

PHARMACOLOGICAL AND PHYTOCHEMICAL CONSTITUENTS, TRADITIONAL USES ON ACALPHYA INDICA LINN: A REVIEW

¹Dr. CH K VL S N Anjana Male*, ²D.Pravallika, ³Thota. Sai sravanthi, ⁴Sd.Salma,S.Ramya,
⁵A.MaryManeesha

Nirmala college of pharmacy, Atmakur, Mangalagiri, Guntur district, Andhra Pradesh, India, email:
anjana.male@gmail.com

CORRESPONDING AUTHOR:

Dr.CH K V L S N Anjana Male,M.Pharm., Ph.D

Professor and H.O.D

Department of Phytochemistry and pharmaceutical chemistry

Nirmala college of pharmacy

Atmakuru(V), Mangalagiri

Guntur District

Andhra Pradesh

India

Mail i.d:anjana.male@gmail.com

Ph:9491719011

ABSTRACT:

The comprehensive review is mainly focused on the complete information about its traditional, phytochemical constituents and pharmacological activities of *ACALYPHA INDICA* LINN belongs to the family Euphorbiaceae. It is also known as the copper leaf. The plant is the largest of 450 species. The plant has been acknowledged by local people as the source of the medicine for several therapeutic treatment. According to the siddha text "Pathartha Gunna Chinthamani." This plant is erect annual herb with numerous long branches with soft hairs. They consume part of its asthma, lowering blood sugars levels, haemorrhoids, expectorant and skin disorders. The various phytochemicals such as Ferulic acid, Stigmasterol, syringic acid, 3,3¹Methylene bis (4-hydroxy coumarin), Aurantiamide, alpha pinene. The aim of the study needs to perform preclinical and clinical trials on this plant for further new formulation development from this plant to cure various disease condition.

KEY WORDS: *Acalypha indica*, Euphorbiaceae, Phytochemical constituents, Pharmacological activities.

INTRODUCTION:

Plants are the major source for the indian and other ancient system of medicines.^[1] A report of WHO 1990 states still today number of people are utilising medicines for the treatment of many diseases due to chemical utilisation of the drugs have the side effects. Folk medicines are used for the various disease.^[2]

Acalypha Indica is an herbal plant that grows in wet temperature region primarily in the equator region line. This plant is the weed and can be found by local people for therapeutic treatment.^[3] It is an annual herb that grows through the plains, road side and waste places. It is known as `kucing galak and Rumpu Lis-lis` in Malaysia, `Rumpu-bolong and `Rumpu kokosongan` in java and `Tam ye tuapa and tam ye meao` in siam.^[4] This plant is mainly growing in rainy season at a height of 4-5 cm.*Acalypha Indica* is a type of plant having catkin sort of inflorescence: Pharmacological examination has indicated that the plant has strong antibacterial,

antifungal, against-provocative, hostile to-osteoporotic, cell reinforcement, neuro defensive, injury mending, post-coital antifertility exercises^[5]. This review gives the comprehensive of the pharmacological and phytochemical constituent of the plant.^[6]

Acalypha Indica L. consists of dry herb of *Acalypha Indica* L. (Linn) belong towards family Euphorbiaceae. *Acalypha Indica* L. is one of the largest plants with 450 species.^[7] The common names of the plant are "Jalamaii, kuppigida" in kannada, "Kuppa-mani, Kuppa-cheti" in Malayalam, "Haritha-Manjari, kuppichetti, kuppinta, Murukonda-chettu, Murupindi, Puppante" in Telugu, "Khajoti, khojoti, khokoli, khokla" in Marathi, "Indian Nettle" in English^[8]. Different extraction methods are used for obtaining active components from *Acalypha indica*. Generally, Soxhlet extraction has a high efficiency and accuracy but the thermal stress might degrade target photochemical components^[9]. Leaves are broadly ovate, nearly triangular, rather coarsely toothed. Leaf stalks are as long as or longer than the 3-5 cm long blades. Flowers are stalkless, borne on erect axillary spikes longer than the leaves. Male flowers are minute, crowded distally. Female flowers are scattered along the inflorescence axis, each subtended by a conspicuous semicupular leaf-like toothed green bract nearly 7 mm long. Capsule is bristly, 1 mm broad.^[10]

TAXONOMICAL CLASSIFICATION:

KINGDOM : Plantae
UNRANKED : Angiosperms
UNRANKED : Eudicots
ORDER : Malpighiales
GENUS : *Acalypha*
SPECIES : *A. Indica*

The leaves have crenate -serrate, base cuneate and glabrous thin. The leaf is spirally arranged having 0.02-12cm long and shape is ovate to ovate lanceolate and tap root type of plant leaves having 2-7.5cm long and 2-4.5cm broad. This leaves having ovate and rhombic ovate in shape. The leaves have apex acute, margins toothed, sparingly short hair to almost glabrous in nature, 5-veined with 4-5 pairs of lateral veins. The branches are numerous, long, ascending and finely pubescent^[11].

GEOGRAPHICAL DISTRIBUTION:

Acalypha Indica grows naturally in wet, temperate, and tropical areas along the equator cross continental of Asian, Africa, Europe, South and North America and Australia. The discover life (2015) database reported the spread distribution of *Acalypha Indica* in the most wet and warm tropical regions especially in Asia, from the India to Australia.^[12] Many Australians recognized this plant in their area but are less inclined to consume it. *Acalypha Indica* is also a common weed found in West Africa and south Africa.^[13] The plant is high distribution particularly in Africa from the central part of equator down to the southern of Africa through Ethiopia, Sudan, DR Congo, South Africa, Somalia, Kenya, Mozambique, Tanzania, Zambia, Nigeria and others.^[14]

FOKLORE USES:

- The plant leaf pastes with lime juice and powder of dry leaves, Decoction with garlic is having the Anthelmintic property^[15]
- Decoction of the leaves taken 50ml per day, for 1 week by mouth cures the Asthma^[16]
- Leaf juice, Paste is prepared by using leaves and black Cuminum then applied as a balm is used as the Dermatology ailment.^[17]
- Leaf ground into a paste and made into a ball-shape. The paste is introduced into the rectum to relax the sphincter and produces relief motions^[18]
- Leaves, roots and seeds are used as the Diarrhoea^[19]
- Leaves ground with garlic, pepper and leaves of *Leucas aspera*, extract given orally and leaves mixed *Cardiospermum halicacabum* and boiled in *Azadirachta indica* oil. Extract is consumed is used for the Epilepsy^[20]
- Whole part plant is used as Expectorant^[21]
- Crushing leaves and leaf decoction cures the haemorrhoids^[22]

- The leaves are blend with *Ficus benghalensis*, *Morus alba* and *Tridax procumbens* are used for the wound healing [23]
- Root extract is having the property of lowering the blood sugar levels[24]

Even though the plant is known for its therapeutic purposes, there are some people who consume this plant as a food prepared either as a green leafy vegetable or a fried flour snack in their daily meal. 64% of ethnomedicinal practices consume the leaf parts of the plant, followed by the whole plant (24%) and the root (12%).[25]

PHYTOCHEMICAL CONSTITUTENTS:

The fresh *Acalypha Indica* plant has a wide variety of nutrients such as carbohydrates, proteins, vitamins, and lipids. It also contains a heavy metals and high amount of iron content, copper, nickel zinc, and chromium which are useful for patients with mineral deficiencies problems. This plant has a high moisture content of up to 90% and a total ashes value of 18% suitable for body hydration. The list of phenolic compounds derived from this plant, corilagin, geraniin, glucogallin and chebulagic acid were useful as antioxidants. Five compounds from the ethanolic leaf extract of the leaves which acted as antioxidants. Ellagic acid, gallic acid, 16 α , 17-dihydroxy-ent-kauran 19-oic-acid, 4,4',5,5',6,6' hexa hydroxy diphenic acid and kauren-18-oic-acid can be found inside this plant [26]

PHYTOCHEMICAL CONSTITUENTS	PLANT PART	REFERENCE
Acaindinin	Whole Plant	Ma et al., 1997
Acetylgeraniin	Whole Plant	Ma et al., 1997
Corilagin	Leaf	Ma et al., 1997
Ferulic acid	Leaf	Murugan et al., 2015
Stigmasterol	Root	Raj et al., 2000
Syringic acid	Root	Murugan et al., 2015
3,3' Methylene bis (4-hydroxyl coumarin)	Root	Murugan et al., 2015
Aurantiamide	Leaf	Raj et al., 2000

PHARMACOLOGICAL ACTIVITES:

ACTIVITY	AUTHOR	YEAR	OBSERVATION
Analgesic Activity	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8	The methanolic extract of <i>Acalypha Indica</i> showed significant activity in mice in a dose-dependent manner. Analgesic activity of the methanol extract was studied in mice by acetic acid induced writhing reflex method. Methanol extract at doses of 200mg and 400mg per kilogram body weight was used and was compared with the standard drug aminopyrine at a dose of 50mg/kg body weight.
Anti-inflammatory	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8	Maximum inhibition by the methanolic extract was observed at 250mg/kg body weight after three hours of ingestion, which was comparable to that of the standard drug Phenylbutazone at a dose of 100mg/kg body weight. The anti-inflammatory activity also demonstrated in a dose dependent manner.
Anti-helminthic	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8	Anti-helminthic potential evaluated using alcoholic extract of root of <i>Acalypha Indica</i> and <i>pheretimaposthuma</i> as test worm. Three concentrations (10,25 and 50mg/ml) of alcoholic extract and its various fractions were tested in the bioassay. Albendazole (10mg/ml) was included as standard reference as distilled water as control. The results indicated that the alcoholic extract significantly demonstrated paralysis and caused death of worms especially at higher concentration of 50mg/ml.
Anti-bacterial and anti-fungal	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8	1.The ethanol extract of <i>Acalypha Indica</i> showed maximum inhibition against <i>Bacillus cereus</i> , <i>Bacillus subtilis</i> , <i>Escherichia coli</i> , <i>salmonella typhi</i> , <i>vibrio cholera</i> and <i>pseudomonas aeruginosa</i> but proved to be resistant against <i>pseudomonas aeruginosa shigella flexneri</i> , <i>staphylococcus aureus</i> , <i>klebsiella pneumonia</i> , <i>vibrio cholerae</i> and <i>bacillus cereus</i> . The ethyl acetate extract of <i>Acalypha Indica</i> showed maximum inhibition against <i>staphylococcus</i> , <i>klebsiella pneumoniae</i> and <i>shigella flexneri</i> ethyl acetate was resistant to <i>vibrio cholerae</i> and <i>bacillus cereus</i> . <i>Pseudomonas aeruginosa</i> was resistant to ethyl acetate extract of <i>Acalypha indica</i> . 2. Another study proved that ethanol and water extract of leaves, stems, seeds, and roots from <i>Acalypha Indica</i> were effective against two bacterial <i>Escherichia coli</i> (gram negative bacteria), <i>staphylococcus aureus</i> (gram positive bacteria) and for anti-fungal activity against three fungi, <i>Aspergillus fumigatus</i> , <i>Microsporium</i>

			Canis (molds) and Candida albican (yeast), Microsporium Canis showed dose-dependent sensitivity towards aqueous leaves and roots extract, but resistant to both ethanol and water stems, roots and seeds extracts. Aspergillus fumigatus and Candida albican were resistant to both ethanol and water extract of all <i>Acalypha Indica</i>
Anti- tuberculosis	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8.	Anti-tuberculosis activity was tested against five plants extract namely <i>Acalypha indica</i> , <i>Acalypha vasica</i> , <i>Acalypha vera</i> . The resulted inhibition of these plants extract mentioned are 95,32,37,72,32%, respectively for MDR isolate DKU-156 and 68,86,79,72,85% respectively for MDR isolate JAL-1236, white for sensitive <i>Mycobacterium tuberculosis</i> H37Rv, inhibition was found to be 68,70,35,63 and 41%, at 4% v/v concentration in L-J medium. There was no inhibition against rapid grower <i>Mycobacterium fortuitum</i> (TMC-1529). In Bact/ALERT also, extracts of these plants showed significant inhibition against <i>mycobacterium tuberculosis</i> .
Antioxidant	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8.	The antioxidant activity of the extracts was analyzed by evaluating superoxide and hydroxyl radical scavenging activity and effect on lipid peroxidation. The ethanol extract showed significant antioxidant activity in all the free radical scavenging tests.
Molluscicidal activity	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8.	The molluscicidal activity was tested using <i>Lymnara acuminata</i> as test animal. Ten experimental animals were kept in a glass aquarium. Snails were treated with different conditions such as ethanolic extract, methanolic extract, distilled water extract, chlorinated water extract, tap water extract containing 2 liters each and 5mg fresh aerial plant extract. Control group were provided with Molluscicides. Toxicity was observed after 24 and 48 hours. The weight of the ethanolic extract, methanolic extract, distilled water extract was taken as the final strength per liter of aquarium water extract was taken as the final strength per liter of aquarium water. Dose dependent toxicity was observed. The ethanolic extract of <i>Ricinus communis</i> were higher in comparison to <i>Acalypha Indica</i>
Neuro-protective and Neuro-therapy	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8.	1.The neuro-protective and neuro-therapy studies done on the frog. Frogs were dosed with 5,10,15,20,25mg. pancuronium bromide 0.2%,4mg was used for a positive control as muscle relaxant. Neuro-protective study was done by ringer pancuronium bromide extract procedures. The parameters measured in these studies were the electrical activities such as amount and duration(second) of repolarization, depolarization, resting potential and the height of spike after electrical stimulation. 2.Neuro-protection effect of extract was determined by the ability of muscle to show the electrical response after incubating with extract for 10 minutes for neuro-therapy effect. In the dose of 15mg and 20mg/ml of <i>Acalypha Indica</i> Linn. Extract showed better activities than the dose of 25mg of extract, both as neuro-protective and neuro-therapy effects
Post- coital Anti fertility	Rajesh Saha and Azhar Ahmed	UPSR (2011), vol.2, issue 8.	Four successive extracts of the whole plant <i>Acalypha Indica</i> were tested for post-coital antifertility activity in female Albino rats of these, the petroleum ether and ethanol extracts were found to be most effective in causing significant anti-implantation activity. The antifertility activity was reversible on withdrawal of the treatment of the extracts. Both the extracts at 600mg/kg body weight showed estrogenic activity

REFERENCE:

- 1 Balandrin, A.D. Kinghorn and N.R. Fransworth. Plant derived natural products in drug discovery and development.1993
- 2 Indira PP. Studies on antimicrobial activity of *acallyphaindica* along with preliminary phytochemical screening. Inter J life sciences and PharmResearch.2017; 5.
- 3 Nor Syahiran Zahidin, Syafiqah Saidin, Razauden Mohamed Zulkifli, Ida Idayu Muhamad, Harisun Ya'akob, Hadi Nur. A review of *Acalypha Indica* L Euphorbiaceae as traditional medicinal plant and its therapeutic potential. Journal of Ethnopharmacology. 2017
- 4 Rajsekhar Saha and Azhar Ahmed. Phytochemical Constituents and Pharmacological Activities of *Acalyphus Indica* Linn: A REVIEW. International Journal of pharmaceutical research and sciences. IJPSR (2011), Vol. 2, Issue 8
- 5 Rimi Mondal, Arvind Negi and Manish Mishra. *Acalypha Indica* – A Boon to Mankind. World journal of pharmaceutical research. January 2021. Volume 10, Issue 3, 764-798. Review Article ISSN 2277–7105

- 6 Sudhakar Chekuri, Lali Lingfa, Shiva prasad Panjala, K.C. Sai Bindu, Roja Rani Anupalli. *Acalypha Indica* L-an important Medicinal Plant: A Brief Review of its pharmacological Properties and Restorative Potential. European journal of Medicinal plants.30 July 2020.1-10
- 7 Aushi Nag, Dr. Anoop M, Komal Sharma and Dr. Khushbu Verma. *Acalypha Indica* L an important Medicinal Plant with Antimicrobial agents: A review. Prakash Institute of Ayurvedic Medical Sciences and Research, Greater Noida, Uttar Pradesh, October 17,2018. Volume 5.
- 8 Chopra, R.N. Nayar. S.L. and Chopra. I.C. 2006. Glossary of Indian Medicinal Plants, National Institute of Science Communication and Information Resources. 2006, 54.
- 9 Rao R. Traditional knowledge and sustainable development. Key role of ethnobiologists. Ethnobotany.1996;8:14- 24.
- 10 Prajapati ND, Purohit SS, Sharma AK, Kumar TA. Handbook of Medicinal Plants, AGROBIOS, (India) Jodhpur,2003,3.
- 11 C. Chitravadivu, S. Manian and K. Kalaichelvi, Qualitative Analysis of Selected Medicinal Plants, Tamilnadu, India, Middle East Journal of Scientific Research 4 (3): 2009, 144-146.
- 12 Savithamma N, Sulochana C, Rao K. Ethnobotanical survey of plants used to treat asthma in Andhra Pradesh, India. Journal of Ethnopharmacology. 2007; 113: 54-61
- 13 Burkill HM. The useful plants of west tropical Africa. Families EI. Botanic Gardens; 1994.Volume 2
- 14 Marwah RG, Fatope MO, Al Mahrooqi R, Varma GB, Al Abadi H, Al-Burtamani SKS. Antioxidant capacity of some edible and wound healing plants in Oman. Food Chem, 2007; 101: 465-470
- 15 S. Chandra Mohan, S. Dinakar, T. Anand, R. Elayaraja, B. Sathiya Priya, Phytochemical, GC-MS analysis and Antibacterial activity of a Medicinal Plant *Acalypha indica*, IJPRIF, 2012; 4(3): 1050-1054.
- 16 Savithamma N, Sulochana C, Rao K. Ethnobotanical survey of plants used to treat asthma in Andhra Pradesh, India. J. Ethnopharmacology, 2007; 113: 54-61.
- 17 Paindla, P, Mamidala, E. Phytochemical and chromatographic studies in the leaves extract of *Acalypha Indica*. Online International Interdisciplinary Research Journal. 2014. 4, 175-182.
- 18 Saha, R., Ahmed, A. Phytochemical constituents and pharmacological activities of *Acalypha Indica* Linn: A Review. International Journal of Pharmaceutical Sciences Research. 2011,2, 1900-1904
- 19 Das, P.R., Akter, S., Islam, M.T., Kabir, M.H., Haque, M.M., Khatun, Z., Nurunnabi, M., Khatun, Z., Lee, Y.-k., Jahan, R. A selection of medicinal plants used for treatment of diarrhoea by folk medicinal practitioners of Bangladesh. American Eurasian Journal of Sustainable Agriculture.2012. 6, 153-161.
- 20 Reddy, K., Trimurthulu, G., Reddy, C.S. Medicinal plants used by ethnic people of Medak district, Andhra Pradesh. Indian Journal of Traditional Knowledge. 2010. 9, 184-190.
- 21 Jayaprakasam, R., Ravi, T. Evaluation of antiarthritic activity of the root extract of *Acalypha Indica* Linn. using in vitro techniques. International Journal of Phyto pharmacy.2013. 2, 169-173.
- 22 Ribeiro. A, Romeiras. M.M, Tavares, J. Faria, M.T. Ethnobotanical survey in Canhane village, district of Massingir, Mozambique. medicinal plants and traditional knowledge. Journal of Ethnobiology and Ethnomedicine.2010. 6, 33.
- 23 Basha, S.K., Sudarshanam. G. Multiple herbal therapy-Antimicrobial activity of wound healing paste (Pasuru) used by Sugali tribes of Yerramalais of Kurnool district, Andhra Pradesh, India. International J of Pharmaceutical Sciences and Research.2011. 3,1238-1241
- 24 Chopra, R. Nayar SI, IC. Glossary of Indian Medical Plants, New Delhi, India.1956.
- 25 Seebaluck. R, Gurib-Fakim. A, Mahomoodally. Medicinal plants from the genus *Acalypha* (Euphorbiaceae)–A review of their ethnopharmacology and phytochemistry. J. Ethnopharmacology. 2015.159, 137-157
- 26 Sanseera, D. Niwatananun, W. Liawruangrath, B. Liawruangrath, S. Baramee, ATrisuwan, K. Pyne, S.G, 2012. Antioxidant and anticancer activities from aerial parts of *Acalypha Indica* Linn. Chiang Mai University Journal of Natural Sciences .2012,11(2), 157- 168
- 27 Ma, Y.T., Chuang, J.I., Lin, J.H., Hsu, F.L. Phenolics from *Acalypha indica*. Journal of the Chinese Chemical Society.1997, 44, 499-502.
- 28 Raj, J., Singh, K.P. *Acalypha indica*. 2000,22(21&22): 21-26.
- 29 M Aminuar Rahman, Sitiesh C Bachar and Mohammed Rahmatullah, Analgesic and Antiinflammoraty activity of methanolic extract of *Acalypha Indica* L., Pak. J. Pharm. Sci., July 2010, Vol.23, pp.256-25
- 30 B. Chengaiah, K. Mahesh Kumar, M. Alagusundaram, C. Sasikala, C. Madhusudhan Chetty, In- vitro Antihelmintic activity of root of *Acalypha Indica* Linn. International Journal of PharmTech Research, Oct-Dec 2009, Vol.1, No.4, pp 1499-1502.

- 31 Lakshmi, S, Antibacterial potential of *Acalypha Indica* against human pathogens, International Journal of Current Research, January, 2010.Vol. 1, pp. 001-004.
- 32 Omar, R., Ali Rahman, Z., Latif, M.T, Lihan, T. and Adam J.H, In Vitro Antibacterial and antifungal properties of *Acalypha Indica* (KUCING GALAK) Proceedings of the Regional Symposium on Environment and Natural Resources 10-11th April 2002 Vol 1: 503-508
- 33 Renu Gupta, Bandana Thakur, Pushpendra Singh, H.B. Singh, V.D. Sharma, V.M. Katoch & S.V.S. Chauhan, Anti-tuberculosis activity of selected medicinal plants against multi-drug resistant Mycobacterium tuberculosis isolates, Indian J Med Res 131, June 2010, pp 809-813.
- 34 Beena Joy, Molly Mathew, Anti-oxidant studies and chemical investigation of ethanol extract of *Acalypha Indica* Linn. Recent Progress in Medicinal Plants, Volume 27.
- 35 S. Sharma, T. Singh and R. Vijayvergia, Molluscicidal activity of some medicinal plants, Journal of Herbal Medicine and Toxicology 3 (2) 155-157 (2009).
- 36 Ernie H. Purwaningsih, Nurhadi Ibrahim, Hamdani Zain, Arjo Tedjo, Neuro-protection and neuro-therapy effects of *Acalypha Indica* Linn. Water extract ex vivo on muscles gastrocnemius Frog, MAKARA, KESEHATAN, December 2008, VOL. 12, NO. 2, 70-75.
- 37 Hiremath SP, Rudresh K, Badami S, Patil SB, Patil SR, Post-coital antifertility activity of *Acalypha Indica* L. J Ethnopharmacol.1999 Nov 30, 67(3), 253-8