

A REVIEW ON ACALYPHA INDICA**Ayushi Yadav¹, Dr. Rajneesh Gupta²**¹Research Scholar, Department of Pharmacology, Goel Institute of Pharmacy & Science, Lucknow.²Professor, Goel Institute of Pharmacy & Science, Lucknow, Uttar Pradesh, India.***Corresponding Author: Ayushi Yadav**

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ABSTRACT

AN important medicinal plant in India, *Acalypha indica* is widely utilized in ancient medical systems like Ayurveda and Siddha therapy to treat a wide range of ailments. Its pharmacological characteristics, therapeutic uses, and phytochemical components are all thoroughly covered in this paper. Several bioactive substances, including tannins, flavonoids, cyanogenic glycosides (acalymphin), and pyranoquinolinone alkaloids like flindersin, have been found in considerable quantities in both in vitro and in vivo investigations. These components are in charge of the various pharmacological actions that the plant extracts display. *Acalypha indica*'s anti-venom, anti-fertility, and wound-healing properties are its main medicinal benefits. Its historic medical use is supported by its documented antioxidant, antibacterial, anti-inflammatory, and antidiabetic qualities. Additionally, the plant is said to have therapeutic uses as an expectorant, diuretic, anthelmintic, cathartic, and emetic. Overall, this research supports *Acalypha indica*'s potential for a variety of medicinal uses and emphasizes its ethnopharmacological significance.

KEYWORDS: *Acalypha indica*, Biological constituents, Ayurveda, Therapeutic uses.**INTRODUCTION**

Acalypha indica, also known as Indian *Acalypha*, is a member of the Euphorbiaceae family. It goes by several names, including Ricinela (Spanish), Alcalifa (Brazil), Brennkraut (German), and Indian *Acalypha* (English). The plant is an annual herb that thrives in tropical regions, especially in various parts of Asia, including India, and in West Africa, notably Southern Nigeria. Because of its great flexibility, it usually grows in fields, roadsides, waste areas, and the vicinity of human populations. *Acalypha indica* has long been used in Ayurvedic and Siddha medical systems to treat a number of ailments, including rheumatism, asthma, pneumonia, and as an emmenagogue. The plant's various parts, including its leaves, roots, young shoots, and flowers, are used medicinally.^[1]

In terms of morphology, it is a tiny, upright plant with pubescent, angular branches that can reach a height of 60 cm. The flowers are sessile and carried on axillary spikes, while the leaves are alternately arranged, roughly oval, and coarsely serrated. While female flowers are dispersed throughout the inflorescence with noticeable

green bracts, male flowers are tiny and grouped together. The plant has several pharmacological qualities, such as diuretic, laxative, expectorant, cathartic, and bronchodilator actions, and it tastes bitter. *Acalypha indica* has received a lot of research attention because of its many traditional uses and growing scientific curiosity. The goal of this review is to present a thorough and current description of its phytochemistry, pharmacological actions, and ethnomedical applications.^[2]

SYNONYMS

Sinhalese	Kuppsamenia
Tamil	Kuppivaeni, Kuppaimeni
Malayalam	Kuppamani
Telugu	Kuppichettu, Harita-manjiri,
Kuppinta or Muripindi	
Hindi	Kuppu, Khokali
Sanskrit	Arittamanjarie
English	Indian acalypha
Gujarati	Vanhi Kanto
Uriya	Indramaris
Sinb	Kupa-menya

MORPHOLOGY

The leaves of *Acalypha indica* are around 2.5–7.5 cm long and 2–2.5 cm broad. Their shape ranges from oblong to rhomboid, with a crenate-serrate edge and a sharp or slightly rounded tip. The petioles are thin and frequently longer than the leaf blade, and the leaf's base is typically cuneate, or wedge-shaped. There are also minor, unnoticeable stipulations. The plant produces long, loose axillary spikes of unisexual blooms. Female flowers are spread throughout the inflorescence and are somewhat larger than male blooms, which are typically found in the terminal or top sections. These female flowers are truncate, leafy, and have dentate anthers with cuneiform features in addition to noticeably veined bracts that measure between 6 and 8 mm. The bracts mostly hide the tiny, hairy capsules that make up the fruits. The seeds are small, oval, and have a light brown hue. All things considered, *Acalypha indica* is an upright annual plant with a maximum height of around 75 cm.^[3]

ACALYPHA INDICA: USE IN TRADITIONAL MEDICINE IN AYURVEDA

Acalypha indica is prepared in a variety of dosage forms in traditional Ayurveda, including infusions, powders, tinctures, liquid extracts, decoctions, expressed juice (succus), and cataplasms. Although the powdered leaves have some laxative properties, a combination of garlic and leaf powder is commonly used as an anthelmintic for intestinal worms. Leaf powder combined with salt is administered topically to cure scabies, while leaf juice combined with oil is used to treat rheumatic arthritis.^[4]

Children are given the extracted juice of the leaves as an emetic; at lower doses, it functions as an expectorant and is helpful for ailments including asthma and chronic bronchitis. Additionally, it has long been used to reduce the discomfort brought on by snake bites. Earaches are treated with the plant's decoction, while syphilitic sores are treated with a paste (cataplasm) made from crushed leaves. In addition, the root infusion has cathartic properties and bed sores are treated with the powdered dry leaves.^[5]

PHYTOCHEMISTRY OF ACALYPHA INDICA

The cyanopyridone derivatives found in the methanolic extract of *Acalypha indica* leaves include acalyphin, epiacalyphin, noracalyphin, epinoracalyphin, acalyphin amide, epiacalyphin amide cycloside, ar-acalyphidone, and a related seco-compound, seco-acalyphin. Phytochemical investigations reveal that tannins, flavonoids, cyanogenic glycosides (acalyphin), acalyphamide, aurantiamide, succinimide, and the pyranoquinolinone alkaloid flindersin are significant bioactive components of the plant.^[6]

Furthermore, the methanolic extract of dried flowers and leaves has yielded four recognized kaempferol glycosides: biorobin, nicotiflorin, clitorin, and mauritianin. Spectroscopic methods like ¹H NMR and

¹³C NMR have been used to describe acalyphin, a new cyanogenic glycoside, confirming its distinct chemical structure. Additionally, X-ray crystallography has confirmed the structure of its stereoisomer epiacalyphin and its corresponding N-demethyl derivatives. The medical relevance of *Acalypha indica* is supported by reports that acalyphin and related chemicals have expectorant and emetic characteristics, as well as therapeutic capabilities, such as the ability to cure sore gums.^[7]

POST-COITAL ANTI-FERTILITY ACTIVITY

In female albino rats, the post-coital antifertility efficacy of four successive solvent extracts of the complete *Acalypha indica* plant ethanol, petroleum ether, chloroform, and aqueous extracts was evaluated. When administered at a dose of 600 mg/kg body weight, the ethanol and petroleum ether extracts demonstrated significant estrogenic action. The extracts in chloroform and water, on the other hand, had no discernible estrogenic effects.^[8]

ANTI-VENOM PROPERTIES OF ACALYPHA INDICA

The ethanolic leaf extract of *Acalypha indica* was evaluated for its potential using rat models and isolated frog tissues to counteract the venom of Russell's viper (*Viper russelli*). The results showed that the extract considerably reduced venom-induced mortality, bleeding, tissue necrosis, and mast cell degranulation in rats given 500 and 750 mg/kg. Furthermore, in isolated frog tissue, it reduced the neurotoxic and cardiotoxic effects in a dose-dependent manner. Furthermore, by preventing lipid peroxidation in red blood cells and boosting antioxidant indices like reduced glutathione (GSH) and catalase levels in rat kidney tissue, the extract demonstrated protective effects against oxidative stress brought on by venom. *Acalypha indica* may be a helpful anti-venom agent, according to these studies.^[9]

WOUND HEALING EFFECT OF ACALYPHA INDICA

The ethanolic extracts of *Heliotropium indicum*, *Plumbago zeylanicum*, and *Acalypha indica* were tested for their capacity to heal wounds following topical treatment in rats using excision and incision wound models. A 10% w/v saline-based *Acalypha indica* extract demonstrated wound healing efficacy, according to the results. In contrast to *Heliotropium indicum*, the repaired tissue's tensile strength was significantly lower, suggesting a slower rate of collagen formation.^[10]

EFFECT OF ACALYPHA INDICA ON MALARIAL VECTOR

The larvicidal, ovicidal, and oviposition attractiveness of several Benzene, chloroform, ethyl acetate, and methanol extracts of *Acalypha indica* leaves were evaluated against the malarial vector *Anopheles stephensi*. LC₂₁ readings for benzene, chloroform, ethyl acetate, and methanol extracts were 19.25, 27.76, 23.26, and 15.03 ppm,

respectively, the results showed significant larvicidal potential. Egg hatchability declined with increasing extract concentration in terms of ovicidal activity, suggesting a concentration-dependent inhibitory impact. With maximum attraction rates of 90.09%, 94.20%, 85.43%, and 95.75% for benzene, chloroform, ethyl acetate, and methanol extracts, respectively, the extracts also demonstrated substantial oviposition attractancy. These results imply that *Acalypha indica* has a great deal of potential for use in mosquito control.^[11]

ANTIOXIDANT CAPACITY OF ACALYPHA INDICA

The *in vitro* DPPH (diphenylpicryl-hydrazyl) assay was used to assess the antioxidant potential of a number of medicinal plants, including *Anogeissus dhofarica*, *Moringa peregrina*, *Cordia perrottettii*, *Ficus lutea*, *Acalypha indica*, *Pulicaria crispa*, *Allophylus rubifolius*, *Olea europaea*, *Acacia senegal*, *Pluchea arabica*, and *Becium dhofarense*. Following a 15-minute incubation period at a 50 µg/mL dose, the results showed that all tested extracts had considerable antioxidant activity, with inhibition ranging from 89% to 93%. These results show that the assessed plant extracts, including *Acalypha indica*, have a considerable ability to scavenge free radicals.^[12]

ANTI-INFLAMMATORY ACTIVITY OF ACALYPHA INDICA

The anti-inflammatory qualities of fresh *Acalypha indica* leaf juice were evaluated using an overnight-fasted albino rat model of carrageenan-induced paw edema. The animals were divided into four groups ($n = 6$) and given oral pretreatments with control, standard medication (Indomethacin), *Acalypha indica* extract, or a combination of both an hour before to the administration of carrageenan. To induce acute inflammation, 0.1 mL of a 1% carrageenan solution was injected into the right hind paw. Paw volume was measured every 0–4 hours using a plethysmometer. The findings showed that *Acalypha indica*'s fresh leaf juice had a substantial anti-inflammatory effect by reducing paw edema and inflammation.^[13]

ACARICIDAL ACTIVITY OF ACALYPHA INDICA

Acalypha indica leaf paste's *in vitro* acaricidal efficacy was assessed over a 48-hour period; at the conclusion of the investigation, maximum mite inhibition and a discernible decrease in lesion severity were noted. The acaricidal potential was evaluated *in vivo* for 14 days in naturally infested broiler rabbits by tracking lesion scores and living mite counts. The findings showed that the leaf paste killed mites quickly—significant mortality was seen within 4 hours of application. These results imply that *Acalypha indica* has potent acaricidal activity and could be helpful in controlling mite infestations.^[14]

DIURETIC ACTIVITY OF ACALYPHA INDICA

In order to evaluate its possible impact on urine production, In albino mice, the methanolic extract of

Acalypha indica was tested for its diuretic properties. Diuresis was considerably elevated by the extract, particularly at 400 mg/kg body weight, according to the study. Five hours after delivery, the greatest diuretic effect was seen, suggesting a time-dependent response. The extract shown similar effectiveness in increasing urine production when compared to the conventional diuretic medication Frusemide given at a dose of 20 mg/kg body weight. These results imply that *Acalypha indica* has significant diuretic qualities and could be a useful natural remedy for illnesses related to fluid retention.^[15]

ANTIBACTERIAL AND ANTIFUNGAL ACTIVITIES OF ACALYPHA INDICA

Bacillus subtilis, *Staphylococcus aureus*, and *Klebsiella pneumoniae* were used to test the antibacterial activity of different solvent extracts of *Acalypha indica*—ethyl acetate, hexane, and methanol—obtained from leaves, stems, and roots. Hexane extracts showed a modest level of antibacterial activity, but leaf and root ethyl acetate extracts showed significant inhibitory effects against all tested species. Additionally, the filter paper disc diffusion method was used to evaluate aqueous extracts of *Acalypha indica* and other medicinal plants at concentrations of 30 and 40 mg. Maximum inhibition against *Bacillus cereus* and *Aeromonas hydrophila* was found in the results.^[16]

Soxhlet extraction of fresh, dried, and powdered plant parts utilizing hexane, chloroform, acetone, and methanol was used for additional analysis. TLC and HPLC were used to identify the active contents. The plant extract demonstrated an R_f value of 0.371 ± 0.0009 , which is similar to the standard antifungal agent Clotrimazole and suggests the presence of bioactive chemicals. According to the study, The active compounds in the root, leaf, and stem extracts of *Acalypha indica* were 538, 415, and 171 µg/g, respectively. The extracts' significant antibacterial activity against *Escherichia coli*, *Aspergillus niger*, and *Candida albicans* suggested strong inhibitory potential.^[17]

Additionally, the antibacterial activity of extracts made from *Acalypha indica* and other medicinal plants using acetone, chloroform, ethanol, and diethyl ether against pathogens like *Shigella flexneri*, *Klebsiella*, *Staphylococcus aureus*, *Pseudomonas aeruginosa*, and *Salmonella typhi pneumoniae* was evaluated. Ethanol extracts showed the strongest antibacterial activity of all the studied solvents. Additionally, *Acalypha indica* leaf extracts in Gram-positive and gram-negative microorganisms were examined using hexane, chloroform, ethyl acetate, and methanol, including *Bacillus cereus*, *Streptococcus faecalis*, and *Staphylococcus epidermidis*. With inhibitory doses ranging from 0.156 to 2.5 mg/mL, all extracts demonstrated significant antibacterial action, especially against gram-positive species.^[18]

CONCLUSION

Acalypha indica has significant therapeutic promise in treating ailments like diabetes, wounds, malaria, cough, and inflammation, according to pharmacological research. Numerous biological properties, such as wound healing, anti-venom, antioxidant, antibacterial, anti-inflammatory, antidiabetic, and antifertility properties, have been identified for the plant. Nevertheless, the majority of these conclusions are derived from laboratory animal experiments, and it is still unclear if they can be directly applied to clinical situations in humans. To fully use this plant's medical potential, there are still significant research gaps that need to be filled.

Acalypha indica is still frequently utilized in traditional medicine despite these drawbacks, and it has bright future medicinal prospects. To determine its effectiveness and safety, more research on the isolation of active phytoconstituents, mechanism of action, and clinical validation is necessary. Deeper understanding of its pharmacological potential is anticipated from ongoing research employing sophisticated experimental models.

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