



EVALUATION OF PHYTOCHEMICAL AND IN VITRO ANTIMICROBIAL PROPERTIES OF ANDROGRAPHIS PANICULATA AND CINNAMOMUM TAMALA

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ABSTRACT:

Medicinal plants are used to cure common ailments by the people of the tribal area. The selection of *Andrographis paniculata* and *Cinnamomum tamala* for evaluation was based on traditional use for treatment of common ailments. *Andrographis paniculata* is also known as *Bhuinimb* or *Kalmegh* in India. This plant is the rich source of bioactive constituents. Its phytochemical extract can protect human against a number of diseases. It is mostly used for the treatment of fever, breathing problem, skin disorders, ulcers and also in liver disorders, diabetes and has antimalarial activity. *Cinnamomum tamala* known as *tejpat* / bay leaves in trade, found in Himalayan region, is a promising medicinal plant species. Its leaves are widely used as spice throughout the world since ancient times. It is used in Indian system of traditional medicines in various Ayurvedic formulations. Qualitative phytochemical screening of *Andrographis paniculata* and *Cinnamomum tamala* were studied. The methanol solvent was used to obtain extracts from powdered plant parts. The extracts were subjected to qualitative phytochemical screening using standard procedures. The extract of *Cinnamomum tamala* showed the presence of Flavonoids, Tannins, Triterpenoids, Phenols, Steroids and Quinones. The extract of *Andrographis paniculata* showed the presence of alkaloids, flavonoids, sterols, phenols and tannins. The diversity of phytochemicals present suggests that *Cinnamomum tamala* and *Andrographis paniculata* could serve as a source of useful drugs.

Keywords: - *Andrographis paniculata*, *Cinnamomum tamala*, Phytochemicals, Antibacterial, leaves, stem.

INTRODUCTION :

Medicinal plants are important sources for the treatment of various diseases in Ayurvedic system of medicine (Kirtikar, K.R., (1981) Ayurvedic medicines are usually adopted to an Individual constitution. Ayurvedic, Indian and traditional Chinese system have great traditions and play important roles in Bioprospecting of new medicines from medicinal plants.

Phytochemicals are bioactive chemicals of plant origin. They are regarded as secondary metabolites and are naturally synthesized in all parts of the plant i.e., any part of the plant may contain active components (Tiwari et al., 2011). The quantity and quality of phytochemicals present in plant parts may differ from one part to another. In fact, there is lack of information on the distribution of the biological activity in

different plant parts essentially related to the difference in distribution of active compounds (or active principles) which are more frequent in some plant parts than in others (Lahlou, 2004). Phytochemicals have been recognized as the basis for traditional herbal medicine. The presence of a phytochemical of interest may lead to its further isolation, purification and characterization. Then it can be used as the basis for a new pharmaceutical product.

Andrographis paniculata is a traditional medicinal annual herb. *Andrographis paniculata* is also known as *Bhuinimb* or *Kalmegh* in India. This plant is the rich source of bioactive constituents. Its phytochemical extract can protect human against a number of diseases. It is mostly used for the treatment of fever, breathing problem, skin disorders, ulcers and

also in liver disorders, diabetes and has antimalarial activity.

Cinnamomum tamala known as tejpat / bay leaves in trade, found in Himalayan region, is a promising medicinal plant species (Showkat, R.M., et.al., (2004). Its leaves are widely used as spice throughout the world since ancient times. It is used in Indian system of traditional medicines in various Ayurvedic formulations.

MATERIAL AND METHODS :

Plant sample: Fresh dried leaves of *Andrographis paniculata* and *Cinnamomum tamala*.

Bacterial culture: Commonly used microorganism for the study of antimicrobial activity are gram negative bacteria *Escherichia coli* and gram-positive bacteria *Staphylococcus aureus* were obtained from Department of Microbiology, Guru Nanak College of Science, Ballarpur.

Plant sample and preparation: Fresh leaves of *Andrographis paniculata* were obtained from different parts of Chandrapur region of Maharashtra and *Cinnamomum tamala* purchased from shop. The material was collected in the month of March, 2022 and washed 3-4 times with distilled water and dried at room temperature for 15 days and stored in air tight polythene bag. They were identified according to the description in literature and were further authenticated using herbarium.

Extraction procedures: Dried leaves (200 g) powder of *Andrographis paniculata* and *Cinnamomum tamala* was subjected to extraction with 200ml methanol for 48 hours. The methanol extract was collected, filtered and concentrated in vacuums under reduced pressure and dried in a desiccator. The concentrated methanol extract was further subjected to phytochemical screening.

PHYTOCHEMICAL TESTS:

Test for flavonoids-To the test substance in alcohol, a small amount of Magnesium and a few drops of conc. HCl was added and boiled for 5-8

minutes, a red colour shows the presence of flavonoids.

Test for tannins – Test substance mixed with boric lead acetate solution a white colorization shows the presence of tannin.

Test for Phenols (Ferric chloride test): A fraction of the extracts was treated with aqueous 5% ferric chloride and observed for formation of deep blue or black colour.

Test for Triterpenoids- The dry crude plant extract was dissolved in chloroform and then acetic anhydride was added to it. Concentrated sulphuric acid was added to the solution. Formation of reddish violet colour shows the presence of triterpenoids.

Test for Alkaloids –Substance was added and two drops of Mayer's Regent, formation of white colour indicates the presence of alkaloids.

Test for steroids – One gram substance was dissolved in a few drops of acetic acid and acetic aldehyde, warmed and cooled under the tap water and a drop of sulfuric acid was added along the sides (285) of the test tube, presence of green colour shows the positive test for steroids.

Test for quinones –To the substance Sodium hydroxide was added, a blue green or red colour indicates the presence of quinone.

Determination of proteins – To the test solution Biuret reagent is added. The blue reagent turns violet indicating the presence of proteins.

Determination of Sugars – The substance was mixed with equal volume of Fehlings A and B solutions, heated on water bath, formation of red colour is the indication of the presence of sugar. The results obtained were recorded as --, +, ++, +++ signs, indicating their approximate concentrations.

The results are given in Table 1.

ANTIMICROBIAL SCREENING :

Preparation of Inoculum - The bacterial culture viz, *Staphylococcus aureus* and *Escherichia coli* was inoculated into sterile Nutrient broth and incubated overnight at 37°C.

Preparation of stock extract - The dried extract powder was dissolved in dimethyl sulphoxide to prepare extract solution.

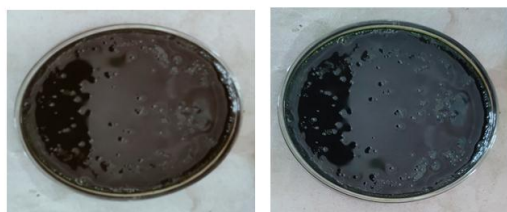
Agar well diffusion method - Agar well diffusion method was used to screen the antibacterial activities. Nutrient Agar was sterilized by autoclaving at 15 lbs for 15-20 minutes. One ml of fresh inoculums was pipetted at the centre of sterile petri dish, then nutrient agar poured into the petri dish containing the inoculum and mixed well. Upon solidification wells were made using a sterile corkborer into agar plates containing inoculums. Then extract of *Andrographis paniculata* and *Cinnamomum tamala* was added to respective wells. The plates were placed at room temperature for 1hr to let the extract diffuse into the agar. Then, the plates were incubated at 37°C for 18 hr. Antibacterial activity was detected by measuring the zone of inhibition (including the wells diameter) appeared after the incubation period. Triplicates were maintained for each sample of the extracts respectively. For each bacterial strains control were maintained where pure solvents were used. All the diameters of zone of inhibition were measured in mm.

The results are shown in Table 2.



Cinnamomum tamala

Andrographis paniculata



Methanol extract of *Andrographis paniculata*

Methanol extract of *Cinnamomum tamala*

RESULTS:

The leaf and stem extract of *Andrographis paniculata* and leaf extract of *Cinnamomum tamala* were analysed for the presence of

alkaloid, terpenoids, steroids, flavonoids, phenols, tannins, quinones, proteins and sugars.

Phytochemical Screening: Results obtained for qualitative screening of phytochemicals in leaves and stem of *Andrographis paniculata* and leaves of *Cinnamomum tamala* are presented in table 1.

Anti-bacterial screening: Results of the antibacterial screening of methanol extracts of leaves and stems of *Andrographis paniculata* and leaves of *Cinnamomum tamala* revealed significant antibacterial activity against all tested bacterial strains. The results are shown in table 2.

DISCUSSION:

The phytochemical screening and quantitative analysis of leaves and stem of *A. paniculata* shows that they are rich in alkaloids, flavonoids, steroids, phenols and tannins. The phytochemicals in the extract are reported to have antimicrobial activity. Thus, the phytochemicals are medicinally important for use to treat infections and some other diseases. The methanol extract of leaves and stem of *Andrographis paniculata* and leaves of *Cinnamomum tamala* showed significant activity against the tested microorganisms. Methanol extracts of *Andrographis paniculata* exhibited more activity against *E. coli* and *S. aureus* compared to *Cinnamomum tamala*. The inhibitory effects of *Andrographis paniculata* and of *Cinnamomum tamala* on the test microorganisms may be due to the presence of the above phytochemical components. The various phytochemical compounds detected are known to have beneficial importance in medicinal science. Alkaloids have been used to treat diseases like malaria and glycosides serve as defence mechanisms against many microorganisms. Alkaloids generally present in both parts play some metabolic role and control development in living system (Lalitha et

al.,2012). They are also involved in protective function in animals and are used as medicine especially the steroidal alkaloids (Sharma et al.,2011). Flavonoids and other polyphenols have been shown to exhibit significant antioxidant activity. The phenols along with antimicrobial activity also show astringent properties (Adelheid Brantner, 1994).

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Table 1: Results of phytochemical analysis of plant extracts

Plant species	Alkaloids	Flavonoids	Tannins	Phenols	Triterp endoids	Steroids	Quinones	Proteins	Sugars
A.paniculata	+++	++	++	+++	+	++	+	+	-
C.tamala	-	++	++	+	+++	++	+++	--	+

Table 2: Results showing antibacterial activity of plant extract

Microorganism	Plant Extract	Diameter of zone of inhibition (mm)	Diameter of well (mm)
Staphylococcus aureus	Andrographis paniculata	14	6
	Cinnamomum tamala	12	6
Escherichia coli	Andrographis paniculata	15	6
	Cinnamomum tamala	10	6