



REVIEW ARTICLE OF KALAMEGHA AND ITS THERAPEUTIC USES

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ABSTRACT

The plant *Kalamegha*, which means "Dark cloud," is well recognized, and also known as "Neem of the ground" or Bhui-neem. It is made up of the aerial parts of *Andrographis paniculata* (Burm.f.) Wall.ex Nees, a member of the Acanthaceae family and an annual herb that is found in India up to a height of 600 m. As the "King of Bitterness," Maha-tikta" Bhunimba or Hara *Chirayata*. Kalmegh (*Andrographis paniculata* Nees.) is renowned for its extensive therapeutic capabilities and is used as traditional medicine to treat a variety of illnesses. It is a dark green plant with a quadrangular stem and white flowers. It is an upright plant with an exceptionally bitter flavours that has been utilized for hundreds of years in many different traditional medical systems all over the world. The juice and fresh or dried leaves of used as febrifuges and bitter tonics (Pharmacopoeia, 1955). this herb is employed as an official medication in Indian pharmacopoeia and are frequently. Nowadays, the philosophy of drug discovery has transformed into "one drug, multitarget" from "one drug, one target".

INTRODUCTION

A significant portion of the flora, which produces raw materials for use in the pharmaceutical, cosmetic, and medicine industries, is made up of medicinal plants. The vast majority of people in poor nations rely on medicinal plants for their basic medical needs. At least 25% of the medications in pharmacopoeias are still made from plants, and many more are synthetic equivalents based on plant-derived prototype chemicals. Due to growing recognition of natural products as non-narcotic, without side effects, easily accessible at reasonable prices, and occasionally the only source of health care available to the poor, demand for medicinal plants is rising in both developing and developed countries.ⁱ

A. paniculata is recognized as a prescribed part of at least 26 Ayurvedic preparations used to treat liver diseases in the Indian Pharmacopoeia. It is one of the plants that can treat tumours, according to ancient Ayurvedic literature. Utilized plant parts include the aerial parts of the plant (leaves and stems), which are utilized for their medicinal value because they can be used to extract the phytochemicals that are active. Roots are hardly very infrequently.

Extracts of this plant and andrographolide exhibit pharmacological activities such as those that are immunostimulatoryⁱⁱ antiviralⁱⁱⁱ and antibacterial^{iv}. As major active constituent, andrographolide exhibits a broad range of biological activities, such as anti-inflammatory, antibacterial, antitumor, antidiabetic, antimalarial, and hepatoprotective^v. Because of the impressive variety of these biological activities, researchers propose obtaining various leads by structurally modifying andrographolide.

Scientific classification

Family: Acanthaceae

Genus: *Andrographis*

Species: *paniculata*

Botanical description

Plant height 30–110 cm Stem Dark green Length 30–100 cm Diameter 2–6 mm Shape Quadrangular with longitudinal furrows and wings on the angles of the young parts, slightly enlarged at the nodes Leaves Glabrous Length 2–12 cm Width 1–3 cm Arrangement Lanceolate Shape Pinnate, acute apex, entire margin Flowers White with rose-purple spots on the petals Size Small, in lax spreading axillary and terminal racemes or panicles Seed Capsules linear-oblong, acute at both ends Size 1.9 cm × 0.3 cm Colour Yellowish brown Shape Subquadrate, numerous Flowering and fruiting December to April .



Plant part use the areal part use (leaves and stems) are used to extract the active phytochemicals and thus used for its medicinal importance. Very rarely roots are also used.

Synonyms - Bhunimba, Yavakara- phala, Yavatikta

English name -King of Bitters; Gujarathi - Kariyatu; Hindi - Kirayat; Kannada - Nelaberu;

Malayalam - Kiriyaattu; Marathi- Oli-kiryata; Sanskrit: Kalmegha,

Bhunimba; Tamil: Nilavembu; Telugu: Nilavembu

Major Chemical Constituents - Andrographolide is a major bioactive phytoconstituent found in various parts of *Andrographis paniculata* but particularly in the leaves.

Andrographis andrographidine A, B, C, D, E & F; andrographoside, oroxylis A wogonin, neoandrographolide, Paniculides etc.

Properties -

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Ras	Guna	Virya	Vipak	Dosh karma	Mukhya karma
Tikta	Laghu Ruksa	Sita	Katu	Kapha pitta hara	Dipana

Indications - Kamala Pandu, sotha, Jvara, Krmi, Kustha, Vrana

Part	Medicinal use
Leaf	Fever, colic pain, loss of appetite, irregular stool and diarrhoea, common cold, common fever hepatitis tuberculosis, mouth ulcer, bronchitis, gastrointestinal disorder and sores.
Whole plant	Snakebite and insect sting treatment, dyspepsia influenza, dysentery, malaria, and respiratory infections.
Root	Febrifuge, tonic, stomach ache.

Medicinal use	Mode of use
Chardi	Paste of Bhunimba is mixed with equal quantity of sugar or honey and given.
Malaria	About 20 g of the whole plant is pounded, mixed in water, filtered and given internally. Alternatively, the plant is cut into small pieces and kept overnight in 100 mL of Water. About 40 mL of the cold infusion obtained is given internally, twice a day.
Eczema	Oil is added with herb powder, then applied to the lesions. Also 2 g of powder is taken once daily for 40 days
Post natal care	About 25 gm of powdered herb is boiled in 400 ml of water, reduced to 50 ml, cooled filtered and given internally to arrest unusual thirst. this decoction is also given to alleviate burning sensation in the palm and foot of the subject.
Dysmenorrhea	About 10 gm of leaf together with 3 black peppers is grounded well and given once a day for 7 days.
Leucoderma	For 40 days, a total of 2 g of powdered herb is given.
Infestation	In mothers' milk and given internally. Alternatively paste made of fresh leaves or juice extracted form 5mg of root is mixed in hot water and given internally.
Abscess	Internal use of leaf paste is about 10 gm. and also paste is applied externally.
Jaundice	Given three times daily for six days in a dose of 30 ml, a water extract of the herb totalling 10 is mixed with stem bark extracts of <i>Azadirachta indica</i> and <i>holarrhena antidysenterica</i> in equal amount.
Infected wound	The herb and turmeric are ground into a paste that is used externally. As an alternative, the affected regions may be covered with leaf paste and put on for two days.

Important formulation – Bhunimbadi churn, bhunimbadi kasaya,

Pharmacology

Scientists studied the pharmacological properties of the *A. paniculata* plant to confirm its use as a medicinal agent in the treatment of various illnesses as a result of the common use of its various sections in traditional healthcare, especially in Asia. Multiple studies found this plant was a range of biological properties, including anti-microbial, cytotoxic, anti-protozoan, anti-inflammatory, anti-oxidant, immunostimulant, hepato-renal protective, sex hormone modulatory, anti-infective, anti-angiogenic, insecticidal, and toxicity activities.

Anti-microbiological action

For anti-microbial action, aqueous extract, andrographolides, and arabinogalactan proteins extracted from the dried herb of *A. paniculata* were tested. The findings indicated that whereas andrographolide was only effective against *Bacillus subtilis* (*B. subtilis*), *Escherichia coli* (*E. coli*), and *Pseudomonas aeruginosa*, the aqueous extract and arabinogalactan proteins both possess antibacterial activity. Additionally, it was noted that each of the three had anti-*Candida albicans* fungus action.^{vi}

For antibacterial activity against *E. coli*, *Staphylococcus aureus*, *Staphylococcus epidermidis*, *Pseudomonas aeruginosa*, and *B. subtilis*, five uncommon noriridoides, andrographidoides A-E, were tested. (MIC>100 g/mL) None of the compounds show any inhibitory action. As positive controls, gentamycin, chloramphenicol, and Ciprofloxacin were used.^{vii}

Antioxidant function

Male Wistar rats' liver, kidney, heart, lungs, and spleen were examined for anti-oxidant activity on nicotine-induced oxidative stress using andrographolide and an aqueous extract of *A. paniculata* herbs. The results

indicated that intraperitoneal administration of andro (25 mg/kg) and *Aphanamixis polystachya* (25 mg/kg) for a period of 7 days significantly (P0.05) decreased levels of lipid peroxidation.^{viii}

Catalase and superoxide dismutase activities in erythrocytes were preserved after the rats were given an oral methanol extract of the dried leaves for 14 days, followed by a carbon tetrachloride (CCl₄) challenge. However, lipid peroxidation, alanine transaminase, aspartate transaminase, and plasma thiobarbituric^{ix} acid reactive substances were restored to values comparable with those. Following oral administration of a methanol extract (1 g/kg body weight) of the dried leaves, andrographolide, 14-deoxy-11, and 12 didehydroandrographolide were detectable in rat plasma, indicating that these diterpenes may be responsible for the observed anti-oxidant effect.^x

Immunomodulatory Activity

The innate immune response in mice was assessed by the macrophage movement index, phagocytosis of leucine-labeled *Escherichia coli*, and stimulation of splenic lymphocyte proliferation by *Andrographis paniculata* extract. The extract and pure andrographolide were also reported to have similar effects.^{xi}

Antidiarrheal Effects

This compound has also been used traditionally to sluggish live as an antidote for colic dysentery and dyspepsia, and has been employed successfully in cases of general debility in convalescence after fever, liver disorders and advanced stages of dysentery. The juice of fresh leaves of *A. paniculata*, which generally contains andrographolide, is used as a domestic remedy to treat colic pain, loss of appetite, irregular stool, and diarrhoea^{xii}

Hepatoprotective Activity

Liver diseases of various origins remain a serious health problem and a major cause of mortality. In the absence of reliable hepatoprotective drugs in modern medicine, herbs and plants play a vital role in managing several liver disorders.^{xiii}

Extensive literature related to the hepatoprotective activity of molecules from herbal sources shows that there is a vast array of molecules exhibiting potent hepatoprotective efficacy. The Indian systems of medicine have long used *Andrographis paniculata* as a hepatostimulant and hepatoprotective agent.^{xiv}

Conclusion

In India, *Andrographis paniculata* has been widely utilized in traditional medicine. Due to its significant therapeutic potential, *Andrographis panniculat* demand has significantly exploded in recent years. The information that is now available on *Andrographis panniculata* also expresses the wide range of pharmacological qualities that this plant possesses. The majority of the plant's therapeutic virtues are found in its aerial portions, which are also used to cure fever, throat pain, coughs, stomach-aches, and insect stings. The AP can be safely regarded as one of the contemporary catholicons due to its wide pharmacological actions.

The biological activities of various formulations, extracts, and pure compounds derived from this plant include anti-microbial, anti-inflammatory, anti-oxidant, cytotoxic, immune modulatory, modulatory of liver enzymes, anti-malaria, anti-angiogenic, and hepato-renal protective activity.

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