



EVALUATION OF PHYTOCHEMICAL ANALYSIS OF *ANDROGRAPHIS PANICULATA* LEAF AND STEM EXTRACT

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ABSTRACT

The present study is the continuation of a program aimed at investigation of photochemical properties of *Andrographis paniculata* leaf and stem extract to justify the traditional claim endowed upon this herbal drug as a rasayana in Ayurveda. *Andrographis paniculata* is a member of the family *Acanthaceae*. It is commonly known as kalmegh, bhumineeb, chirayata. It is a valuable traditional medicinal plant. It has antibacterial, antioxidant, antidiabetic, antipyretic, hepatoprotective cardiovascular and anti-virus including inhibited HIV properties. The plant commonly used by the local people, for the treatment of common cold, fever, Malaria, liver diseases, snakebite diabetes, and some skin infection. Phytochemical screening of the methanol, petroleum ether, acetone and chloroform extract of leaves and stem bark of *Andrographis paniculata* Linn showed the presence of glycosides, phytosterol, saponins, tannins, flavonoids and terpenoids in all extractions fragments. The presence of terpenoids as major constituents of the plant leaves as well as stem bark extract that are commonly known to posses different activity. These results support the traditional use of the plant in therapy of different disease.

KEYWORDS: Androgrphis paniculata, phytochemicals, kalmegh, terpenoids.

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 herbal products to supplement the diet, mainly with the intention of improving the quality of life and preventing the diseases of elderly people. India has been identified as a major resourceful area in the traditional and alternative medicines globally.

Andrographis paniculata (Burm.f.) Wall. ex Nees., (Family- Acanthaceae) (English name-King of Bitters, Tamil name-Nilavempu) is an annual herbaceous plant and is extensively cultivated in Southern Asia, China and some parts of Europe. In traditional medicine, *A. paniculata* is widely used to get rid of body heat, dispel toxins from the body; prevent common cold, upper respiratory tract infections including sinusitis and fever (Gabrielian, et. al., 2002) and as an antidote against poisons of snakes and insects (Samy, et. al., 2008). The plant has been reported to exhibit various mode of biological activities in vivo as well as in vitro viz., antibacterial (Singha, et. al., 2003; Mishra, et. al., 2009),

antiviral (Wiert, et. al., 2005), anti-inflammatory (Wen, et. al., 2010), anti HIV (Human immunodeficiency virus) (Chao, et. al., 2010), immunomodulating/ immunostimulatory (Calabrese, et. al., 2000) and anticancer (Iruetagoiena, et. al., 2005; Li, et. al., 2007). The plant showed potential therapeutic action in curing liver disorders, common cough and colds in human (Geethangili, et. al., 2008). The presence of important phytochemicals in *A. paniculata* make the plant useful for treating different ailments and have a potential of providing useful drugs of human use. The quantitative determination of pharmacognostic parameters will help for setting standards for crude drugs (Sharma, et. al., 2012).

An antioxidant is a molecule capable of terminating the chain reactions that damage cells by removing free radical intermediates, and inhibit other oxidation reactions by thereby reducing stress responsible for many degenerative disorders. *Andrographis paniculata* Nees, a multipurpose tropical plant is believed to have antioxidant properties (Mishra, et. al., 2013). The characteristic secondary metabolites encountered in this plant have considerably enhanced its importance in the arena of medicinal plants.

MATERIALS AND METHODS

Plant material – *Andrographis paniculata* was collected from Local Herbal Garden, Raipur (Chhattisgarh), India.

Reagent and authentic samples – The reagents used were of highest purity (>99.95%) and were purchased from Sigma Chemical Co. (Germany).

Extract preparation: *Andrographis paniculata* leaf and stem bark (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 40-50°C and dried in hot air oven at 40°C. The dried powder was kept in air tight box.

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, glycosid, proteins, phytosterols, flavonoids, triterpenoids, tannins fixed 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 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 Glycosides: Small quantity of the extract 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 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 1 minute 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 Phytosterol: Salkowski test was done for the detection of phytosterols. In this test, 1 ml of concentrated Sulphuric acid was added to the 1g plant extract and allowed to stand for 5 minutes. After shaking, formation of golden yellow color in the lower layer indicates the presence of phytosterols.

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 terpenoids (Salkowski test): 5 g of each extract was mixed in 2 ml of chloroform, and concentrated H₂SO₄ (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.

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 brownish green or a blue-black colouration.

RESULT

The plant extract were screened for the presence of major secondary metabolite classes such as Alkaloides, Flavonoides, Saponin, Terpenoide, Tannin, Glycosides, Phytosterol, and Proteins, according to common phytochemical methods. The tests were based on visual observation of the change in color 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. The present study exhibited the presence and absence of phytochemical compounds in each solvent extract. It was found that Methanol showed maximum number of phytochemicals when compared to Chloroform, Petroleum ether and Acetone.

Sl	Components	<i>Andrographis paniculata</i>							
		Methanol		Petroleum Ether		Acetone		Chloroform	
		leaf	stem	leaf	stem	leaf	stem	leaf	stem
1	Alkaloids	+	+	-	+	+	-	+	+
2	Saponin	+	+	-	-	+	+	+	+
3	Terpenoids	+	+	+	+	+	+	+	+
4	Flavonoids	+	+	-	-	-	+	-	+
5	Protein	+	+	-	-	+	+	+	+
6	Glycoside	+	+	+	+	+	+	+	+

7	Phytosterol	+	+	-	-	-	-	+	-
8	Tannin	+	+	-	-	+	-	+	-
9	oils and fats	+	+	-	-	+	+	+	+

Presence = +; Absent= -

CONCLUSION

From the vast literature study and experimental results analysis it can be concluded that *Andrographis paniculata* is a traditional remedy for fever, cold and various infections. It also employs various immunological applications in cancer, immunomodulatory activity and viral diseases like HIV and others. The plant is also beneficial in treating cardiovascular disease and in preventing liver toxicity, thus improving functions of heart and liver. In the our experiment the plant extract were screened for the presence of major secondary metabolite classes such as Alkaloides, Flavonoides, Saponin, Terpenoide, Tannin, Glycosides, Phytosterol, and Proteins, according to common phytochemical methods. The tests were based on visual observation of the change in color or formation of precipitate after the addition of specific reagent. The present study exhibited the presence and absence of phytochemical compounds in each solvent extract. It was found that Methanol showed maximum number of phytochemicals when compared to Chloroform, Petroleum ether and Acetone. It also finds immense utility in abdominal problems, body aches, respiratory disorders, snake bites, allergic reactions, central nervous system and functioning of brain. *Andrographis paniculata* is reported to decrease fertility in animals and human beings. Taking great concern of the useful benefits of the plant, it can be advocated as a safe, highly important medicinal plant for mankind.

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