WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.453
Volume 14, Issue 16, 244-261. Review Article ISSN 2277–7105

ACALYPHA INDICA (KUPPAIMENI): A PROMISING ETHNOMEDICINAL HERB FOR THE MANAGEMENT OF HEMORRHOIDS A PHYTOPHARMACOLOGICAL REVIEW

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Article Received on
24 June 2025,

Revised on 14 July 2025,
Accepted on 03 August 2025,

DOI: 10.20959/wjpr202516-37919

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ABSTRACT

In traditional Indian medical systems like Ayurveda and Siddha, Acalypha indica, sometimes referred to as Kuppaimeni, is a regularly utilized medicinal herb. Acalypha indica's therapeutic potential is thoroughly examined in this article, with a focus on how well it works to treat hemorrhoids, or piles. The plant has a variety of pharmacological activities, including laxative, anti-bacterial, anti-inflammatory, and wound-healing qualities, all of which are helpful in treating and relieving piles symptoms. Bioactive substances such flavonoids, tannins, alkaloids, phenolics, and anthraquinone glycosides have been found through phytochemical studies. These substances are important in lowering vascular inflammation, facilitating mucosal repair, softening feces, and avoiding subsequent infections. Acalypha indica's prospective uses in nanomedicine are further enhanced by its use in the environmentally friendly manufacturing of silver nanoparticles. Even with encouraging outcomes from animal and in vitro models, well planned clinical studies are still essential. By bridging the gap between traditional knowledge and contemporary pharmacological discoveries, this review supports Acalypha indica as a practical herbal remedy for hemorrhoids.

KEYWORDS: *Acalypha indica, Kuppaimeni, Hemorrhoids, Pharmacological activities, Ethnomedicinal uses.*

INTRODUCTION

Fig. 1.

A popular medicinal herb in South Asia, which includes India, Sri Lanka, and Thailand, Acalypha indica is highly valued in ancient medical systems like Siddha and Ayurveda. Its leaves, roots, and stems have long been used to cure a variety of illnesses, including infections, excessive blood sugar, respiratory disorders, and skin conditions. The antimicrobial and anti-inflammatory qualities of Acalypha indica have drawn scientific attention, and its methanolic extracts have demonstrated potent antibacterial effects, including activity against drug-resistant bacteria and viruses like COVID-19. The environmentally friendly green synthesis of silver nanoparticles, which exhibit strong antibacterial action against waterborne pathogens including Vibrio cholerae and Escherichia coli, has recently made use of the plant's leaf extracts. In addition to killing bacteria, these nanoparticles also interfere with their respiration and membrane functions, demonstrating Acalypha indica's promising role in modern medicine and nanotechnology applications. Despite these advancements, more research is required to fully explore and utilize the therapeutic potential of this versatile medicinal herb.[2]

Hemorrhoids are a very common anorectal disease that affects a person's quality of life and is caused by swelling and downward displacement of the "anal cushions" in the anal canal. In Siddha medicine, Kuppaimeni (Acalypha indica) is traditionally recommended as a remedy for haemorrhoids. Through this pilot study, the potential efficacy of Kuppaimeni Samoola Choornam (KSC) was evaluated in managing first, second, and third-degree internal hemorrhoids, along with a dietary regimen that included two figs per day.[26]

Fig. 2.

Abnormal alterations in the anal cushions, which typically aid in stool management, cause hemorrhoids. Blood vessel enlargement brought on by tearing of the supporting tissue results in symptoms like bleeding, swelling, prolapse, leaking, and skin irritation. In severe cases, thrombosis may occur, which would be painful. About one in four persons suffer from hemorrhoids, which significantly strain the healthcare system. In the UK, more than approximately 20,000 surgeries are performed annually in the UK to treat haemorrhoids. Many traditional remedies have been shown to be beneficial over time, despite the fact that they frequently lacked solid scientific support. Since 2000, there has been a growing body of research supporting novel treatments. This article provides a current, evidence-based guide to hemorrhoid care by reviewing both conventional and contemporary methods.[27]

BOTANICAL DESCRIPTION OF ACALYPHA INDICA

Taxonomic Classification

Kingdom: Plantae

Class: Magnoliopsida

Order: Malpighiales

Family: Euphorbiaceae

Genus: Acalypha

Geographic Distribution

Acalypha indica is a common medicinal plant that grows throughout the world's tropical climates. In addition to being widespread in Yemen, South East Asia, and India, it is also frequently observed in Nigeria and other regions of West and tropical Africa. In addition, the

plant thrives in the islands of the Indian Ocean. It grows well in warm regions and is frequently found in disturbed soils, waste places, and by the sides of roadways. Its widespread use in many herbal therapeutic systems is supported by its historical use.

Habitat

Most often, Acalypha indica grows in disturbed places like roadsides, wastelands, and wall gaps. Along riverbanks, forest borders, and rocky hillsides, it can also be found. For optimal growth, the plant favors damp, shaded areas. It is capable of growing up to 1350 meters above sea level. It thrives mostly in tropical and subtropical settings and can tolerate warm, humid conditions.[7]

VERNACULAR NAMES

Around the world, Acalypha indica is known by a number of regional names, The plant is known by several names in nations including India, Malaysia, Indonesia, and Thailand, which are influenced by linguistic variances, ethnic backgrounds, and customs. Similarly, the species is given unique local names in European countries like the UK, Spain, France, and Germany. However, compared to Europe, the plant is used and consumed more frequently in parts of Asia and Africa.[3]

Table 1: Vernacular Names of Acalypha Indica.

Local Name(s)	Country/Region
Kuppaimeni	India
Acalifa	Brazil
Tie Xian	China
Muktajhuri	Bangladesh
Kuppameniya	Sri Lanka
Muktabarshijhar	Nepal
Kucing Galak; Lis-lis; Cheka Emas	Malaysia
Tamyae Tuaphuu; Tamyae Maeo; Haan Maeo	Thailand
Acalifa	Spain
Indisches Brennkraut	Germany
Ricinelle des Indes; Oreille de Chatte; Herbe Chatte	France
Ntlambissana	Mozambique
Indian Acalypha; Indian Nettle; Three-Seeded Mercury	United Kingdom
Baro; Berbere	Ethiopia
Tai Tua Ong Xanh; Tai Tua Ong Aasn	Vietnam
Maraotong; Bugos; Taptapingar	Philippines
Horrisa	Djibouti

Table 2: PHYTOCHEMICALS OF ACALYPHA INDICA

Parts of a Plant	Pytochemicals
LEAF	Alkaloids, Tannins, Steroids, Saponin, Flavonoid, Glycoside and phenolic compounds (ethanolic extract); sterols (petroleum ether and chloroform extracts); reducing sugar, coumarin, antho cyanin, anthra quinone, saponin, cardiac glycosides, terpenoid, tannin, alkaloid, flavonoid and phenolic compounds (methanolic extract).

MATERIALS AND METHODS

AIM

1. To Analyse the Anti-Microbial activity on the acalypha indica used as laxative.
2. To focus on the Anti-Inflammatory activity used for piles

TRADITIONAL USES OF ACALYPHA INDICA

Leaves

Fig. 3.

- Scabies and other skin conditions are treated using a plant decoction, which is the essence of leaves combined with salt.
- Leaf extract is used as a purgative and vermifuge; the leaf essence is used as an emetic and for eye infections.
- The powdered leaves are used to wounds infested with maggots; in India, they are used as an expectorant to treat pneumonia and asthma.
- The leaf extract has purgative properties.
- Infusion of plant leaves is used to help persons with type 2 diabetes manage their blood sugar levels.
- The leaf extract is used to treat rheumatism in India. Leaf extract is used to counteract the venom of snakes.[4]

root

Fig. 4.

- Root extract is used to cleanse the kidneys and liver and to treat asthma.
- The root decoction is also used to cure stomachaches and intestinal worms.
- This plant's root is used as a purgative.
- The roots are utilized in Ayurveda to treat blood dysentery, migraine, joint discomfort, chest pain, and blood sugar levels.[4]

seed

Fig. 5.

- According to Ayurveda, the root helps with biliousness, cardiac conditions, fever, and retained excretions.
- The seed has laxative, carminative, and appetite-boosting properties.
- Amoebiasis is treated with seed powder.[4]

WHOLE PLANT

Fig. 6.

- The purpose of this herb is to prevent vomiting.
- This plant is used in traditional Austrian medicine to cure a number of conditions, including rheumatism, skin issues, hemorrhage, gout, cardiovascular disease, kidney and gastrointestinal issues, and urinary tract issues.[4]

PLANT COLLECTION

Acalypha indica was chosen for this study due to its past medical applications and the findings of previous research (Prasad Paindla and Estari Mamidala, 2013). The plants' leaves were gathered in October 2012 from the Jannaram forest's rural regions in the Adilabad district of Andhra Pradesh, India. Identification of the species was confirmed by Prof. V.S. Raju of Kakatiya University's Department of Botany in Warangal. A voucher specimen was kept at the Department of Zoology's Infectious Diseases & Metabolic Disorders Research Laboratory at Kakatiya University.[6]

PREPARATION OF PLANT EXTRACT

The collected leaves were allowed to dry in the shade for about two weeks at room temperature. After drying, they were ground into a powder (about 600 grams) and placed in a Soxhlet apparatus to undergo a series of solvent extractions. The solvents that were utilized sequentially were methanol, acetone, ethyl acetate, chloroform, and hexane (all from Merck, India). The residue was disposed of after the extraction was finished, and distillation was used to concentrate the extracts. Using a rotating evaporator, residual solvents were further

evaporated while keeping the temperature below 40°C. Using the methods of De, Dey, and Ghosh (2010), physical attributes and yield percentages were recorded.

PRELIMINARY PHYTOCHEMICAL SCREENING

In order to identify the main bioactive substances, such as alkaloids, proteins, phenolics, glycosides, carbohydrates, saponins, and tannins, the different extracts were put through standard phytochemical screening procedures.[8]

1. Alkaloid Detection

- Mayer's Test: A few drops of the extract were mixed with Mayer's reagent. Alkaloids were proven to be present when a cream-colored precipitate formed.
- Hager's Test: 50 mg of solvent-free extract was combined with diluted HCl, filtered, and then subjected to Hager's reagent treatment. Alkaloid content was identified by a yellow precipitate.

2. Carbohydrate Detection

- Fehling's Test: Fehling's A and B solutions were heated after equal amounts of extract and water were mixed. Reducing sugars were indicated by a brick-red precipitate.
- Benedict's Test: 100 milligrams of extract were filtered after being dissolved in water. Benedict's reagent was added to the filter, and it was then boiled. The presence of sugar was established by the formation of a colored precipitate.
- Iodine Test: An iodine solution was added to the aqueous extract. The presence of starch was detected by a shift in color to blue-violet.

3. Glycoside Detection

- Borntrager's Test: 50 mg of extract was combined with chloroform after being hydrolyzed with HCl and filtered. Glycosides were indicated by a pink hue when ammonia was added.
- Brown Ring Test: After treating the extract with glacial acetic acid and $FeCl_3$, concentrated H_2SO_4 was layered on top. Heart glycosides were represented by a brown ring.

4. Saponin Detection

- After diluting the extract with distilled water, it was shaken briskly for fifteen minutes. Saponins were present when a 1 cm layer of foam formed.

5. Protein Detection

- Million's Test: Million's reagent was added to crude extract, producing a white precipitate that became red when heated, indicating the presence of proteins.
- Biuret Test: Drops of copper (II) sulfate were added after equal volumes extract and sodium hydroxide were combined. Protein content was indicated by a purple coloring.
- Ninhydrin Test: When boiled in Ninhydrin solution, a violet hue developed, indicating the presence of proteins or amino acids.

6. Phenolic Compounds Detection

- Lead Acetate Test: 10% lead acetate was added to 50 mg of extract that had been dissolved in water. Phenolic chemicals were recognized by a white precipitate.

7. Tannin Detection

- The solvent-free extract was mixed with 1 milliliter of a 5% ferric chloride solution. The presence of tannin was indicated by a bluish-black or greenish-black coloration.

RESULTS

Pharmacological Activity

- Anti-bacterial activity
- Anti-Microbial activity
- Anti-inflammatory activity
- Laxative activity
- Anthelmintic activity
- Anti-cancer activity
- Anti-diabetic activity
- Anti-fungal activity
- Anti-obesity activity
- Anti-oxidant activity
- Hepatoprotective activity
- Anti-venom activity
- Anti-ulcer activity
- Anti-viral activity
- Wound healing activity
- Anti-ageing activity

- ❖ Anti-hemolytic activity
- ❖ Mosquito repellent activity.[9]

Ethnomedicinal Uses

- Acalypha indica has a long history in traditional medicine throughout Asia, Africa, and the islands of the Indian Ocean. Various plant components, whether fresh or dried, are made into pastes, infusions, decoctions, or juices.

Emetic, Purgative & Expectorant

- Poisons & Cleansing: Leaf sap or decoction is used as an emetic or purgative in Mauritius and Réunion to treat poisoning or to cleanse the digestive system.
- Exectorant: Used in siddha systems for pneumonia and asthma, this medication is listed in the Indian Pharmacopoeia and aids in mucus expulsion.

Anthelmintic (Deworming)

- Intestinal Worms: In East Africa, Madagascar, and Réunion, whole-plant infusions or root decoctions are used to alleviate stomachaches and drive out parasite worms.

Respiratory Disorders

- Asthma and Bronchitis: In the Seychelles, Réunion, and India, root decoction is frequently used to treat these conditions.
- Cough Relief: Leaf juice and decoctions are used as a lung tonic and to relieve coughing and wheezing.

Dermatological & Parasitic Skin Conditions

- Scabies & Ringworm: In Mauritius, Madagascar, and East Africa, leaf sap is either used alone or in combination with salt to treat scabies and chronic skin diseases.
- Dermatoses & Tropical Ulcers: Used in India to treat bedsores, pimples, eczema, and wounds infected with maggots.

Gastrointestinal Disorders

- Digestive Aid: Constipation, indigestion, flatulence, diarrhea, and stomach cramps can be treated with leaf juice, stem decoction, or fresh plant ingestion.
- Prevention of Ulcers: Methanolic extract, which is ascribed to alkaloids and steroids, decreases the development of ulcers in rat models with pylorus ligation.

Eye, Ear & Related Ailments

- Eye and Ear Infections: In East Africa and India, leaf sap is used as an eye and ear drop to treat inflammation and infections.
- Earache & Tooth: Applying a juice or decoction to treat cheek ulcers, earaches, and toothaches.

Diuretic & Detoxification

- Diuretic: Whole-plant decoction or juice encourages the evacuation of fluid from the kidneys; roots are occasionally used to assist liver and kidney function.

Antivenom & Animal Bites

- Snake and Dog Bites: In rural areas of India, Sri Lanka, Bangladesh, Myanmar, and Nepal, a decoction of roots or entire plants is used as an emergency antivenom.[11]

SCIENTIFIC EVIDENCE

1. **Author:** Yogesh K. Chaudhari et al

Title: To Study The In Vitro Anti-Inflammatory Aactivity of acalypha indica leaves

Journal: World Journal of Pharmaceutical Research

Content: They have studied the anti-inflammatory activity of Acalypha indica leaf aqueous extract using in-vitro method.

2. Author: Analava Mitra et al

Title: Phyto-pharmacology of Acalypha indica: A Review

Journal: International Journal of Biosciences, Alternative and Holistic Medicine

Content: Based on the substances employed and their stated functions, a laxative can be detected in the content I have submitted. The formulation is probably meant to ease constipation or encourage bowel movements if it contains well-known laxatives like senna, bisacodyl, lactulose, psyllium husk, castor oil, or magnesium hydroxide. Furthermore, a laxative action is indicated if the description states that the chemical "softens the stool," "increases water content in the intestines," or "stimulates bowel activity." Together with the ingredient's pharmacological function, these functional keywords aid in determining which component of the formulation has laxative properties.

SAFETY & SIDE EFFECTS

1. Unless directed by a qualified herbal practitioner, stay away from raw juice.

2. Use processed or dried forms, as these are usually safer.
3. To check for tolerance, start with low dosages.
4. Steer clear while pregnant or nursing.
5. If you have G6PD deficiency, liver problems, or are taking medication, see a doctor.

Table 3: SAFETY & SIDE EFFECTS

Concern	Details
Toxicity (especially fresh plant)	Some reports suggest fresh juice or high doses can be toxic, particularly to the liver or red blood cells.
Hemolytic anemia	Fresh juice has been reported to cause hemolysis in some individuals, especially those with G6PD deficiency.
Allergic reactions	Skin contact or ingestion can cause dermatitis or allergic responses in sensitive individuals.
Gastrointestinal upset	High doses may cause nausea, vomiting, or diarrhea.
Pregnancy	Traditionally avoided in pregnancy; could have uterine stimulant properties (not well studied).
Drug interactions	Unknown, but caution is advised when combining with blood thinners, anti-diabetic, or liver-metabolized drugs.

TREATMENT OF PILES

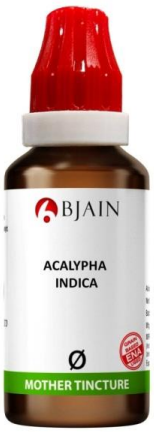

Fig. 7.

Around the world, piles, also known as hemorrhoids, are a prevalent health issue that many people face. In short, piles are caused by swelling or inflammation of the blood vessels in and around the anal canal. These blood vessels typically serve as cushions to facilitate the smooth passage of excrement.A pile's level of severity varies. While unpleasant swelling or bleeding may be experienced by some, others may just feel slight discomfort. The severity of the symptoms determines how they are treated. Medication and a better, higher-fiber diet are two easy ways to prevent or lessen symptoms. Ointments, medicine injections, rubber band tying, and even minor surgery are some of the remedies that doctors employ in certain situations. In

India, traditional herbal treatments have been used for many years to treat piles safely and efficiently. As alternatives to surgery, these home cures and herbal medicines are frequently used. The purpose of this article is to discuss the various herbs that are used to cure piles, including their common names, families, and the particular plant parts that are utilized in treatment.[22] In Indian traditional medical systems like Ayurveda and Siddha, Acalypha indica, also known as Kuppaimeni in Tamil, is a regularly utilized medicinal herb. This plant demonstrates numerous pharmacological actions effective for managing piles. It boasts significant anti-inflammatory, wound healing, and laxative effects that help reduce inflammation, promote healing of inflamed tissues, and treat constipation—one of the major causes of piles.[23]

Acalypha indica supports both symptom relief and the underlying causes of piles, making it a useful herbal therapy. The medicinal potential of Acalypha indica and other herbs that have historically been used to cure piles is examined in this article.

Table 4: Pharmacological activities of Acalypha indica relevant to piles

Activity	Bioactive Compounds	Benefit in Piles
Anti-inflammatory	Flavonoids, Alkaloids, Tannins	Reduces swelling, pain, and inflammation
Wound Healing	Antioxidants, Tannins	Promotes tissue repair and faster healing
Laxative	Anthraquinone glycosides	Softens stool, eases bowel movements
Antimicrobial	Phenolics, Alkaloids	Prevents infections in haemorrhoidal tissues

Anti-inflammatory Activity

One of the main reasons why piles (haemorrhoids) hurt and swell is inflammation. Inhibiting inflammatory mediators including prostaglandins and cytokines, Acalypha indica contains bioactive ingredients such flavonoids, alkaloids, tannins, and phenolic chemicals. This lessens the anal region's vascular irritation and edema, which eases pile-related pain and swelling. In animal models, several experimental investigations have shown that extracts from Acalypha indica have strong anti-inflammatory properties.[23]

Wound Healing Properties

It is possible for hemorrhoidal tissues to develop fissures or ulcers, particularly in severe piles that cause bleeding. By encouraging the synthesis of collagen and the development of new blood vessels (angiogenesis), the plant's tannins and antioxidant components promote wound healing. The traditional use of leaf paste from Acalypha indica speeds up the healing process

and repairs injured mucosal tissues. It is also effective at promoting epithelium regeneration and reducing the production of scars, according to research.[24]

Laxative (Purgative) Effect

The two main causes of piles are constipation and excessive straining during bowel movements. Acalypha indica's mild laxative qualities are a result of anthraquinone glycosides and other phytochemicals that soften feces and promote intestinal motility. Because of this impact, bowel motions are made easier, anal vein pressure is decreased, and hemorrhoids are kept from getting worse.[25]

Antimicrobial Activity

Secondary infections can worsen symptoms and slow the healing process in inflammatory hemorrhoidal tissues. Broad-spectrum antibacterial action is demonstrated by Acalypha indica against a variety of bacteria and fungi that are frequently linked to illnesses. Because its antimicrobial components prevent germs from growing in the anal area, they aid in infection control and healing.[22]

Reports

The existence of several bioactive substances, including flavonoids, alkaloids, tannins, saponins, glycosides, and phenolic compounds, was established by the analysis of Acalypha indica leaf extracts using Soxhlet extraction and subsequent phytochemical screening. Numerous bands were visible in the TLC profile under various solvent systems, suggesting a varied phytochemical composition.

Additionally, the herb has noteworthy pharmacological qualities, particularly in the treatment of hemorrhoids, or piles. Particularly important were the anti-inflammatory, laxative, antibacterial, and wound-healing qualities. Its application in lowering anal inflammation, encouraging mucosal repair, and facilitating defecation by softening stool is supported by experimental data from past investigations.

Acalypha indica's traditional uses as a skin healer, emetic, and purgative aligned with contemporary pharmacological research. Additionally, extracts demonstrated antibacterial activity against pathogens including V. cholerae and E. coli, confirming their function in preventing secondary infections in hemorrhoids.

Discussion:

The results of this review lend credence to Acalypha indica's traditional therapeutic claims. The combined effects of several phytoconstituents make it possible to reduce the symptoms of piles: anthraquinone glycosides provide mild laxative effects to ease constipation, a major contributing factor to hemorrhoids; antioxidants and phenolic compounds promote wound healing and reduce oxidative stress; alkaloids and saponins provide antibacterial and antifungal protection against secondary infections; and flavonoids and tannins reduce inflammation and vascular congestion in the anal area. Furthermore, the plant's traditional role is reinforced by its usage in nanomedicine, particularly in the environmentally friendly creation of silver nanoparticles, which offers up new therapeutic opportunities. However, further clinical and in vivo research is needed to standardize dosage, guarantee long-term safety, and validate its effectiveness in contemporary medicine. Overall, Acalypha indica is still a useful ethnomedicinal herb with much promise for advancement as a contemporary phytotherapeutic agent, particularly for inflammatory and restorative ailments like piles. The results of this review demonstrate that Acalypha indica's multi-targeted pharmacological activities make it a promising treatment option for hemorrhoids. Its alkaloids, flavonoids, and tannins aid in lowering anal edema and inflammation. Constipation, a major cause of piles, is alleviated by the laxative action of anthraquinone glycosides. Antimicrobial activity stops subsequent infections, whereas antioxidants and phenolic substances aid in mucosal regeneration and wound healing. Additionally, the plant's contribution to the environmentally friendly manufacturing of silver nanoparticles opens up new treatment options by fusing conventional use with cutting-edge nanotechnology. More systematic clinical research is required to validate safety, dose, and long-term use despite these encouraging characteristics. All things considered, Acalypha indica is a useful ethnomedicinal herb for creating herbal remedies for hemorrhoids that are both safe and efficient.

CONCLUSIONS

Acalypha indica, also known as kuppaimeni, has been used for a long time in traditional medicine. Its anti-inflammatory, wound-healing, laxative, and antibacterial properties have recently been scientifically proven to have therapeutic potential, particularly in the treatment of piles. Together, its bioactive ingredients, such as alkaloids and flavonoids, relieve symptoms, encourage healing, and maintain intestinal health. The plant has great potential for modern therapy, as evidenced by its use in the environmentally friendly manufacture of silver nanoparticles. However, there are few clinical trials, little standardization, limited safety data,

and little understanding of herb-drug interactions. The majority of research comes from lab investigations and anecdotal observations. Regulations and differences in plant chemistry also impact its application. Clinical trials, separating active ingredients, bioavailability, standardized dose forms, and developing nano-formulations should be the main areas of future study. In summary, Acalypha indica has the potential to become a vital herbal remedy for piles and other ailments by bridging the gap between traditional knowledge and contemporary research.

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