

A Review on Ethnobotanical Status of *Andrographis paniculata*

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ABSTRACT: *Andrographis paniculata* is a plant genus of the family Acanthaceae. A wide range of *Andrographis paniculata* species is used as traditional medicine. *Andrographis paniculata*, commonly called creat or green chiretta which belongs to the genus 'Andrographis'. It is mainly found in southern and south eastern Asia including India, China, Thailand, Indonesia and the West Indies such as Jamaica, Barbados and tropical areas in America. Present review focuses on the reports available in various literatures. *Andrographis paniculata* possess various pharmacological activities such as antibacterial, antifungal, antiviral, hypoglycemic, hypercholesteremic, diuretic, emollient and astringent effect. These results are very encouraging and hence this review was intended to study about the plant more extensively to confirm pharmacological activities and other potential benefits of *Andrographis paniculata*.

KEY WORDS: *Andrographis paniculata*, Botanical description, Pharmacological activities, Chemical constituents

I. INTRODUCTION

Andrographis paniculata, commonly known as creat or green chiretta which belonging to genus *Andrographis* of family, Acanthaceae. *Andrographis paniculata* is used as traditional herbal medicine in Bangladesh, china, Hong Kong, India, Pakistan, Philippines, Malaysia and Thailand and is ethno botanically used for the treatment of snake bite, bugbite, diabetes, dysentery, fever and malaria. It is an annual herbaceous plant native to Srilanka.

Synonyms Of *Andrographis paniculata*

- *Justicia latebrosa* Russell ex Wall
- *Justicia paniculata* Burm.
- *Justicia stricta* Lam. ex Stued.

Vernacular Names

- Malayalam : Nelavepu
- Tamil : Nilavembu
- Hindi : Kirayat
- English : Creat, King of bitters
- Gujarati : Kariyattu
- Bengali : Kalmegha
- Sanskrit : *Andrographis*
- Telugu : Nilavembu

Scientific classification of *Andrographis paniculata*

Kingdom	: Plantae
Subkingdom	: Tracheobionta
Super division	: Spermatophyte
Division	: Angiosperm
Class	: Dicotyledonae
Subclass	: Gametopetalae
Series	: Bicarpellatae
Order	: Personales
Family	: Acanthaceae
Subfamily	: Acanthoideae
Tribe	: Justiciae
Subtribe	: <i>Andrographideae</i>
Genus	: <i>Andrographis</i>
Species	: <i>A. paniculata</i>

Table no. 1: Botanical description of *Andrographis paniculata*

Habitat	Moist shady places
Habit	Annual, branched, easily broken fragile stem
Height	30 to 110cm
Stem	Acutely quadrangular, branched, easily broken fragile stem
Leaves	Green, simple, opposite, lanceolate, glabrous, 2-12cm long, 1-3cm wide with margin acute and entire.
Flowers	Calyx – small, linear Corolla – narrow, white with yellowish top Stamens – 2, inserted in the throat Anther – basically bearded Ovary – 2, superior-celled
Capsules	Erect, liner, 1- 2cm long and 2-5 cm wide, compressed, acute at both ends
Seeds	Very small, subquadrate



Stems



Leaves

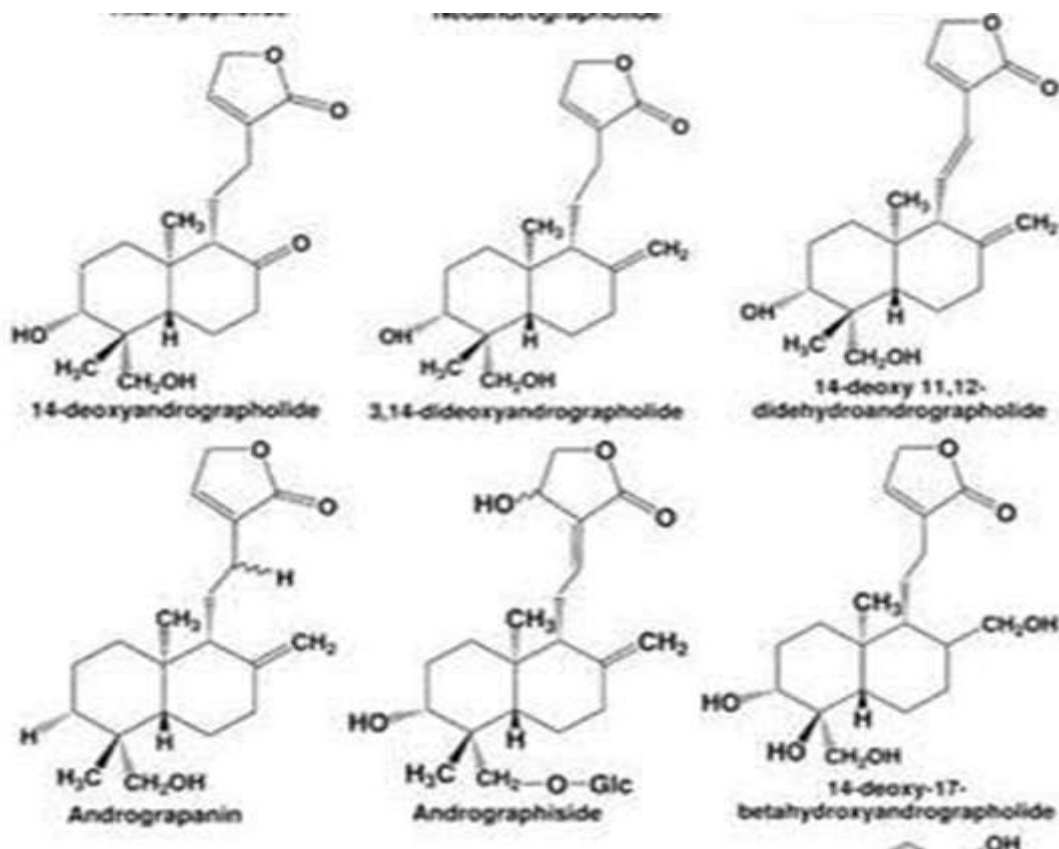


Flower

CHEMICAL CONSTITUENTS

Its major constituents are diterpinoids, flavonoids and polyphenols. Among the single compounds extracted from *Andrographis*

paniculata, andropholide is the major one in terms of bioactive properties and abundance. The other main diterpinoids are deoxyandrographolide, neoandrographide and isoandrographolide.



ETHNOBOTANICAL STATUS

Madhavi sahu (2018) - presented *Andrographis paniculata* (Burm f.) Nees is a medicinal plant used in many countries and used as a valuable traditional medicinal plant. It has many important bioactive compounds and is a potent drug used in Ayurveda, Siddha and Homoeopathy in many formulations. They reported that these medicinal plants are very effective in the treatment of various diseases like malaria, diabetes, viral hepatitis, cirrhosis, liver cancer, etc. The *Andrographis paniculata* (King of bitters), commonly known as Kalmegha is belongs to the family of Acanthaceae and its major constituents are diterpenoids, flavonoids and polyphenols. Among the single compounds extracted from *A. paniculata*, andrographolides is the major one. It cures and prevents a number of diseases in human beings and it is a boon of the nature of human healthy life. It prevents cold, fever, colic pain, active against inflammatory, anti-diabetic activity, antioxidant, antifertility, cardiovascular and anti-virus including inhibited HIV. It is extensively used in indigenous system of medicines as home remedy for various diseases in Bangladeshi traditional system. It is used to treat hepatitis, gastrointestinal tract

and upper respiratory infections, herpes, and a variety of other chronic and infectious diseases. The objective of this study is to review the literature of *Andrographis paniculata* specifically articles pertaining to therapeutic benefits, chemical properties and the attempt to provide recent update on phytochemical and pharmacological profile of *Andrographis paniculata* along its toxicity and contraindications status.

Md Sanower Hossain (2014) - reported that *Andrographis paniculata* is one of the highly used potential medicinal plants in the world. This plant is traditionally used for the treatment of common cold, diarrhoea, fever due to several infective cause, jaundice, as a health tonic for the liver and cardiovascular health, and as an antioxidant. It is also used to improve sexual dysfunctions and serve as a contraceptive. All parts of this plant are used to extract the active phytochemicals, but the compositions of phytoconstituents widely differ from one part to another and with place, season, and time of harvest. Their extensive data mining of the phytoconstituents revealed more than 55 ent-labdane diterpenoids, 30 flavonoids, 8 quinic acids, 4 xanthenes, and 5 rare nor iridoids. In this

review, they selected only those compounds that pharmacology has already reported. Finally, they focused on around 46 compounds for further discussion. They also discussed ethno botany of this plant briefly. Recommendations addressing extraction process, tissue culture, and adventitious rooting techniques and propagation under abiotic stress conditions for improvement of phytoconstituents are discussed concisely in this paper. Further study areas on pharmacology are also proposed where needed.

Manjusha - reported that *A. paniculata* is an antibacterial agent capable of counteracting the ill effects of pathogenic microbe. The antimicrobial activity of aqueous leaf extract of *A. paniculata* was found to have antibacterial activity against *Bacillus subtilis* and *Streptococcus aureus*.

Radha - found that petroleum ether, acetone, chloroform and methanol extracts of *A. Paniculata* leaves and stems, exhibit significant antimicrobial potential against *Enterococcus faecalis*, *Streptococcus pyrogenes*, *Klebsiella pneumonia* and *Proteus vulgaris*.

Abubacker and Vasantha - studied the antibacterial effect of ethanolic leaf extract of *A. Paniculata* against *Escherichia coli*; *Klebsiella pneumonia*, *Proteus vulgaris* and *Streptococcus pneumonia* by disc diffusion method were identified. The results revealed that the ethanolic leaf extract and andrographolides compound isolated from the leaves are potent in inhibiting these bacteria and the work highlights that the inhibitory effect is on par with standard antibiotics. Non-polar (dichloromethane) and polar (methyl alcohol and aqueous) extracts of *A. paniculata* (whole plant) were evaluated for in vitro antibacterial activity against 12 skin disease causing bacterial strains (7-gram positive strains; *Staphylococcus saprophyticus*, *Staphylococcus epidermis*, *Staphylococcus aureus*, *Streptococcus pyrogenes*, *Bacillus anthracis*, *Micrococcus luteus*, *Enterococcus faecalis*).

Xu - Reported the antibacterial activity of *A. paniculata* (methanolic and aqueous) extracts and authentic andrographolides against nine human bacterial pathogens gave evidences that authentic andrographolides did not show any activity. They concluded that the observed antimicrobial activity was due to other active principles present in the extracts that were used in the investigation.

Shen - have established that the anti-inflammatory effect of Andrographolides could be explained by its ability to inhibit neutrophil adhesion/transmigration through suppression of Mac-1 up regulation. The inhibitory effect of Andrographolides on Mac-1 expression could be mediated by down regulation of ROS production via a PKC-dependent but calcium independent mechanism. As effective anti-adhesive and anti-transmigration drug at pharmacological concentrations (0.1 ± 10 mm), andrographolides may be useful for the improvement of inflammatory disorders by limiting the early phases of neutrophil infiltration. Andrographolides dose-dependently reduce plasma glucose concentration in streptozotocin-induced diabetic rats and normal rats, with a more marked effect in normal rats than on diabetic rats. Andrographolides also attenuates the increase in plasma glucose in response to an intravenous glucose challenge in normal rats and enhances the uptake of radioactive glucose by isolated soleus muscle of streptozotocin-diabetic rats in a concentration-dependent manner. Repeated intravenous administration of andrographolides in diabetic rats for three days resulted in an increase in mRNA and protein levels of glucose transporter (GLUT4) in the soleus muscle, which indicates that the glucose lowering effect of andrographolides could be due to better glucose utilization by skeletal muscle. However, after in vitro experiments, Wibudi and his co-workers concluded that the hypoglycaemic effect of *Andrographis paniculata* is due to insulin released from pancreatic β -cells through ATP-sensitive potassium channels, similar to other insulinotropic ant diabetic agents. Ant diabetic effect of *A. paniculata* was also studied by several other researchers thus proving its effect against diabetes.

Radha - andrographolides, neoandrographolide and 14-deoxy 11,12didehydroandrographolide are reported to be viricidal against herpes simplex virus 1 (HSV-1) without having any significant cytotoxicity at viricidal concentrations. Fungal infections are one of the major health problems in tropical countries. Fungi or dermatophytes invade in to the keratinophilic region of the body and cause dermatophytosis. Examined the petroleum ether, acetone, chloroform and methanolic extracts of *Andrographis paniculata* leaves and stems, in order to evaluate the antifungal potential of

Candida albicans and *Aspergillus flavus*. The yeast, *Candida albicans* showed susceptibility to 75% of chloroform extracts of the leaves (23.33 ± 1.20 mm) and the acetone extracts of stems showed inhibitory effect on the growth of the fungus, *Aspergillus flavus* (23.67 ± 0.88 mm).

Bobbaral - against *Acremonium strictum*, *Alternaria alternata*, *Aspergillus flavus*, *Bipolaris bicolor*, *Cladosporium herbarum*, *Curvularia lunata*, *Fusarium oxysporum*, *Penicillium expansum*, *Rhizoctonia solani*, *Tiarospora phaseolina* and *Ustilago maydis* using hexane, chloroform and methanolic extracts and the results revealed that the methanolic extract showed activity against *Alternaria alternata* whereas, the chloroform extracts showed greater activity against *Fusarium oxysporum*

II. CONCLUSION

Andrographis paniculata is a major medicinal plant used since before recorded history in both organized (Ayurveda, Unani) and unorganized (folks, tribal, indigenous) traditional medicine practices. The Recent technological invention in identifying, isolation and validating active principles from medicinal plants has gained importance as these may provide an excellent source of lead molecules for the treatment of various disease conditions. In this context, *Andrographis paniculata* appears to be a very promising medicinal plant containing many active molecules evident by its vast medicinal and pharmacological properties. The review provides comprehensive information about the therapeutic, toxicological and clinical value of *Andrographis paniculata*. Though studies have identified the clinical potential of different parts of the plants, there still needs a scientific basis for the medicinal use of this plant.

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