WWW.IJRPR.COM

International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Phytopharmacological Significance of Eclipta Alba

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ABSTRACT:

Eclipta alba Hassk. (compositeae) is a prominent little branched annual herbaceous plant in Ayurveda, first mentioned by Bhavprakasha, and widely utilized in the Indian system of medicine for treating numerous diseases. The goal of this review is to offer detailed information on the pharmacological actions of various parts of the Eclipta alba Hassk plant. Setting and design: This is a paper that presents a full study of Eclipta alba Hassk. as an important medicinal plant, including ethnomedicinal applications, chemical composition, and pharmacological profile. Methods and materials: For information without a specific timeline, all relevant universally accepted electronic databases were searched for the terms "Bhrungaraj," "False Daisy," "Ecliptaerecta," "Eclipta prostate," "Verbesina alba,"&Verbesina prostrate," including Indian classical texts, pharmacopoeias, Ayurvedic books, journals, and so on, using the terms "Bhrungaraj," "False Daisy," "Eclip The plant's whole information was personally gathered. Many ethnomedicinal claims have been substantiated through modern in vitro and in vivo pharmacological research employing different extracts and isolates of Eclipta alba Hassk, according to the collected data. The isolation of active ingredients, their biological effects, clinical safety, and validation of Eclipta alba's traditional usage could lead to more scientific investigation. The data gathered here will be helpful in developing research methodologies for current medications and Ayurvedic formulations.

Keywords:Bhrungaraj, Eclipta alba, Ecliptaerecta, Eclipta prostate, Hepatoprotective.

1. INTRODUCTION:

Eclipta alba (L.) is a popular name for the annual herbaceous plant Eclipta alba (L.). The leaves are opposite, sessile, and lanceolate, and it is an erect or prostrate, heavily branched, rough hairy, annual that roots at the nodes. Asteraceae is a plant family. It's also known as Bhringaraj or Karisilakanni, and it's a widespread weed that grows up to 6000 feet in India. The genus name stems from a Greek term that means "deficient," referring to the fruits' lack of bristles and awns. The particular Eclipta alba refers to the color of the flowers, which is white. Coumestans such as wedelolactone, desmethylwedelolactone, furanocoumarins, oleanane, and taraxastaneglycosides are the main active principles. [1]

Eclipta alba (L.) is a tropical and subtropical plant that has been utilized in South America, Asia, and Africa. There are three types of Eclipta alba: white-flowering, yellow-flowering, and black-fruiting, although all three thrive in marshes, rivers, and lakes across India, as well as in the Himalayan foothills. It's an active ingredient in a lot of herbal remedies for liver problems, and it has an effect on liver cell growth. It's used to treat hepatic and spleen enlargement as a tonic and diuretic. It's also used to treat catarrhal jaundice and skin conditions1. The plant's alcoholic extract shows antiviral effect against the Ranikhet sickness virus. [2]

FIG 1: A Plant of Ecliptaalba

3.Botanical description:[3]

False Daisy, yerba de tago, and Andbhringraj are all names for Eclipta alba (L.) Hassk. (Syn. EcliptaprostrataL.), a plant in the Asteraceae family. The root is mature, cylindrical, and greyish in color. In Assamese, it's called kehraj, while in Tamil, it's called Andkarisalankanni. Floral heads are solitary, white, achene compressed, and narrowly winged, with a diameter of 6-8 mm. Eclipta alba is a tufted herbaceous plant that can grow up to 50cm tall in upright form. The stems and leaves have white hairs on them. The stems might be reddish in color. Simple, opposite, and without a petiole, the leaves are connected to the stem. The inflorescences are white and grow on 1cm diameter hemispherical heads..

4. Botanicalclassification:

- Kingdom – Plantae
- Unranked – Angiosperms
- Unranked – Eudicoalb
- Unranked – Asterids
- Order – Asterales
- Family – Asteraceae
- Genus – Eclipta
- Species – Eclipta alba
- Botanical name – Eclipta alba L. Hassk
- Synonyms – Ecliptaerecta, Eclipta prostate, Verbesina alba, Verbesina prostrate

5.Habitat:

Subherbaceous annual or perennial tufted plant that grows up to 50cm in erect or prostrate form. In actuality, it grows multiple long prostrate stems from the base of the main stem, roots at the nodes. It is a weed that thrives in wet areas all over the world. It can be found in India, China, Thailand, and Brazil, among other places..

6.Phytoconstituents:

Eclipta alba (L) contains a wide range of active constituents, as shown in Table 1. These include coumestan derivatives such as wedololactone[1.6 percent] and alkaloidemethylwedelolactonecliptine, glyoides such as demethylwedelolactone, desmethyl-wedelolactone-7 glucoside present in leaves, and ecliptal(11), ß-a Eclipta alba is utilized as an anticancer, antileprotic, analgesic, antioxidant, antimyotoxic, antihaemorrhagic, antihepatotoxic, antiviral, antibacterial, spasmogenic, hypotensive, ovicidal, and promoter for hair blackening and growth.

Table 1: Chemical constituents and biological activities of parts of *Eclipta alba*

Sr no.	Part	Formulation	Constituents	Biological Activity
1.	Leaves	Juice	Stigmasterol,a-terthienymethanol, Wedelolactone[1.6%], Desmethylwedelolactone, Desmethyl-wedelolactone-7-glucoside	Skin diseases, allergic Urticaria, Asthma, Inflatulence, Colic and liver affections, Bronchitis, Enlarged glands, Dizziness, Vertigo, Blurred vision
2.	Roots	Powder/ juice	Hentriacontanol, Heptacosanol& Stigmasterol4, Ecliptal12-1	Liver tonic, Emetic, Purgative, Antiseptic to ulcers, Wounds in cattle
3.	Aerial parts	Juice	ß-amyrin & Luteolin-7-0-glucoside, Apigenin, Cinnaroside, Sulphur compounds	
4.	Stems	Paste	Wedelolactone	
5.	Seeds		Sterols	Sexual debility, Tonic, Aphrodisiac
6.	Twigs of the plant	Paste	Unnamed alkaloid	
7.	Whole plant	Paste	Large amounts of resin, Ecliptine, Reducing sugar, Nicotine, Stigmastero, Triterpene saponin, Eclalbatin togetherwith a -amyrin, Ursolic acid, Oleanolic acid.	Rejuvenating, Age-sustaining tonic, Detoxifying, Deobstruent, Antiseptic herb in vitiated blood, Anaemia, Splenic and liver enlargements, Catarrhal jaundice, Hyperacidity, Gastritis, Dysentery, Anticatarrhal, Spasmogenic, Hypotensive properties

7.Pharmacological activities of Eclipta alba:

7.1. Hepatoprotective Activity:

This study concluded that Eclipta alba's hepatoprotective action is mostly based on the control of hepatic microsomal drug metabolizing enzymes[4]. The bi-herbal ethanolic extract (BHEE) of a combination of Eclipta alba leaves and Piper longum seeds was given orally at a dose of 50 mg/kg body weight once a day for 14 days and was found to restore the elevated serum marker enzymes SGOT, SGPT, ALP, LDH, ACP, GGT, and 5' Nucleotidase that had been caused by CCl4 treatment. Biochemical indicators such as total protein, total bilirubin, total cholesterol, triglycerides, and urea were also shown to be recovered to normal levels. Using carbon tetrachloride to induce liver damage and measure Lysosomal enzyme levels in wistar albino rats, the hepatoprotective efficacy of Methanolic extract of leaves and chloroform extract of roots of Eclipta alba was investigated.

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7.2. Antihyperlipidemic activity:

The aqueous leaf extract of the Eclipta has antihyperlipidemic action. Prostratawas administered orally to rats, and it was found that in the atherogenic food caused hyperlipedemic model, there was a significant reduction in total cholesterol, triglycerides, and total protein, as well as a significant increase in high density lipoprotein cholesterol levels. When compared to 100mg/kg, a dose of roughly 200mg/kg of the Extract had better outcomes [5]. In another study, Charles River Sprague-Dawley CD rats (specific Pathogen-free/viral antibody-free Crj/Bgi male, 180 10 g) were fed experimental diets supplemented with 0 mg (control), 25 mg (E25), 50 mg (E50), or 100 mg (E100) of a freeze-dried butanol Extracted fraction of E. prostrata per kilogram of diet for 6 weeks, as well as a control group that When compared to the untreated control group, the E50 and E100 groups showed significant reductions in blood Triacylglycerol and total cholesterol, low-density Lipoprotein-cholesterol levels, and an increase in high-density lipoprotein levels. In CD rats, the butanol extract fraction of Ecliptaprostrata(Linn) was reported to efficiently lower serum lipid levels and boost antioxidant activity

7.3. Antioxidant action:

Charles River Sprague-Dawley CD mice were used in this study. The extract lowered blood hydroxyl radical (nmol/mg protein per minute) and serum lipid peroxide (nmol/mg protein) levels to considerable extent in rats administered 50mg/kg and 100mg/kg doses of Ecliptaprostrata Alcoholic extract. The extract of Eclipta at a concentration of 100 mg/kg considerably reduced the carbonyl content of oxidatively damaged proteins (26). FRAP radical scavenging activity, reducing activity, and the DPPH assay were used to determine Ecliptaprostrata's antioxidant activity. When the concentration of the extracts was increased from 25 to 100 mg/ml, the antioxidant capacity was seen to increase when compared to -tocopherol as a reference medication. The antioxidant activity of E. prostrata extracts in hexane, ethyl acetate, ethanol, and water was also determined using the ferric thiocynate (FTC) method, which was used to determine the amount of peroxide formed and that reacts with ferrous chloride ($FeCl_2$) to form a reddish ferric chloride ($FeCl_3$) pigment. Hexane, ethyl acetate, ethanol, and water extract of Eclipta showed antioxidant activity at various concentrations (50, 100, 250, and 500 in g/mL) in the ascending order of concentration. At a concentration of 500 g/mL, Ethanolic Extract demonstrated a maximum of 77.62 percent, which is close to the reference value. -tocopherol is the compound that was employed (80.06 percent) [6]

7.4. Action on immune system:

The protection of neural tissues was observed as a result of Eclipta alba's immunomodulatory effect. As a result, Eclipta alba appears to be a possible memory modulator. Carbon clearance, antibody titer, and cyclophosphamide immunosuppression measures were utilized to analyze the immunomodulatory efficacy of methanol extracts of whole E. alba plants (1.6 percent Wedelolactone) at five dose levels (dose-response relationship) ranging from 100 to 500 mg/kg. The study found a significant increase in phagocytic index and antibody titre, as well as large F ratios of phagocytic index and WBC count. In another experiment, aqueous leaf extract Eclipta alba was fed to a fish (tilapia, Oreochromis mossambicus) at 0, 0.01, 0.1, or 1 percent as a diet for about 3 weeks, and non-specific humoral (lysozyme, antiprotease, and complement) and cellular (myeloperoxidase content, production of reactive oxygen and nitrogen species) responses and disease resistance against Aeromonas hydro As a result of the findings, dietary consumption of E. alba aqueous leaf extract can boost O. mossambicus' non-specific immune responses and disease resistance to A. Hydrophila.

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7.5. Anti-inflammatory and analgesic effect :

The anti-inflammatory activity of methanolic extract of Eclipta following oral administration was investigated in Albino Wistar carrageenin and egg white induced hind paw Edema rats. Carrageenin and egg white showed considerable efficacy at doses of 100 and 200 mg/kg. Induced hind paw edema in rats, which was compared to the control groups of indomethacin (10 mg/kg) and cyproheptadine (8 mg/kg). Ethanolic and alkaloidal extracts of Eclipta alba were used to test the analgesic impact on albino mice. Standard experimental models were utilized, such as the tail clip method, tail flick method, and acetic acid induced Writhing response, to show that both the ethanol extract and the total alkaloids were effective. In many rat studies, it produced good analgesic efficacy. In all of the testing models, the alkaloidal extract fraction was determined to be the most effective.

7.6. Antidiabetic effect:

The antidiabetic activity of Eclipta Alba leaf suspension (2 & 4g/kg) was tested in alloxan-induced diabetic rats. Blood glucose levels and glycosylated hemoglobin levels were found to be significantly lower. Glucose-6 phosphatase and fructose1, 6-bisphosphatase activity reduced, but liver hexokinase activity increased. The study discovered that oral administration of Eclipta alba suspension has strong antihypergylcemic action in Alloxan-induced diabetic rats. Eclipta alba has been used as an ingredient in polyherbal formulations such as Pan-five, which have been scientifically and clinically proven to have anti-diabetic and diuretic activity by acting on the pancreas through the mode of pancreatic -cell activity restoration and regeneration.

7.7. Anticancer Activity:

The anticancer activity of methanol extract of Eclipta Alba against Ehrlich Ascites Carcinoma (EAC) was studied in Swiss albino mice. The wistar albino mice were given the Methanolic extract of Eclipta alba orally for 9 days at doses of 250 and 500 mg/kg body weight. Cancer was assessed using parameters such as tumor volume, tumor cell count, viable tumor cell count, nonviable tumor cell count, mean survival time, and increase in life span in experimental Animal models. The study found that the Eclipta methanolic extract increased the life duration of EAC-treated mice and maintained the

restoration of hematological parameters as compared to EAC-bearing mice. In the investigated animal models, this proved the anticancer activity of the methanolic extract of Eclipta alba. Coumestans Eclipta's active ingredients are well-known for their role as phytoestrogens, which function as a chemopreventive agent in breast and prostate cancer. Another substance found in Ecliptaprotrata is Dasyscyphin-C (saponins), a newly discovered compound that has been shown to exhibit anticancer-cytotoxic activity in an in vitro investigation using HeLa (Human cervical carcinoma) and Vero cell lines. In this investigation, the rat hepatic stellate cell line (HSCs) was used as an in-vitro assay system, and the Methanolic extract of aerial portions of Ecliptaprostrata was used. It was put to use. Significant inhibitory activity on HSC proliferation was discovered in the study.

7.8. Antibacterial activity:[7]

Agar well diffusion methods were used to test the antibacterial activity of aerial portions of Eclipta alba that were extracted in various solvents such as acetone, ethanol, Methanol, water, and hexane against selected strains of Gram positive and Gram negative bacteria. The MIC and MBC Methods were also used in this research. When compared to the inhibitory action of common antibiotics (Ciprofloxacin 25 g/ml), the Eclipta alba extract in the solvent Hexane showed high antibacterial activity against the following bacteria: S.aureus, B.cereus, E.coli, S.typhi, K.pneumoniae, S.pyogenes, and P.aeruginosa. In comparison to standard antibiotics (Ciprofloxacin 25 g/ml), additional Eclipta alba extracts such as acetone, ethanol, methanol, and aqueous extracts demonstrated InteS.typhi, K.pneumoniae, P.aeruginosa, P.mirabilis, and S.pyogenes. The study found that E.coli and S.aureus had the highest MIC (mean inhibitory concentration) of 90.0g/ml (below 100g/ml), while E.coli, K.pneumoni, P.mirabilis, and S.typhi had the highest MIC of 125.0g/ml (100-500g/ml) as a result of the impact of acetone, ethanol, methanol, and hexane extracts on

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7.9. Memory enhancing activity:

rats were given extracts of 100 and 200 mg/kg eclipta alba to assess transfer latency (TL) on an elevated plus maize, which was used as a measure of acquisition and learning to assess spatial habitual learning from 20 minutes to 144 hours. The findings demonstrated a considerable improvement in memory retrieval.

7.10. C.N.S. activity:

Recent research has found that the aqueous extract of Eclipta alba and its hydrolyzed fraction at doses of 300 mg/kg and 30 mg/kg, respectively, have C.N.S. activity

7.11. Toxicity Studies :

In tests conducted on rats and mice, the alcoholic extract of Eclipta alba showed no evidence of toxicity, and the minimum fatal dose was found to be larger than 2.0g/kg when given orally and intraperitoneally in mice.

7.12. Diuretic activity:

Rats were given aqueous and alcoholic extracts of Ecileptaprostrata leaves to test for diuretic action. Body weight before and after the test period, total urine volume, and urine concentrations of Na+, K+, and Cl- were the parameters investigated on each individual rat. EcileptaProstrata leaves (100 mg/kg body weight) increased urine volume, cation excretion, and anion excretion. The plant extracts did not appear to have renal toxicity or any other adverse effects when compared to furosemide, the reference diuretic

7.13. Anticovulsant Activity:

In rats, E. alba ethanolic leaf extracts at 50, 100, 200, and 400 mg/kg, p.o., were tested for anticonvulsant and muscle relaxant activity in the maximum electroshock-induced seizures (mes), rotarod, and traction tests. The Extract reduced seizures generated by mes, shortened the duration of tonic hind limb Extension (thle) (by 76.2 and 89.8%, respectively), and decreased motor coordination at dosages of 200 and 400 mg/kg, indicating anticonvulsant and muscle relaxant action.

.**7.14. Hair Growth Promoting Activity:[8]**

In albino rats, ether and ethanol extracts of E. Alba were examined for hair growth activity. The extracts were mixed into an oleaginous cream (water in an oil cream base) and applied topically to male albino rats' shaved denuded skin. When compared to non-treated Control animals, the extracts considerably reduced hair growth time. Quantitative study of hair growth after treatment with petroleum ether extract (5%) revealed a higher number of hair follicles in the anagenic phase (69 4) when compared to the control group

7.15. Neuropharmacological Activities:[9]

At dosages of 150 and 300 mg/kg, p.o., the aqueous and hydroalcoholic extracts of E. Alba were tested for sedative, muscle relaxant, anxiolytic, nootropic, and antistress activities. The Aqueous extract (300 mg/kg, p.o.) and its Hydrolyzed fraction (30 mg/kg, p.o.) were found to have nootropic effect. The hydrolyzed fraction and the aqueous extract were found to give protection against In the milk produced leukocytosis challenge model, cold restraint induced gastric ulcer formation and also normalized the white blood cell level. Foot Shock-induced aggression and water Competition tests were used to see if an aqueous extract of E. alba could lower aggression. At doses of 100 and 200 mg/kg, the extract was found to reduce aggression in both tests

7.16. Anthelmintic Activity:

At dosages of 25–100 mg/mL, the methanol extract of the whole plant of E. Alba was tested for its anthelmintic potential against the earthworm PheretimaPosthuma. The extract paralyzed worms at doses of 50, 75, and 100 mg/mL and killed them at doses of 75 and 100 mg/mL

7.17. Antiulcer Activity:

The antiulcer activities of the ethanolic extract of E. alba have been investigated in different ulcer models in rats, including cold resistant stress (CRS) and pylorus ligation (PL). The extract was observed to diminish ulcerative lesions dosedependently and considerably when given orally twice daily at doses of 50, 100, and 200 mg/kg. Simultaneously, extract administration resulted in a considerable reduction in lipid peroxidation and an increase in catalase activity. When compared to control (non-Extract) rats, the Extract's antisecretory efficacy was demonstrated by a considerable reduction in stomach volume, acid output, and elevation in gastric pH.

7.18. Miscellaneous activity

In rats, a 200 mg/kg dose of an alcoholic extract of the plant had an antinociceptive effect (Pandey PS et al., 1997). Because of the coumarin components, the plant has been reported to have antinociceptive, antiinflammatorry, and bronchodialatoractivities18. Eclipta alba has been found to have analgesic effects in several studies.

7.19. Snake Bite

Extract of E. alba has been shown to inhibit snake venom phospholipase A2 activity of Crotalusdurissusterrificus venom. The inhibitory activity has been attributed to the coumestans, wedelolactone, and demethylwedelolactone, present in the extract

8. pharmacological actions of Eclipta :[10]

In echinocystic acid derivatives, the methanolic extract Ecliptaprostrata contains Free carboxylic acid at C-28 position, which exhibited antifibrotic efficacy in a study. Triterpenoid from hepatic stellate cells was studied for its antiproliferative effect in rats. Ethanolic and ethyl acetate fractions of Ecliptaprostrata were tested for antibacterial activity against Escherichia coli, Klebsiella Pneumoniae, Shigella dysenteriae, Salmonella typhi, Pseudomonas aeruginosa, Bacillus subtilis, and Staphylococcus aureus in another study, and were found to be potent antibacterial agents. Ethanopharmacological analysis revealed that Ecliptaprostrata is being used in combination with a non-plant substance to bathe malnourished toddlers for 9 days and to self-medicate AIDS patients in various locations of southern Thailand. 16 parts Ecliptaprostrata (bhringaraj), 1 part TriphalaFormulaEmblicaofficinalis (amalaki), 1 part Caltropis gigantean (arka), and 1 part Smilax Officinalis (sariva) mixed with 80 parts sesame oil and boiled to generate a medicinal oil that is reported to be used in skin ailments

9. Therapeutic Uses:

- The whole plant is used as antiseptic, febrifuge, tonic, deobstruent in hepatic and spleen enlargement and is emetic.
- In combination with aromatics, the juice is given in anemia, catarrh and cough.
- The plant is also used as scalp tonic for promoting hair growth.
- Bhringaraj is commonly used as deobstruent to promote bile flow and to protect the liver parenchymatous tissue in viral hepatitis and other conditions involving hepatic enlargement.
- The fresh juice of the leaves is given in the treatment of edema, fevers, liver disorders, and rheumatic joint pains; it is also used to improve the appetite and to stimulate digestion.
- The juice is given with honey to treat upper respiratory congestion in children.
- The hair oil is prepared from boiling the fresh leaves with either coconut or sesame oil renders the hair black and lustrous

10.Traditional uses:

The leaf extract is considered a powerful liver tonic, rejuvenative, and especially helpful for the hair in Ayurvedic medicine. Eclipta alba produces a black color that is used in hair dying and tattooing. Eclipta alba has also been used to treat exterior conditions such as athlete's foot, eczema, and dermatitis, as well as hair loss on the scalp and scorpion stings. It is planted beside rice fields in India, and its leaves are utilized in cooking.

In Ayurveda, the plant has been used for centuries. It tastes harsh, fiery, sharp, and dry. It's known as bhangra or bhringaraj in India. The white-flowered E. alba is known as white bhangra, and the yellow-flowered W. calendulacea is known as yellow bhangra. The dried whole plant is utilized in traditional medicine in Southeast Asia, despite the lack of high-quality clinical studies to support such claims.

Conclusion:

Traditional medical practitioners consider E. alba to be a valuable medicinal plant for the treatment of liver disorders, gastrointestinal disorders, respiratory tract disorders, hair loss, skin disorders, and fever. The majority of the claims of ethnomedical usage, including the treatment of snakebite using the herb, have been supported by scientific research. The plant has yielded a number of significant phytochemicals, which have been separated

and identified. Wedelolactoneeclalbasaponins, -amyrin, ursolic acid, oleanolic acid, luteolin, and apigenin are among these chemicals. According to existing scientific data, these chemicals have the potential to become the next generation of medications for the treatment of cancer, arthritis, liver illnesses, hair loss, and snake bites.

Acknowledgement

Special thanks for D. Rama Brahma Reddy, K. Malleswari.

Matter is collected from library

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