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A Review on Andrographis Paniculata, Phyllanthus Amarus and Acalypha Indica and their Pharmacological Importance

Josuwa A

Abstract: ***Medicinal plants play an important role in human culture's growth. In all cultures of civilizations, medicinal plants have always been at the forefront as a source. Medical plants have played a major role in the traditional medicine scheme. As an essential source of modern drug preparation, the bioactive constituents of plants work. Medicinal plants have been used to treat health problems for thousands of years.***

Keywords: Medicinal plants, Andrographis paniculata, Phyllanthus amarus, Acalypha indica

1. Introduction

Medicinal plants are known to be traditional plants or herbs, composed of different medicinal principles and uses from ancient times to cure infectious diseases. There are special properties and biochemical significance of medicinal plants. Medicinal plants represent a significant number of unused medication reservoirs [1]. A valuable source of medicinal compounds is the structural diversity of their component molecules. Medicinal plants are recognized as having the potential for bioactive compounds to be natural sources. In order to survive, plants combine hundreds of chemical compounds, providing defence against pests, fungi, diseases and plant mammals. In non-industrial cultures, medicinal plants are commonly used, largely because they are more readily available and cheaper than modern medicines.

Commonly referred to as "King of Bitters" by *Andrographis Paniculata* (Tamil:Nilavembu). It is a common herbaceous plant used for the treatment of colds, fever, laryngitis and various infectious diseases such as malaria, diarrhea and dysentery. Andrographis Paniculata belongs to the *Acanthaceae* family and can be seen in regions of the tropics and subtropics [2].An annual, branched herb, *Andrographis paniculata* has historically the properties to cure infections. Its height ranges from 30-110 cm. Andrographolide is a major bioactive Phyto constrictor that is bitter in taste and commonly used in India as hepatoprotective agent found in the leaves of *Andrographis Paniculata*. It protects against vascular heart disease and other issues associated with the heart. It has a very low toxicity rate [3].

Phyllanthus amarus, which belongs to the *Euphorbiaceae* family, is commonly known as the stone breaker. It is a herbaceous herb that is commonly used in South Asian regions as a medicinal plant. Its annual growth is 40-70cm. It assists in the management of jaundice, diarrhea, dyspepsia, kidney stones, and genetic infections. It is used for jaundice, ulcers, skin disorders, asthma, chest pain and urinary problems in India's ayurvedic method [3]. *Phyllanthus amarus* is used as a folk medicine to treat kidney stones, gallbladder stones, liver-related diseases such as liver cancer and jaundice; it is often given for cases of diuretic, hypoglycemic and hypertension, as well as anti-inflammatory, anti-tumor, antinociceptive and anti-oxidant properties.

Acalypha indica is in the family *Euphorbiaceae*. It is an annual herbaceous herb that grows in wet, tropical and temperate regions. Prevents infections from bacteria and other infectious diseases. *Acalypha indica* is used as the most common plant available for anti-cancer, anti-inflammatory, anthelmintic, antibacterial, anti-diabetes, anti-hyperlipidemic, anti-obesity, and anti-venom and wound healing properties with possible medicinal treatments [4].

Pharmacological Importance:

***Andrographis Paniculata*:**
The trademark auxiliary metabolites experienced in the plant have improved its significance in the field of therapeutic plants and medications. It is specifically high rated in therapeutic action in curing liver disorders and common cough and cold in humans. It is used in the treatment of Dengue fever more efficiently. The andrographolide present in the leaves plays an important phytochemical role in reducing the diseased state. Its pharmacological importance includes abortifacient, Analgesic, anti-inflammatory [5] Antibacterial [6] Antiperiodic, Antipyretic, Antithrombotic, Antiviral, Cardioprotective, Choleretic, Hepatprotective, Hypoglycemic, anti-cancer, Immune Enhancement (increases white cell phagocytosis, inhibits HIV-1 replication, and improves CD4 + and T lymphocyte counts), Laxative, Sedative, Thrombolytic, Vermicidal

***Phyllanthus amarus*:**
The secondary metabolites present in the plant helps to cure different kinds of diseases. The pharmacological activities of *Phyllanthus amarus*include the activities like antimicrobial, antiviral, hepato protective, antioxidant, anticancer, anti-inflammatory, antiplasmodial and diuretic [7]

Acalypha indica
The primary and secondary metabolites present in the plant helps in the treatment to cure diseases. The pharmacological activities of *Acalypha indica* include the activities like anti-helminthic, anti-bacterial, anti-cancer [8], anti-bacterial, anti-diabetic, anti-fungal, anti-oxidant, anti-inflammatory, anti-obesity, anti-ulcer, anti-viral, anti-venom and wound healing

Table 1: Pharmacological Activities done in the plants

Andrographis Paniculata	*Phyllanthus amarus*	*Acalypha indica*
Anti-bacterial	Anti-bacterial	Anti-helmintic
Anti-inflammatory	Anti-inflammatory	Anti-bacterial
Anti-viral	Anti-viral	Anti-cancer
Anti-cancer	Anti-cancer	Anti-microbial
Antipyretic	Antimicrobial	Anti-diabetic
Antithrombotic	Antifertility	Anti-fungal
Analgesic	Anti-ulcer	Anti-oxidant
Anti-diabetic	Antinociceptive activity	Anti-inflammatory
Cytotoxic activity	Anti-venom Activity	Anti-obesity
Antimalarial activity		Anti-ulcer
Wound healing		Anti-viral
Photoprotective		Anti-venom
		Wound healing

2. Review

***Andrographis Paniculata*:**
Abubacker and Vasantha [9] studied the antibacterial effect of ethanolic leaf extract of *A. paniculata* against Escherichia coli, Klebsiella pneumonia, Proteus vulgaris and Streptococcus pneumonia by plate dissemination technique were distinguished. The outcomes uncovered that the ethanolic leaf extricate and andrographolide compound disconnected from the leaves are strong in restraining these microbes and the work features that the inhibitory impact is comparable to standard anti-infection agents. Mishra et al and his co-workers reported that in primary screening test the qualitative antibacterial assay revealed that out of the nine different extracts, only methanol extract of *A. paniculata* leaves possess antibacterial activity against S. aureus ATCC 25923 [10].

Shoket Ali and Sajad Ahmad Mir reported that *A. paniculata* methanolic extract exhibited inhibitory activity against the growth of *E.coli* and *S.aureus.*

Yuh-Chiang Shen suggested that Rat inflammatory responses are inhibited by andrographolide (AD) of neutrophils [11].

The ethanol extract was tested by Misra et al. from the aerial portion of A.paniculata For antimicrobial activity against eleven bacterial species. The results revealed that the ethanolic extract is potent in inhibiting bacterial growth of both gram-negative and gram-positive bacteria [12].

Shen et al. have established that the anti-inflammatory effect of Andrographolide could be explained by its ability to inhibit neutrophil adhesion by suppressing of Mac-1 upregulation. Andrographolide may be useful for the improvement of inflammatory disorders by limiting the early phases of neutrophil infiltration [13].

Sheeja et al reported the effects of ethanolic extract of *A.paniculata* against cyclophosphamide_in vivo induced toxicity [14]. Reported the antidiabetic property of A.paniculata in aqueous extract [15]

Zhang et al revealed that the ethanolic extract of andrographis paniculata reduced the stress developed in diabeticrats [16]Reyes et al reported the antidiabetic potential of *Andrographis Paniculata* which restored and impaired the estrous cycle in alloxaninduced diabetic rats [17]

Qonitah Fardiyah *et.al.*, were stated that extract of a plant from *A.paniculata* has excellent photoprotective properties against UV-B and UV-Aradiation due to the presence of flavonoid derivatives in the plants, including quercetin by *A.paniculata* crude extract of the plant displayed higher SPF value compared to the value recommended by the FDA. An extract of the plant from *A.Paniculata* has great potential for use in pharmaceutical preparations as a photoprotective agent [18].

Phyllanthus amarus
The aqueous extract of *P. amarus* was also stated by LawsonEvi et al. to be more cytotoxic to human colon cancer cells (Caco-2) than hydroalcoholic extracts [19].

The cytotoxic effects of the methanolic extract from *P. amarus* hairy roots on the human breast adenocarcinoma cell line (MCF-7) and the cervical cancer cell line were determined by Abhyankar [20].

The hepatoprotective effect of Phyllanthus niruri may be combined with its action at cellular level by contraction oxidative stress as a radical scavenger and buildup antioxidative defense mechanism of the cells [21]. In vitro antioxidant assay showed that the plant is an efficient radical scavenger [22].

Phyllanthus amarus has extensive spectrum antibacterial activity on both gram positive and gramnegative bacteria. A study accomplished on different bacterial isolates of*Bacillus stearothermophilus, Staphylococcus aureus, Bacillus subtilis, Micrococcus leuteus, Salmonella typhi, Enterobacter aerogens, Proteus mirabilis,* and *Proteus vulgaris* confess that *P. amarus* showed the least MIC on all bacteria tested [23].

Another study showed that *P.amarus* manifest potent systemic antinociceptive actions against two models of neurogenic pain [24]. Similarly, methanol extracts of Phyllanthus amarus extraordinaryinhibited gastric lesions induced by intragastric administration of absolute ethanol. Aqueous and methanol extracts of *Phyllanthus amarus* were found to have anti-inflammatory activity [25]

Acalypha indica
Reddy et al have confirmed that *Acalypha indica* has been confirmed by Both Plumbago and Wound Healing Properties have Heliotropium and zeylanica indicum in their research [26]. It was found by Shirwaikar et al that the anti-venom was *Acalypha indica*-derived can be handled with the venom of Daboia russelli [27]

Invitro antimicrobial activity of methanol extracts of *Acalypha indica* leaves were showed significant zone of inhibition was evaluated against Gram positive (*Bacillus subtilis*) and Gram negative (*Escherichia coli, Salmonella typhi*) bacteria *Acalypha indica* plant extract also has the ability to become an anticancer plant as reported by the plant extract can behave as an anti-inflammatory medicine in the human body [28]

Six kinds of fungi (*Aspergillus flavus, Aspergillus niger Candida albicans, Candida glabrata, Candida tropicalis, and Penicillium chrysogenum*) have been used to test whether *Acalypha indica* has an anti-fungal activity.

3. Conclusion

***Andrographis Paniculata*:**
The plant is helpful in the treatment of Cardiovascular disease and liver toxicity prevention Improvements in heart and liver function. It also discovers enormous Useful for stomach issues, pain in the body, snake biting, Breathing disorders, allergic reactions and central nervous disorders Operation of the system and brain. It is claimed that *Andrographis* Fertility reduction in both male and female animals and in human animals being

Phyllanthus amarus
Information on the morphology, ecology, phytochemistry, ethnopharmacology, biological activities, clinical applications and toxicological reports of *P. amarus* is summarized in the present study. The aim of this review is to collect the research work carried out on this plant to date in order to provide appropriate baseline information for future work and commercial exploitation.

***Acalypha indica*:**
This analysis updates the data for *AcalyphaIndica* studies from different components, such asEthno-medicinal practice, phytochemical content Pharmacological and pharmacological practices, from all the Areas. The intake of *Acalypha indica* as an ethnomedicinal herb has been addressed and identified Listed with important studies in pharmacology and Phytochemical content.

Much of the therapeutic potential treatments include anti-cancer, anti-inflammatory, anti-hyperlipidemic, anthelmintic, antibacterial, anti-diabetes, anti-obesity, anti-venom and anti-vein Products of wound healing.

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