



Ancient Herbals Meet Modern Beauty: Therapeutic Value of *Acalypha Indica* – A Comprehensive Review

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(Received: 16 January 2025

Revised: 20 February 2025

Accepted: 14 March 2025)

KEYWORDS

Acalypha indica,
Dermatology, Anti-
inflammatory,
Antibacterial,
Phytochemicals,
Herbal remedies.

ABSTRACT:

Introduction: *Acalypha indica*, a plant with strong roots in ancient Asian and African medical systems, is becoming more well-known for its promise in contemporary dermatology and cosmetic uses. This thorough analysis assesses its medicinal effectiveness by bridging the gap between historical ethnobotanical knowledge and current scientific study.

Objectives: The review points up deficiencies in clinical trials and standardized safety evaluations, highlighting the necessity of thorough human research and toxicity analysis. The phytochemical constituents present in *Acalypha indica* are flavonoids, saponins. In keeping with its historical applications in the treatment of wounds, inflammatory diseases, and skin infections, these components support the plant's antibacterial, anti-inflammatory, and antioxidant qualities. Current research points to the effectiveness of free radical neutralization in anti-aging formulations, skin barrier improvement, and acne mitigation.

Results Through the integration of traditional knowledge and phytochemical insights, *Acalypha indica* presents itself as a viable option for cutting-edge cosmetics, promoting multidisciplinary study to realize its full potential while respecting cultural heritage. The combination of modern science and traditional herbal remedies opens the door to evidence-based, environmentally friendly cosmetics.

Conclusions: *Acalypha indica*. Linn is a potent and natural medicine that has valuable therapeutic properties including antimicrobial, anti-inflammatory, anticancer, antioxidant, anthelmintic. It shows good result on psoriasis treatment. Although it is a weed, it has tremendous medicinal uses. This review article will contribute to the study of traditional and novel use of *Acalypha indica*. Further research is needed to fully explore the potential of *Acalypha indica* and to develop new products that can benefit human health.

1. INTRODUCTION:

Traditional medical practices like Ayurveda, Unani, and Siddha have relied on herbal medications to treat and cure a variety of illnesses and physiological abnormalities. Native Americans on the other side of the world were also using herbs to treat illnesses at the same period. Nowadays, almost 88% of the world's population uses plant-based medications as their first line of treatment for illnesses and to maintain their health. Worldwide, 119 secondary plant metabolites are utilized as pharmaceuticals. "Kuppaimeni" is the Tamil term for *Acalypha indica* Linn and it is also known as "Indian copperleaf". It is a prevalent weed in Tropical Africa and

South America, as well as in Yemen, Sri Lanka, India, and Pakistan^[1]. The plant is widely used in rural areas, where its leaves, roots, and seeds are employed to treat various health issues. *Acalypha indica*'s root, stem, and leaf all have medicinal properties^[2]. While its roots are used as a laxative, *Acalypha indica* leaves are utilized to cure scabies and other skin disorders^[3]. To cure a variety of skin disorders, *Acalypha indica* juice is combined with oil or lime. Additionally, a poultice made from the plant's dried leaves was applied to wounds and bedsores to promote healing.

The fourth largest genus in the Euphorbiaceae family is *Acalypha indica*, with 450 species. Green shrubs, trees,



and annuals make up this type of vegetation, which is primarily found in tropical parts of Africa, America, and Asia [4]. The plant's cytotoxic, anti-inflammatory, wound healing, and antioxidant qualities provide several biological advantages [5]. For assessment experiments, a gel containing the extracted material was created [6]. Skin infections were treated with the leaf extract [7]. The plant's pharmacological actions are facilitated by a wealth of bioactive substances, including flavonoids, alkaloids, and phenolic compounds [8]. Compared to synthetic medicines, topical formulations containing herbal extracts, such as *Acalypha indica*, provide a natural and possibly safer option for treating skin disorders [9]. A study outlined the chemical composition of its leaves, which contains compounds such as kaempferol, acalyphine, acalyphamide, γ -sitosterol, β -sitosterol, and essential oils [10].

2. BOTANICAL DESCRIPTION AND DISTRIBUTION:

Scientific name: *Acalypha indica* Linn

Colloquial names:

Bengali	Muktajhuri, Sveta-basanta
Hindi	Kuppikhokslī, Kuppu, Khokali
Kanada	Kuppigida
Tamil	Kuppivaeni, Kuppaimeni
Telugu	Kuppichettu, Haritamajiri, Kuppinta, Muripindi
Malayalam	Kuppameni



Fig. Morphology of *Acalypha indica*

Morphology:

The herbaceous annual plant *Acalypha indica* has cup-shaped involucre encircling the minute and catkin-like inflorescences. Its roots are well-known for both its many therapeutic uses and for being visually appealing to house cats. The Tropics are where it is typically found [11]. The leaves of the *Acalypha indica* plant are primarily oval, extending beyond 3 to 5 cm with serrated edges and arranged pinnately; the plant has a few angled, hairy branches. The female flowers have sessile, erect axillary spike-borne, flowers that are longer than the leaf; the capsules are hispid, about 1 mm wide, with three locular segments; the stipules are very small; the flowers in male are small, full, and laterally arranged; and the flowers in female have stamens whirled around the inflorescence axis, each of which is enclosed by a noticeable, semicircular, foliaceous, toothed green bract [12].

Geographical Distribution:

It has been reported that the Arabia Gulf region is home to *Acalypha indica*, which they eat [13]. It is also a widespread weed in West Africa and southern Nigeria [14]. Schmelzer (2008) describes the distribution of poverty primarily in Africa, spanning from the equator's center to the continent's southern region via Kenya, Ethiopia, Sudan, Somalia, Zambia, Tanzania, Mozambique, Nigeria, and numerous other countries [15, 16]. Most of the evidence of using plants for traditional remedies comes from Indians [17, 18].

Taxonomical categorisation:

Kingdom	Plantae
Sub-Kingdom	Tracheobionta
Class	Magnoliopsida
Sub-Class	Rosidae
Order	Euphorbiales
Family	Euphorbiaceae
Sub-Family	Acalyphoideae
Genus	<i>Acalypha</i>
Species	<i>A. indica</i>



TRADITIONAL VALUE:

The traditional medical system has always played a significant role in addressing the demands of global health care. India is unique in that it has six recognized medical systems - Homeopathy, Siddha, Ayurveda, Yoga, Naturopathy, and Unani. Allopathy, the present ruling system of contemporary medicine, has evolved gradually but steadily over time and has received favourable feedback from scientific study and application. However, traditional medicine and remedies provide the fundamental foundation for its development [19]. Because they generate a wide variety of bioactive compounds, plants are an abundant source of several medications. The most important of these bioactive plant components include alkaloids, tannins, flavonoids, and phenolic chemicals. Because of their complex nature and therapeutic qualities, bioactive compounds can interact with targets in mammalian cells. The drug industry specifically uses phytochemicals that are naturally extracted from medicinal plants [20]. Since *Acalypha indica* has been shown to be the greatest herbal remedy for several illnesses, including skin conditions, an excellent formulation made from this plant is utilized to treat these conditions. To assess the quality of the herbal formulations, more advanced testing techniques for pharmacological, toxicological, and microbiological activities are required [21]. Insect bites can also be treated using *Acalypha indica* [22].

The leaves of *Acalypha indica* have strong antibacterial, antifungal, and antioxidant phytochemical properties that help shield the skin from environmental dangers. By inserting the tiny, ball-shaped leaves into the rectum, the fluid that is generated from crushed leaves can be used as a lubricant to alleviate constipation in children [23]. People choose to use *Acalypha indica* to cure gum and tooth diseases because of its antibacterial properties, wound-healing properties, and edible and safe. Most applications for *Acalypha indica* involve using the plant fresh, either alone or in combination with other substances. The most potent phytochemicals from the original plant, together with its minerals, volatile compounds, and essential oils, are present in the raw, fresh leaves. Because the raw leaves contain stigmasterol, which influences estrogenic activity, they are highly helpful for abortion [24].

Phytochemicals found in various plant sections include:

Phytochemicals	Plant Parts
Acaindinin	Leaf
Gallic acid	Whole plant
3,3 methylene bis (4 hydroxyl coumarin)	Root
Stigmasterol	Root
Tocoquinone	Leaf
Triacetoneamine	Leaf

Bioactive compounds of *Acalypha indica* and their traditional uses:

Bioactive Compounds	Traditional uses
9,12-octadecadienoic acid (Z, Z), methyl ester	Anticancer
Hexane dioic acid, bis (2-ethylhexyl) ester	Antibacterial
Phytol	Anti-diabetic, cytotoxic, anti-microbial, anti-Biotic
1-Eicosanol	Antibacterial, Anti-fungal activity
Docosanol	Antiviral agent of herpes simplex virus
Octacosanol	Blood metabolism
Tricosane	Insect pheromone, pesticide

PRELIMINARY SCREENING:

PHYTOCHEMICAL

The following phytochemical assays were carried out [25-27]:

**Test for alkaloids:**

After the *Acalypha indica* extract was dried off by evaporation, the residue was boiled with 2% HCl in a boiling water bath. Then the mixture was filtered and add few drops of Meyer's reagent once it had cooled. The samples were then examined to check for yellow precipitation or turbidity.

Test for Glycoside:

The extract solution in GAA is combined with a few drops of FeCl₃ and H₂SO₄ in high concentration. The mixture is subsequently inspected for a bluish green color on the surface layer and reddish-brown color where two layers meet.

Test for Terpenoids and steroid:

0.5 ml of C₄H₆O₃ and 0.5 ml of CHCl₃ were added to 4 mg of extract. Following a gradual addition of strong sulfuric acid solution, terpenoid and steroid colors were seen to be red violet and green blue, respectively.

Test for Flavonoids:

A 50% methanol solution in 1.5 ml was added to 4 mg of extract solution. Magnesium metal was added to the heated solution. Add five to six drops of strong HCl were added to this solution, and flavonoids and flavones were shown to be red and orange, respectively.

Test for Reducing sugars:

A brick-red precipitate was seen after adding 5-8 drops of Fehling's solution and 1 milliliter of water to 0.5 milliliters of extract solution while it was still hot.

Test for Triterpenes:

After mixing 300 mg of extract with 5 ml of CHCl₃, the blend was warmed for 30 minutes at 80°C. A small amount of concentrated H₂SO₄ was introduced and mixed well, and observed for the emergence of a red color.

Test for Phenolic compounds:

After diluting 300 mg of extract with 5 ml of distilled water, the mixture was filtered. After adding 5% ferric chloride to the filtrate, the production of a dark green color was monitored.

Test for Tannins:

Add 1 ml of water to 0.5 ml of extract solution and 1-2 drops of FeCl₃ solution were included. The color blue was noted for Gallic tannins and green black for catechin-based tannins.

Test for Reducing sugars:

A brick-red precipitate was seen after adding 5-8 drops of Fehling's solution and 1 milliliter of water to 0.5 milliliters of extract solution while it was still hot.

Phytochemical screening of *Acalypha indica*:

Phytoconstituents	Petroleum ether	Chloroform	Acetone	Methanol
Alkaloids	+	-	+	+
Flavonoids	+	+	+	+
Tannins	+	+	+	+
Saponins	-	-	-	-
Glycosides	+	-	+	+
Phenols	+	-	-	-

As opposed to *Pseudomonas aeruginosa*, a Gram-negative bacterium that only responded to the extracts at higher concentrations, *A. indica* extracts showed active effects against every Gram-positive bacterium [28]. Gram-positive and Gram-negative bacteria differ in their wall components, which could be the reason for this result. A lipo-polysaccharide layer, proteins, and phospholipids make up the wall of Gram-negative bacteria, which may hinder the access of active compounds of *Acalypha indica* crude extracts. In contrast, the periplasmic space, a highly active region of metabolism of cell found in Gram-positive bacteria, contains numerous digestive enzymes and transport proteins that may contribute to the microorganisms' vulnerability.

PHARMACOLOGICAL PROPERTIES OF ACALYPHA INDICA:**Analgesic:**

Mice *in vivo* investigations have demonstrated the analgesic effects of *Acalypha indica* [29]. They assessed



the analgesic potential of the hexane extract of *Acalypha indica* using a writhing reflex technique created by [30]. As soon as the extract was given to the mice orally, acetic acid was utilized to cause pain. The whole body will be traumatized by the injection of acetic acid in two stages: first, serotonin and histamine will be released, and then prostaglandins will be involved in the inflammatory exudates in the plant extract [31]. With amino pyrine serving as a positive control, two different concentrations were examined and contrasted. The writhing that occurred within 20 minutes of the mice being given the extract and standard was counted to determine the outcome. Hexane extractions at 100 and 200 mg/kg resulted in writhing inhibition of up to 61.1% and 67.2%, respectively. With a writhing inhibition of 79.9%, the effects demonstrated sufficient inhibition activities in comparison to the usage of conventional amino pyrine. By preventing the release of serotonin and histamine, the hexane extract interfered with the initial stage of inflammation production. This inhibition may be brought on by the fresh plant's polyphenols, antioxidants, and anti-inflammatory properties [29].

Antioxidant activity:

When determining the antioxidant activity, three different kinds of tests are employed. Utilizing the 2,2-diphenylpicrylhydrazyl (DPPH), 2,2'-azino-bis (3-ethylbenzothiazoline-6-sulphonic acid) (ABTS), and FRAP tests, *Acalypha indica* different extracts from a particular plant section are tested for antioxidant activity. These antioxidant investigations are therefore highly inconsistent and questionable. The antioxidant value of the methanolic extract, for instance, ranged from weak to extremely powerful activities. Antioxidant properties are present throughout the *Acalypha indica* plant, particularly in the phytochemicals [33].

Anthelmintic activity:

The goal of the study was to access the efficacy of *Acalypha indica* leaf extract as an anthelmintic to postpone the demise of pork roundworms (*Ascaris suum*). The Kruskal-Wallis test a post-hoc test was subsequently performed to assess the differences in the anthelmintic efficacy. Strength of leaf extract at varying concentrations on worm mortality over time was evaluated using the Kolmogorov-Smirnov test. The typical lifespan of *Ascaris suum* the time until worm death at 60% concentration was 228.5 minutes, while at

80% concentration it was 174 minutes, and the full concentration lasted for 92 minutes. The research showed that the *Ascaris suum* parasite is Vulnerable to the anthelmintic properties of *Acalypha indica* leaf extract [34].

Antiulcer activity:

The ethanolic extract of the root and leaf was tested for its anti-ulcer properties at doses of 100 mg/kg and 200 mg/kg. When comparison with ethanolic leaf extract, the 200 mg/kg dose of ethanolic root extract was more efficient in preventing peptic ulcers brought on by aspirin, cold stress, pylorus ligation, and ethanol. It is hypothesized that ethanolic root extract suppresses stomach damage brought on by aggressive forces because it dramatically reduced the ulcers development in pylorus-ligated rats when administered at a dose of 200 mg/kg b.w. [35].

Anti-inflammatory activity:

In the human body, *Acalypha indica* plant extract has anti-inflammatory properties. Used an ethanolic extract to detect this action of *Acalypha indica* in the long-eared rats. They chose phenylbutazone as the typical medication for this activity and applied the anti-inflammation approach with a few small adjustments. Up until five hours following the carrageenan solution injection, the anti-inflammatory effects were on pair with the norm [29]. The inhibition of albumin proteinase and denaturation are further evidence of the anti-inflammatory properties of ethanolic extracts. 85% inhibition was seen in both tests, suggesting that the extract did not cause any denaturation of the proteins. One of the markers of inflammatory activity in the human body is protein denaturation [36].

Antivenom activity:

Anti-venom derived from *Acalypha indica* can be used to cure the venom of *Daboia russelli* [37]. By analyzing the venom-induced mortality, hemorrhage, necrotizing, and mast cell degranulation in rats, it was found that 500 mg/kg of methanolic extract increased the survival rate by up to 100% compared to the anti-venom alone. Extracts from benzene, petroleum ether, chloroform, and acetone were later investigated in relation to similar snake venoms. According to the findings, the survival rate of Swiss albino rats was raised by 100 mg/kg. The survival rate increases with the number of polar



phytochemical substances removed. In the meantime, the survival rate rose by 35%, 47%, 47%, and 77% for benzene, petroleum ether, acetone, and chloroform, respectively. One method of venom inactivation and inhibition is the antioxidant activity of the various *Acalypha indica* preparations [38]. Asiatic nations are home to the Daboia russelli snake, namely Bangladesh, Myanmar, Nepal, India, and Sri Lanka [39].

Psoriasis:

Psoriasis is a long-term inflammatory skin condition marked by inadequate keratinization and fast keratinocyte growth. Currently, research is being conducted to find safer and more effective anti-psoriatic medications. The cell lines A431 and B16-F10 were employed as in vitro model. It examined how well *A. indica* leaf extract induced apoptosis and cell death in various cell lines. Fluorescence investigations were used to measure the cell death (Propidium iodide) and apoptosis (Annexin V), and we found that both cell lines had 80% cell death and 75% apoptosis. As a result, our in vitro investigation revealed that the leaf extract may have anti-psoriasis properties [40].

Antirolithiatic activity:

The antirolithiasis action was tested in vitro using ethanolic and methanolic extracts of *Acalypha indica* leaves. The ability to suppress the formation of calcium oxalate monohydrate, the most frequent type of kidney stone, was studied. *Acalypha indica* was found to have a concentration-dependent inhibition. According to the results, the methanolic extract of leaf has a greater ability than the ethanolic extract to prevent crystal formation and aggregation [41].

Anticonvulsant activity:

MES and the PTZ-induced convulsion technique were used to screen the methanolic whole plant extract of *Acalypha indica* for antiepileptic efficacy in rodents. In the MES model, methanolic extract of *Acalypha indica* significantly decreased the number of convulsion phases at 30 and 60 minutes. MEAI administered at 200 and 400 mg/kg shielded the mice against seizures in PTZ. Therefore, the herb has anticonvulsant qualities [42].

Anti-cancer activity:

The ethanolic extract of *Acalypha indica* might also serve as a herb for cancer treatment [43]. Three separate cancer

cell lines-PC3 human prostate cancer, MCF7 breast cancer, and KB oral cavity carcinoma cancer cells were utilized to evaluate the anti-cancer properties through the MTT assay technique. The ethanol-based the extract exhibited an inhibitory concentration (IC 50) of 35 µg/ml, indicating it inhibited MCF7- Mammary carcinoma. Doxorubicin and ellipticine were the two reference substances used in the experiment. For comparison, their corresponding IC 50 values were 8.8 µg/ml and 0.5 µg/ml. The suppressive the concentration exceeded 50 µg/ml, resulting in the determination that the MCF7-breast cancer and the KB-oral cavity cancer did not show reactivity with the methanolic extract [44]. Furthermore, a recent study discovered that quebrachitol might function via arrest or reversal mechanisms in various significant systems as possible anti-cancer medications [45]. The antioxidant, cell-killing, and the anticancer properties of the aerial components of *Acalypha indica* Linn. Were studied. Vero cell lines the extracts did not cause a cytotoxic reaction in the African green monkey kidney. The cancer-fighting the capability of the extracts was examined through the Resazurin Microplate Assay (REMA). The methanol extract exhibited antitumor effects against NCI-H187 Small Cell Lung Cancer. With an IC 50 of 25.00 µg/mL. Moreover, with corresponding IC 50s of 6.19, 5.70, and 7.79 mg/mL, the extracts of hexane, chloroform, and methanol showed notable antioxidant activity. Activity employing the DPPH radical scavenging test. The hexane, chloroform, and methanol extract additionally demonstrated noteworthy antioxidant properties through the ABTS radical scavenging assay, with corresponding IC 50s of 6.13, 6.31, and 6.37 mg/mL. The aerial methanolic extract the component was separated and refined, yielding substantial quantities of L-quebrachitol, which were characterized through 1D and 2D NMR analyses along with the MS data [46].

Antidote effect:

Acalypha indica is reported to have strong antioxidant properties and has been utilized in poisoning cases. This research aims to assess the preventive effects of an aqueous extract (5 g/l) of *A. indica* (leaves and stems) on metabolic disorders, oxidative stress, and histological alterations in Swiss albino mice produced by muscle extract of puffer fish *Lago Cephalus lunaris*. After receiving a 10-day injection of *L. lunaris* muscle extract (1 ml/100 g body weight), mice exhibited decreased



appetite and diarrhea, which led to a slower growth rate than controls; elevated serum levels of triglycerides, total cholesterol, glucose, and low density lipoproteins indicate oxidative stress, which is demonstrated by an increase in TBARS; and inhibition of antioxidant enzymes (Superoxide dismutase, Catalase, and glutathione peroxidase) in liver, kidney, and heart tissues histopathological changes. For ten days, consuming an aqueous extract of *A. indica* as a beverage showed ameliorative effects and averted the problems brought on by *L. lunaris* muscle extract [47].

Antimalarial activity:

The antimalarial properties of several *Acalypha indica* plant components, including leaves, stem bark, and roots, as well as extracts made of methanol, ethyl acetate, and chloroform, were assessed against *P. falciparum*. The findings demonstrated that *A. indica* leaf chloroform and ethyl acetate extracts exhibited antimalarial efficacy against *P. falciparum* strains 3D7 and K1 [48].

Anti-fungal activity:

The antifungal activity of *Acalypha indica* has been tested using six different types of fungi: *Aspergillus flavus*, *Aspergillus niger*, *Candida albicans*, *Candida glabrata*, *Candida tropicalis*, and *Penicillium chrysogenum* [49]. Hexane, petroleum ether, chloroform, ethyl acetate, methanol, and water were the six solvents employed to extract the chemicals from *Acalypha indica*. The antifungal activity of *Acalypha indica* is categorized using the same methodology as for antibacterial activity. In conclusion, the information that is currently available regarding this plant's antifungal activity is still lacking. According to earlier research, *Acalypha indica*'s phenols and flavonoids are thought to be the source of its antifungal properties [50]. Since fungi are impacted by any photochemical medication, extraction from water, such as a decoction, is advised for antifungal activity [51]. It is recommended to use the entire plant raw to cure human fungal diseases.

Anti-arthritic activity:

In a type II collagen-induced arthritic rat model, the anti-arthritic properties of the entire *Acalypha indica* plant were investigated using doses of 200 mg/kg and 400 mg/kg. According to the study, a hydroalcoholic extract of the entire *Acalypha indica* plant inhibits the Type II Collagen-induced Arthritic Rat Model. Comparing the

entire plant extract of *Acalypha indica* to the common medication Methotrexate, there was a notable drop in WBC count, ESR levels, and blood levels of IL-6, RF, and CRP. More substantial effects on a number of measures have been observed with a higher dose of extract (400 mg/kg) than with a lower dose (200 mg/kg). The findings suggest that the hydroalcoholic extract of *Acalypha indica* has anti-arthritic properties [52].

Anti-diabetic activity:

Alpha amylase activity was decreased by up to 84.51% and 75.32%, respectively, by the hexane and chloroform extracts [53]. The enzyme amylase catalyzes the conversion of starch to sugar. High blood sugar levels might cause problems for those with diabetes. In vivo research on rats has been used to do a follow-up study [54, 55]. Prior to administering the plant extract orally, both of them employed the diabetes induction technique on rats. After the plant extract was administered, blood sugar levels dropped by at least 25%. Five hours later, urea, cholesterol, and triglyceride levels also dropped. Resistance and decreased glucose-stimulated insulin release were the outcomes of streptozotocin's rapid destruction of pancreatic β cells. These are the criteria that set rat studies of type II diabetes apart. The effectiveness of the herb will depend on its capacity to prevent the breakdown of pancreatic β cells. In this instance, the entire *Acalypha indica* plant has anti-diabetic properties. According to this data, some Indians may take *Acalypha indica* as a medication to reduce blood sugar [56]. In their practice, they just utilize the root to treat high blood sugar, although studies have shown that the entire plant works better. This could be because the aerial part contains more cyanogenic phytochemicals than the root [57].

Lipid lowering activity:

The *Acalypha indica* extract lowers the free fatty acids levels and glucose level in blood in rats having diabetes. It was evaluated how *Acalypha indica* extract affected the growth of pancreatic fat in rats fed by a high-fructose, high-cholesterol diet for 4 weeks. The study found that the *Acalypha indica* extracts reduces blood cholesterol [58].

Anti-hemolytic activity:

The antihemolytic, antibacterial, and phytochemical qualities of the methanolic leaf extract of *Acalypha*



indica were evaluated in this investigation. *Acalypha indica* leaf extract in methanol has demonstrated a high level of anti-hemolytic action. The methanolic extract exhibited antihemolytic efficacy in 27% to 54% of cases. At different plant extract dosages (20, 40, 60, 80, and 100 mg/ml), the percentages of hemolysis inhibition were 27%, 34%, 40%, 47%, and 54%, respectively. All five bacterial species- *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Escherichia coli*, and *Streptococcus* variants were significantly inhibited by the methanol extract of *Acalypha indica* leaves. At 15 μ l, 20 μ l, and 25 μ l dosages of *S. aureus*, the inhibition zones were 14 mm, 16 mm, and 20 mm (including well 4 mm). Inhibitory zones for *P. aeruginosa* were 14 mm, 14 mm, and 16 mm, but those for *Streptococcus* variants were 10 mm, 11 mm, and 20 mm. Ten, twelve, and twenty-one millimeters were the *E. coli* zones, and fourteen, sixteen, and nineteen millimeters were the *Bacillus subtilis* zones [59].

Anti-ageing activity:

The physical properties of the *A. indica* leaf extract microemulsion and its antibacterial efficacy against *Staphylococcus aureus* bacteria. The study's microemulsions included isopropyl myristate as the oil phase, free water from CO₂, isopropanol as a co-surfactant, and tween 80 and span 80 as surfactants. Three different extract concentrations—5%, 10%, and 15%—were employed to create the microemulsion. An extract of *A. indica* was produced using a 70% ethanol solvent and the ultrasonic maceration extraction method. The sumuran diffusion technique was employed to evaluate the properties of preparations and each recipe's antibacterial efficacy against *Staphylococcus aureus* bacteria [60].

Diuretic:

Albino mice produced 77.42% more urine when 400 mg/kg of methanolic extract was given to them. The increase was 72.72% when the mice were given 20 mg/kg body weight of frusemide, a common positive control. More electrolytes, including Na⁺, K⁺, and Cl⁻, can be expelled by the extract than by the conventional treatment. The outcomes demonstrate *Acalypha indica*'s potential as a diuretic medication. The only part that can be consumed as a natural diuretic is the aerial component [61].

Neuroprotective activity:

The pancuronium bromide and extract were injected into the frog's ischiadicus nerve and gastrocnemius muscle. The extract effect was next examined by activating the nerve with a 5-mV electrical source. Finally, 20 mg of extract may reduce the activation spike in the frog muscle, they claimed. However, they did not back up their conclusions with statistical analysis. Especially when it comes to an examination of electrical signal processing, they can make their experimentation approach more reliable and scientific. Additionally, their findings quietly spurred a new study on the plant's potential for use as a neuroprotective drug [62]. The root contained the stigmasterol molecule, which was responsible for the neuroprotective effect [63].

Renal protective effect:

Rats fed a high fructose diet and cholesterol were used to assess the kidney-protective benefits of captopril, AI root extract, and their combination. Kidney impairment was measured in this study using two biochemistry parameters: serum urea and creatinine levels. Rats given *Acalypha indica* root extract with captopril had reduced blood urea and creatinine levels. The study proved that *Acalypha indica* had kidney-protective qualities [64].

3. CONCLUSION:

Acalypha indica. Linn is a potent and natural medicine that has valuable therapeutic properties including antimicrobial, anti-inflammatory, anticancer, antioxidant, anthelmintic. It shows good result on psoriasis treatment. Although it is a weed, it has tremendous medicinal uses. This review article will contribute to the study of traditional and novel use of *Acalypha indica*. Further research is needed to fully explore the potential of *Acalypha indica* and to develop new products that can benefit human health.

4. ACKNOWLEDGEMENT:

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