



## Evaluation of Phytochemical Properties of *Andrographis Paniculata* Stem and Leaf Extract

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### Abstract

*Andrographis paniculata* has antioxidant, antidiabetic hepatoprotective cardiovascular and antipyretic properties and thus used by local societies for digestive problems, fever, common cold, liver diseases, snakebite, skin infection and sore throat. This study aims to investigate the phytochemical properties of *Andrographis paniculata* stem and leaf extract to validate the traditional claim bestowed upon this herbal drug as a rasayana in Ayurveda. Standard analytical method as described by AOAC, 2005 were used for this analysis. Phytochemical screening of the methanol, acetone, chloroform and petroleum ether extract of stem bark and leaves of *Andrographis paniculata* showed the presence of Glycosides, Saponins, flavonoids, Tannins, Phytosterol and Terpenoids in all the extractions. Terpenoids as major constituents of the plant stem bark as well as leaves extract are commonly known to possess different activity. The outcome of the investigations showed that the plant has a therapeutic property.

**Keywords:** *Andrographis paniculata*, Terpenoids, Phytochemicals

### Introduction

In many developing countries, it is estimated that about two third of the population relies heavily on traditional practitioners and medicinal plants to meet primary healthcare needs (Farnsworth and Soejarto, 1991). *A. paniculata*, commonly known as King of Bitters or kalmegh, is an annual, branched, erect handsome herb running half to one meter in height. It is native to peninsular India and Sri Lanka and is also distributed in different regions of Southeast Asia, China, America, West Indies and Christmas Island. It is cultivated because of its well-known medicinal value and it grows well in most soil types thus it is widely distributed (Latto et al., 2006). Beyond this pharmaceutical approach to plants, there is a wide tendency to utilize herbal product to supplement the diet, mainly with the intention of improving the quality of life and preventing the diseases in people (Oladipo et al., 2023).

*Andrographis paniculata* plant (King of Bitters) can be found in a diversity of habitats, such as plains, roadsides, farms and hillsides. It is widely grown in southern and south Eastern Asia to treat contagions and some other

diseases (Shalini and Sriman, 2015). *Andrographis paniculata* grows erect to a height of 30-120cm in moist and shady places. The lance shaped leaves have hairless blades measuring 8cm long by 2.5cm wide. It contains many yellow brown seeds. It belongs to Acanthacea family and widely distributed in Madhya Pradesh, India (Owoade et al., 2021).

The plant showed possible therapeutic action in curing liver disorders common cough and colds in human (Gabrielian et al., 2002). The presence of phytochemical in *Andrographis paniculata* make the plant useful for treating different diseases and have a latent of providing useful drugs for human use. *Andrographis paniculata* plant is said to have antioxidant properties which help in dismissing the chain reactions that damage cells by removing free radical intermediates, and inhibit other oxidation reactions by thereby reducing stress accountable for many degenerative disorders. (Oladipo et al., 2003).

### Materials and methods

**Plant Collection** - *Andrographis paniculata* was collected from Oyo State College of



Agriculture and Technology Igboora, Oyo State.

**Reagents** – The reagents used were of Analytical grades which include petroleum ether, distilled water, Dragandroff's reagent e.t.c

**Extract preparation:** Andrographis paniculata stem and leaf (200g) were defatted with petroleum ether (100ml) and the residue was extracted in 50% methanol using cool extraction. The sample was collected and concentrated in rotary evaporator and dried in hot air oven at 40°C. The dried sample was kept in an air tight bottle.

#### **Phytochemical screening of the extract:**

The dried extract was subjected to phytochemical screening using the method adopted by Trease, Evans, and Harbourne, (2005). Phytochemical screening was performed to test for alkaloids, saponin, Tannin, glycoside, protein, flavonoids.

**Test for Saponin:** About 2g of the powdered sample was boiled in 20ml of distilled water in a water bath and filtered. 10ml of the filtrate was mixed with 5ml 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 which confirms the presence of saponin.

**Test for Alkaloids:** A small portion of the extract was stirred separately with 1ml 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 Proteins:** Small quantity of the extract was dissolved in 5ml of water and subjected to anthoprotein test. To 3ml 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 then it was made alkaline by excess of 40% NaOH. Appearance of orange precipitate indicated the presence of protein.

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

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

**Test for Terpenoids:** 5g of each extract was mixed in 2ml of chloroform, and concentrated H<sub>2</sub>SO<sub>4</sub> (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 Phytosterol:** 1ml of concentrated Sulphuric acid was added to 1g of the plant extract and allowed to stand for 5 minutes. After trembling, formation of golden yellow colour, in the lower layer indicated the presence of phytosterols.

**Test for Tannins:** 0.5g of dehydrated powdered plant sample was boiled in 20ml of water in a test tube and sieved. Little drops of 0.1% ferric chloride was added and observed for brownish green or a blue- black colouration.

#### **Results and discussion**

The plant extracts were screened for the presence of major secondary metabolite classes such as Tannin, Alkaloides, Flavonoides, Saponin, Terpenoids, Phytosterol, Glycoside and Protein, agreeing to common phytochemical methods. It was found on visual observation of the change in colour or formation of precipitate after the addition of specific reagent.

The result of phytochemical tests carried out for Andrographis paniculata with different solvents are shown in Table 1. The study



shows the presence and absence of phytochemical compounds in each solvent extract. It was found out that all the phytochemicals tested positive to plant sample

extracted with methanol compared to the plant sample extracted with other solvents (Chloroform, Petroleum ether and acetone.).

**Table 1: Qualitative Phytochemical composition of *Andrographis paniculata* extracted with different solvent**

| Components  | <i>Andrographis paniculata</i> |      |                 |      |            |      |          |      |
|-------------|--------------------------------|------|-----------------|------|------------|------|----------|------|
|             | Acetone                        |      | Petroleum ether |      | Chloroform |      | Methanol |      |
|             | Stem                           | Leaf | Stem            | Leaf | Stem       | Leaf | Stem     | Leaf |
| Flavonoids  | +                              | -    | -               | -    | +          | -    | +        | +    |
| Alkaloids   | -                              | +    | +               | -    | +          | +    | +        | +    |
| Terpenoids  | +                              | +    | +               | +    | +          | +    | +        | +    |
| Protein     | +                              | +    | -               | -    | +          | +    | +        | +    |
| Saponin     | +                              | +    | -               | -    | +          | +    | +        | +    |
| Tannin      | -                              | +    | -               | -    | -          | +    | +        | +    |
| Phytosterol | -                              | -    | -               | -    | -          | +    | +        | +    |
| Glycoside   | +                              | +    | +               | +    | +          | +    | +        | +    |
| Oils & Fats | +                              | +    | -               | -    | +          | +    | +        | +    |

Keys: + = Present - =Negative

## Conclusion

From the result presented, *Andrographis paniculata* could be concluded to be a medicinal plant useful for the cure of ailments in human having contained biologically active components which fight ailments. 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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