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ANALYSIS OF PHYTOCHEMICAL CONSTITUENTS OF *ANDROGRAPHIS PANICULATA* (Burm.f.) Nees

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ABSTRACT

Medicinal plant plays a vital role in our life. We have been using plants since ancient time, for food, clothes, shelters and medicine. India has been traditionally rich in different types of medicinal plants and many useful drugs obtained from the screening of such medicinal plants. *Andrographis paniculata* is an annual Herb. It grows roadside, shady places and moist places. The plant is also known as king of bitter, because it is extremely bitter in taste. *Andrographis paniculata* is one of the most important medicinal plants which are used in many kinds of diseases like leprosy, bronchitis, ulcers, cancer and dysentery etc. In our study we have investigated different phytochemicals in whole plant by using different solvents for extraction.

Keywords: Phytochemical constituents, *Andrographis paniculata*, medicinal values.

INTRODUCTION

Andrographis paniculata is known as king of bitter, kamlegh, bhuinnimb. It is an annual herb grows up to a height of 30-110 cm in moist shady places, road side and hills. The stem is dark green, much branched quadrangular with longitudinal furrows (Mishra *et al.*, 2007). Leaves are simple, opposite, lanceolate, glabrous, 2-12 cm long (Saxena and Brahmam, 1995). Flower small and solitary, corolla, whitish or light pink in color with hair, in lax spreading axillary and terminal racemes. Seed numerous, sub-quadrate, yellowish brown (Bharati *et al.*, 2011; Haines, 1924). In ancient times, the herb *Andrographis paniculata* was one of the highly used potential medicinal plants and it has been used to treat various illness conditions all over the world especially in Asia, Europe and Africa since a very long time (Mishra, 2007). The tribal community used this plant for the treatments of array of diseases and the main plant parts, including the roots and leaves were used for curing a wide range of diseases includes cold and fever, skin eruptions, gonorrhoea, leprosy scabies and boils (Hossain *et al.*, 2014). The complete plant body has been applied for remedies such as anti-dote, poisonous stings from insect bites and, as the medication for dysentery and respiratory infections. (Okhuarobo, 2014). The Chinese used this plant traditionally as the cold-property herb to rid the body heat due to fever and to drive out toxins from the body. In Malaysia, *Andrographis paniculata* has been used traditionally as a remedy for diabetes and hypertension. In the traditional Bangladesi medicine, this herb played an integrated part as a remedy for a couple of diseases such as sexual and skin disorders, lungs and

urinary part infections, liver disorders and used as a blood purifier and also against the disease caused by worms. In traditional Indian medicine, this plant has been used for the treatments of dysentery and diabetic problems, skin and worm infections and against various ulcers (Hossain *et al.*, 2014). Ayurveda explores the use of plant-based medicines and treatments. Recently people are affected by so many diseases due to their unhealthy life style. Our traditional system of Medicines like Siddha, Ayurveda contain remedies for all the ailments and diseases. Potentially valuable treasures in medicinal plants remain unexplored (Kirtikar and Basu, 1918). Plants are capable of synthesizing an overwhelming variety of low-molecular weight organic compounds called secondary metabolites. All the secondary metabolites are unique and complex structures. Many of these have been found to possess interesting biological activities and find applications such as pharmaceuticals, insecticides, dyes, flavours and fragrances. They can be used to treat chronic and infectious diseases as well (Duraipandiyar *et al.*, 2006). Secondary metabolites aid in the defence and protection. Extraction and characterization of several active phytochemicals from these green factories has given birth to some high activity profile drugs (Mandal *et al.*, 2007). The biosynthetic pathways are responsible for the occurrence of both primary and secondary metabolites such as, carbohydrates, proteins, phenols and alkaloids, etc. (Waterman and Mole, 1994). In order to confirm the presence of secondary metabolites, phytochemical analysis can be done. For this analysis, the selected plant materials are continuously extracted by using various methods such as, homogenization, percolation, infusion,

decoction, soxhlet extraction and microwave assisted extraction, etc. Extraction can be done using a range of solvent such as, chloroform, petroleum ether, acetone, ethyl acetate, methanol and Water. After the extraction, the crude extracts are analysed by using the standard procedures, such as test for alkaloids (Wagner's test, Mayer's test, Dragendroff's test), test for saponins (froth test, foam test), test for flavonoids (Lead acetate test, alkaline reagent test, sulphuric acid test), detection of Phenols (ferric chloride test, Lead acetate test, Gelatine test, Alkaline reagent test), detection of Glycosides (Borntragers's test, Keller-killani test), detection of Tannins (Gelatine test), detection of Terpenes (Salkowski test, Libermann test) followed by Harborne (1998).

MATERIALS AND METHODS

Phytochemical assays

Phytochemical analysis was carried out on different extract of the whole plant using standard procedure to identify the bioactive compounds (Harborne, 1973; Trease and Tiwari *et al.*, 2011).

Test for Tannin

5ml of plant extract was added with 5 drops of 10% lead acetate. Formation of a light-yellow precipitate indicates the presence of tannin.

Test for Saponin

1ml of the extract was boiled in 10ml of distilled water and filtered with Whatman filter paper. 5ml of filtrate was mixed with 2 ml of normal distilled water and shaken vigorously. Occurrence of stable persistent froth indicates the presence of saponins.

Test for Flavonoids

To 1 ml of the extract, few drops of dilute sodium hydroxide were added. Presence of flavonoids is indicated upon production of an intense yellow colour in the plant extract which became colourless on addition of 2-3 drops of 50% dilute acid.

Test for Terpenoid

0.5 gm of plant extract was mixed with 2 ml of chloroform and equal volume of concentrated sulphuric acid was added. Terpenoids presence is confirmed by a reddish-brown colouration of interface.

Test for Phenolic compounds

2 ml of plant extract was added with 5 drops of 1% ferric chloride and 1 ml of potassium ferro cyanide, a bluish-green solution showed the presence of phenolic compound.

Test for Reducing sugar

0.5 g of plant extract was dissolved with distilled water and filtered. The filtrate was boiled with 2 drops of Fehling's solution A and B for 5 minutes. An orange-red precipitate obtained indicates the presence of reducing sugar.

Test for Steroid

2 ml of plant extract was dissolved in 5 ml chloroform and then 5 ml of concentrated sulphuric acid was added. Formation of 2 phases (upper red and lower yellow with green fluorescence) indicates the presence of steroid.

Test for Alkaloids

5 ml of plant extract was mixed with 3 ml of aqueous HCL on water bath and then filtered. 1 ml of Dragendorff's reagent was added in the filtrate. The occurrence of orange-red precipitate indicates the presence of alkaloids in the sample extract.

Test for Carbonyl

2 ml of plant extract was added with 2 drops of 2, 4-dinitrophenyl hydrazine solution and thoroughly shaken, yellow crystal formation indicates presence of carbonyl

RESULTS AND DISCUSSION

Phytochemical assays were done and the study reveals that *Andrographis paniculata* is diverse of bioactive compounds like saponin, tannin, flavonoids, terpenoids, phenolic compounds, reducing sugar and steroids. Due to presence of these compounds, it indicates that the plant possesses various medicinal values. By the literature survey it was concluded that *Andrographis paniculata* might be used as anti-diabetic, anti-microbial and antidote during insect bite. People of Jharkhand use *Andrographis paniculata* to cure diseases like diabetics, skin diseases, sound appetite and also used as blood purifier.

Table 1: Ethnomedicinal values of *Andrographis paniculata*

Location	Uses
Jharkhand	The whole plant extract is used to cure diabetes
Jharkhand	The paste of stem is applied externally to cure skin infections
Jharkhand	The leaf is consumed as a blood purifying agent
Jharkhand	The whole plant is used against insect-bite
Jharkhand	The decoction of stem is used to get sound appetite

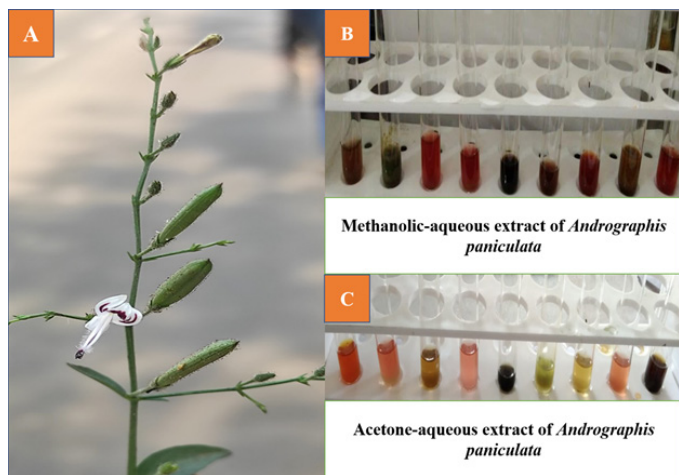


Figure 1: A) Vegetative part of *Andrographis paniculata*; B) Methanolic-aqueous extract; C) Acetone-aqueous extract

Table 2: Phytochemical assays of leaf extract of *Andrographis paniculata*.

<i>Andrographis paniculata</i>			
Solvents	Aqueous	Methanolic aqueous	Acetone aqueous
Saponin	+	+	-
Tannin	+	+	+
Flavonoids	-	+	+
Terpenoids	-	-	-
Phenolic compound	+	+	+
Reducing sugar	+	+	-
Steroids	-	-	+
Alkaloids	-	-	-
Carbonyl	-	-	-

Table 3: Supporting literature on correlation of bioactive compounds detected in Phyto-chemical testing along with medicinal uses

Medicinal uses	Corelation with Biotic Compounds	Supporting literature
Anti-diabetic activity	Reducing sugar is present in both aqueous and methanolic aqueous which indicates that it might be act as anti-diabetic.	Gothai <i>et al.</i> , (2010)
Anti-microbial and skin diseases	Presence of tannin and flavonoids m=indicates that it might be use against skin diseases and act anti-microbial activity.	Mgbeahuruike <i>et al.</i> , (2017)
Antidote in insect bite.	Presence of flavonoids and phenolic compounds in the tested plant it indicates that it might be used as Antidote against insect bite.	Ibanez-Calero <i>et al.</i> , (2009)

CONCLUSION

The above study reveals the presence of saponin, flavonoids, tannins, terpenoids, reducing sugar which indicates it might be used as herbal medicine. Hence, more study needs to do to reveals its more of its potential medicinal uses.

REFERENCES

Bharti, B.D.; Sharma, P.K.; Kumar, N.; Dudhe, R.; and Bansal, V. (2011). Department of Pharmaceutical Technology, Meerut Institute of Engineering and Technology Baghat Bypass, Delhi Roorkee Highway, Meerut-250005, U.P., India. Pharmacological Activity of *Andrographis paniculata*: A Brief Review Pharmacology online, 2: 1-10.

Duraipandiyar, V.; Ayyanar, M. and Ignacimuthu, S. (2006). Antimicrobial activity of some ethnomedicinal plants used by Paliyar tribe from Tamil Nadu, India. BMC Complement. Alternative Medicine, 6: 35-41.

Gothai, S.; Ganesan, P.; Park, S.Y.; Fukurazi, S.; Choi, D.K.; and Arulselvan, P. (2016). Natural Phyto-Bioactive compounds for the Treatment of Type-2 Diabetics: Inflammation as target. Nutrients, 8(8):461.

Hains, H.H. (1924). The Botany of Bihar and Orissa. Adlard & Sons & West Newman, Ltd. London.

Harborne, J. B. (1998). Phytochemical methods: A guide to modern techniques of Plant analysis. 2nd Edition, Chapman and Hall Publishers, London.

Hossain M.S.; ZannatUrbi, Abubakar, S. and Rahman, K.M.H. (2014). *Andrographis paniculata* (Burm. f.) Wall. ex Nees: A Review of Ethnobotany, Phytochemistry, and Pharmacology. Article ID 274905 <https://doi.org/10.1155/2014/274905>

Ibanez-Calero, S.L.; Jullian, V. and Sauvain, M. (2009). A new anthraquinone isolated from *Rumex obtusifolius*. Revista Boliviana de Quimica, 26(2): 49-56.

Kirtikar, K. R and Basu, B. D. (1918). Indian Medicinal Plants. Indian Press, 34-44.

Mandal, V.; Mohan, Y. and Hemalatha, S. (2007). Microwave assisted extraction- an innovative and promising extraction tool for medicinal plant research. *Pharmacognosy Reviews*, 1(1): 7-18.

Mgbeahuruike, E.E.; Yrjonen, T. and Holm, H.V. (2017). Bioactive Compounds from Medicinal plants: Focus on Piper Species. *South African Journal of Botany*, 112: 54-69.

Saxena, H.O. and Bramham, M. (1995). The Flora of Orissa, Orissa Forest Development Corporation Ltd & Regional Research laboratory.

Mishra, S.K.; Neelam, S.S.; and Sangwan, R.S. (2007). Phcog Rev.: Plant Review *Andrographis paniculata* (Kalmegh): A Review. *Pharmacognosy Reviews*, 1(2).

Waterman, P. G and Mole, S. (1994). Analysis of Phenolic plant metabolites. Wiley publications.