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Phytochemical Characterization of Leaf, Stem and Root Extract of Andrographis Paniculata

Keerti Samdariya[1], O. P. Rai[2]

[1]Assiatant Professor, Department of biotechnology, AKS University, Satna (M. P.), India

[2]Professor, Department of Chemistry, Govt. P. G. College, Satna (M. P.), India

Abstract: ***Andrographis paniculata is a traditional medicinal plant used in Madhya Pradesh, It is commonly known as kalmegh. Andrographis paniculata, is a member of the family Acanthaceae. The aerial part of the plant was screened for their phytochemical activity. This plant is a richest source of bioactive constituents used in India to treat diseases like common cold, liver diseases, snake bite and some skin infection, etc. The plant extracts were prepared with selected solvents. The phytochemical screening shows the presence of alkaloids, steroids, flavonoids, tannins, saponins, triterpenoids, quinones, protein, and sugars.***

Keywords: Phytochemical Extraction, Andrographis paniculata, Kalmegh, secondary metabolites, Acanthaceae

1. Introduction

Medicinal plants have been used over the hundred years to treat various type of acute and chronic diseases. Medicinal plants are important sources of valuable therapeutic agents, both in traditional and modern medicine. Medicinal plants contain a lot of bioactive constituents or phytochemicals which are secondary metabolites that produced by plant. The major secondary metabolites including alkaloids, carbohydrates, flavonoids, tannins, terpenoids, and steroids Bioactive constituents have been reported from plant extract, this phyto extract can protect human against diseases.

Andrographis paniculata is one of the most potential herbs to be used as an alternative treatment for treating various deadly diseases. Plants are the source of large amount of drugs comprising to different groups such as antispasmodics, emetics, anti oxidant, anti-cancer, antimicrobials etc.

Andrographis paniculata belongs to family (Acanthaceae), native to India, is a medicinal herb with bitter taste. Andrographis Paniculata have number of pharmacological properties like, anticancer, antiheptotoxicity, Anti-diabetic & anti -inflammation, to treat liver disorders, bowel complaints of children, common cold, respiratory infection, antidiarrhoeal, immunostimulant have been allocate to this plant in traditional system of medicine. According to Indian ayurveda, A. paniculata "cools" and relives internal heat, inflammation and pain and it is also used for dexotification.

Indian Pharmacopoeia describe that it is a predominant constituent of at least 26 Ayurvedic formulations. The demand of Andrographis paniculata is increasing day by day due to its importance in the treatment of different ailments.

2. Botanical Description:

Andrographis Paniculata is an annual, branched, herbaceous plant erecting to a height of 30-110 cm in moist shady places with stem acutely quadrangular, much branched, easily broken fragile texture stem. Leaves are simple, opposite, lanceolate, glabrous, 2-12cm long, 1-3cm wide with margin acute and entire or slightly undulated and upper leaves often bractiform with short petiole.

Habitat: In India, it is cultivated during rainy phase of summer season (Kharif) crop. Any soil having fair amount of organic matter is suitable for commercial cultivation of this medicinal plant. About 400 g seeds are sufficient for one hectare.

Taxonomical Classification

Kingdom: Plantae
Subkingdom: Tracheobionta
Super division: Spermatophyta
Division: Angiosperma
Class: Dicotyledonae
Sub class: Gamopetalae
Family: Acanthaceae
Genus: Andrographis
Species: paniculata

3. Materials and Methods

Collection of plant: Plant Andrographis paniculata were collected from the herbal garden of AKS university satna and from arogyadham chitrakoot. it was authenticated by DRI arogyadham chitrakoot. Fresh plant materials (R, S, L) were air-dried for 2-3 weeks and grinded into fine powdered form, by using a grinder, kept in plastic bags, and subjected later to soxhlate extraction.

Solvents used for extraction: Chloroform, Acetone, Ethanol, Methanol, Diethyl ether and Benzene were used as the solvents for the preparations of plant extracts.

Extract preparation: Andrographis paniculata leaf, stem, and leaf (100 g) were defatted with petroleum ether (1000 ml) and the residue was extracted in 50% methanol with the help of soxhlet extraction unit. The sample was collected and concentrated in water bath at 40-50oC and dried in hot air oven at 40oC. The dried powder was kept in air tied box.

Phytochemical Analysis: Phytochemical screening was performed to identify phytochemicals in the chloroform, hexane, Methnol, ethenol Acetone, Diethyl ether and Benzene extracts of plant leaves were used in the study in this present work, the phytochemicals were detected by colour tests

Phytochemical screening of the extract: The portion of the dry extract was subjected to the Phytochemical screening using the method adopted by Trease, Evans and Harbourne. Phytochemical screening was performed to test for alkaloids, saponins, glycosides, proteins, phytosterols, flavonoids, terpenoids, tannins, oil and Fats.

Test for Alkaloids: A small portion of the extract was stirred separately with 1 ml of dilute Hydrochloric acid and filtered. The filtrate was treated with Dragandroff's reagent. Appearance of organic precipitate shows the presence of alkaloids.

Test for Carbohydrates: 1ml of different extracts was taken into test tubes to which equal volume of Fehling's A and Fehling's B were added. The tubes were heated at 65 ℃ in a water bath for 10-15 min. Redbrick precipitate indicated the presence of carbohydrates.

Test for Proteins: Small quantity of the extract was dissolved in 5 ml of water and subjected to Xantho protein test. To 3 ml of the extract, 1ml of concentrate Nitric acid was added. A white precipitate was obtained. The solution was heated for 1minute and cooled under tap water. It was made alkaline by excess of 40% NaOH. Appearance of orange precipitate indicates the presence of protein.

Test for saponin: About 2 g of the powdered sample was boiled in 20 ml of distilled water in a water bath and filtered. 10ml of the filtrate was mixed with 5 ml of distilled water and shaken vigorously for a stable persistent froth. The frothing was mixed with 3 drops of olive oil and shaken vigorously, then observed for the formation of emulsion.

Test for Flavonoids: The extract was treated with concentrated Sulphuric acid. Appearance of yellowish orange show the presence of anthocyanins, yellow to orange color show the presence of flavones, and orange to crimson show the presence of flavonones.

Test for steroids: Chloroform 10ml was added to 2ml of plant extracts. To these extracts 1ml of acetic anhyride was added and then 2ml of concentrated sulphuric acid was added along the sides of the test tube. Colour formation at the junction is noted. The appearance of blue green colour indicates the presence of steroids.

Test for Glycosides: Small quantity of the extract o was hydrolyzed with 5ml Hydrochloric acid for few hours on a water bath and the hydrolysate was subjected to Fehling's test. To 2ml of Fehling's solution (1ml of Fehling's A and 1 ml of Fehling's B solution), 2ml of extract was added, mixed well and boiled. Appearance of yellow or red color precipitate indicates the presence of reducing sugars.

Test for Tannins: About 0.5 g of the dried powdered sample was boiled in 20 ml of water in a test tube and then filtered. A few drops of 0.1% ferric chloride was added and observed for browrish green or a blue-black colouration.

Test for Terpenoids: 5 g of each extract was mixed in 2 ml of chloroform, and concentrated H2S04 (3ml) was carefully added to form a layer. A reddish brown colouration of the inter face was formed to show positive results for the presence of terpenoids.

4. Result

The plant extract were screened for the presence of major secondary metabolite such as Alkaloides, Saponin, Flavonoides, Terpenoide, Tannin, Glycosides, steroides, and Proteins, according to common phytochemical methods. The tests were based on visual observation of the change in colour or formation of precipitate after the addition of specific reagent. The results of phytochemical tests carried out for Andrographis paniculata with different solvents are presented in Table 1.

S. N.	Chemical Test	Acetone			Methanol			Ethanol			Water			Benzene			Diethyl ether			Chloroform		
		R	S	L	R	S	L	R	S	L	R	S	L	R	S	L	R	S	L	R	S	**L**
1.	Alkaloids																					
	a) Dragendorff's reagent	-	+	-	+	+	+	-	-	-	+	+	+	-	-	-	-	-	-	-	+	**+**
2.	Carbohydrate																					
	a) Fehling's test	-	-	-	+	-	-	-	-	+	-	-	-	-	+	-	-	-	-	+	+	-
3.	Proteins																					
	a) Bieuret's test	+	+	-	-	+	-	+	-	-	+	+	+	-	-	-	+	-	-	+	-	+
4.	Resins	-	+	-	-	+	+	-	-	-	-	+	+	-	-	-	+	-	-	+	+	-
5.	Saponins																					
	Froth test	-	-	-	-	+	-	-	-	-	+	+	+	-	-	-	-	-	-	+	-	**+**
6.	Flavonoid																					
	a) Fluroscence test	+		+	+		+	+		-	+	+	+	-	-	-	-	-	-	-	-	-
7.	Steroid																					
	a) Salkowski's test	-	-	-	-	-	+	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8.	Glycoside																					
	a) Borntrager's Test	-	-	+	-	+	-	-	+	-	-	+	-	-	+	-	-	+	-	+	-	+
9.	Tannin																					
	a) Lead acetate Test		+	+	+	+		+	+	+		+	+	-	-	-	+	-	-	-	+	+
10	Terpenoid	-	+	-	+	-	-	+	+	-	-	-	-	-	+	-	-	-	-	-	+	+

5. Conclusion

The qualitative analysis of the seven different plant extract of Andrographis paniculata reveals the presence of medicinally valued bio active components like, flavonoids, tannins, alkaloids, steroids, and glycosides etc. These phytochemical constituents produced by plant are able to exhibit some biological activities such as, antiperiodic, antibacterial, antitumor, antidiabetic, antithrombotic, anti-inflammatory anti-HIV, antifeedant and antiviral. Medicinal plants play a vital role in preventing various diseases. The anti diuretic, anti-inflammatory, anti-analgesic, anti malarial, anti-bacterial and anti-fungal activities of the medicinal plants are due to the presence of the above mentioned secondary metabolites.

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