	+
		Wagner's Reagent	+	+	−	+	+	+	+	+	−
		Picric acid	++	+	−	+	+	−	+	+	−
2	Amides	Hydrolysis with alkali	+	+	+	+	+	+	+	+	+
3	Amines	Amines test	+	+	+	+	+	+	+	+	+
4	Ascorbic acid	DNPH test	+	++	+	+	+++	+	+	+++	+++
5	Carbohydrates	Benedict test	+	+	+	+	+	+	+	+	+
6	Carboxylic acid	Sodium bicarbonate test	+	+	+	+	+	+	+	+	+
7	Flavonoids	Ammonium Test	+	+++	+	+ +	+++	++	+	++	+
		Aluminum chloride test	+	+	+	+	+	+	+	+	+
8	Glycosides	Fehling solution	++	+++	++	++	+++	++	+	+++	++
9	Phenol	Ferric chloride test	+	+	+	+	+	+	+	+	+
10	Proteins	Millons Reagent test	+	+	−	+	+	−	+	+	−
11	Reducing Sugar	Fehling solution test	−	−	+	−	−	+++	−	−	+++
12	Saponin	Frothing test	−	−	−	−	−	−	−	−	−
13	Starch	Starch test	+	+	+	+	+	+	+	+	+
14	Steroids	Liebermann - Burchard's test	++	+++	++	++	+++	+	+	+++	+
		Salkowski's Test:	+	+++	++	+	+++	++	+	++	+
15	Tannin	Ferric chloride test	++	+++	++	+ +	+++	+	+++	++	+
16	Terpenoides	Liebermann - Burchard's test	++	++	++	+	+++	++	+	++	++
		Salkowski's Test:	+	+++	++	+	+++	++	+	++	++
17	Amino acid	Ninhydrin Reagent test	+	+	+	+	+	−	+	+	−
18	Aromaticity	Flame test (Ignition test)	+	+	+	+	+	+	+	+	+
19	Unsaturation	Test for unsaturation	−	−	−	−	−	−	−	−	−

- =absent, + =Presence, ++ = Moderate, +++ = Maximum

For extraction of phytochemicals, ethanolic, methanolic and chloroform extracts were used. Preliminary phytochemical analysis of *Andrographis paniculata* compounds shows various types of chemical compounds which provide the baseline for the occurrence of the medicinally active constituents like alkaloids, flavonoids, glycosides, tannins. The *A. paniculata* were rich in alkaloid, ascorbic acid, Flavonoids, glycosides, steroids, tannins, terpenoids, *etc*. It lacks saponin. From the table, it is revealed that the methanolic extract of leaf stem, the root of *A. paniculata* shows maximum Phytoconstituents.

CONCLUSION: In the present study callus extract showed the presence of bioactive compound such as alkaloids, flavonoids, terpenoids, ascorbic acid, tannin, glycosides, proteins, triterpenoids, starch, phenol, *etc*. This study also leads to further research in the way of isolation and identification of the active compound from the *A. paniculata* using extraction, chromatographic and spectroscopic techniques.

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CONFLICT OF INTEREST: Nil

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