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An Extensive Review of *Eclipta Alba*

Akula Mounika[1], Dr. G. Krishna Mohan[2]

(Student of M. Pharmacy- Pharmacognosy CPS, UCEST, Jawaharlal Nehru Technological University, Kukatpally, Hyderabad-500085, Telangana State, India)[1]

(Professor-Department of Pharmacognosy, CPS, UCEST, Jawaharlal Nehru Technological University, Kukatpally, Hyderabad-500085, Telangana State, India)[2]

ABSTRACT:

The small-branched annual herbaceous *Eclipta alba* has long been used in traditional medicine, particularly in tropical and subtropical areas. Folk medicinal practitioners and tribal medicinal practitioners of the Indian subcontinent employ plant and plant components to treat a range of illnesses. The plant's ethnomedicinal usage has been reported in India, Bangladesh, Pakistan, and Nepal. From this species, a large variety of chemical substances have been identified, including Coumestans, Alkaloids, thiophenes, flavonoids, polyacetylenes, triterpenes, and their glycosides. Pharmacological activities such as Anti-bacterial, Anti-inflammatory, and Anti-oxidant activities, etc have been reported for this plant's extracts and metabolites. This work offers a thorough analysis of the pharmacological profile, chemical makeup, and ethnomedicinal use of medicinal plants.

Key Words: *Eclipta alba*, Anti-bacterial, Anti-inflammatory, Anti-oxidant, Coumestans, Alkaloids, Thiophenes, Flavonoids.

I. INTRODUCTION:

The majority of the time, however, "Natural products" refer to the Secondary metabolites made by living things; these tiny molecules; with a molecular weight of 2,000 amu, are ostensible and can't naturally, be necessary for maintaining, promoting, or reproducing of the producing organism. (1)

Mother Nature has long been a valuable source of Therapeutic substances, and astounding numbers of today's drugs are derived from naturally occurring sources, frequently due to usage in conventional medical care. The Historical use of Plants as medicinal substances has led to the discovery of each chemical entity with medical importance in Contemporary medicine. (2)

Eclipta alba is a common folk medicinal plant also known as Bhringraj in Indian traditional medicine and fake daisy in English. Eclipta alba is a well-known and widely used medicinal herb worldwide, particularly in tropical and subtropical regions. Researchers have paid close attention to E. alba because of its numerous properties, and several studies on biomolecules and pharmacological activities have revealed that this herb is rich in alkaloids, phenolic compounds steroids, polysaccharides and polyacetates. (3)

II. PLANT PROFILE OF *ECLIPTA ALBA*

Synonyms: Bhringaraj, False daisy, Bringraj

Eclipta alba

Family: Asteraceae

Table1: Taxonomical Classification

Kingdom	Plantae
Division	Tracheophyta
Class	Magnoliopsida
Subclass	Asteridae
Order	Asterales
Family	Asteraceae
Genus	*Eclipta*
Species	*Alba*

Table 2: Vernacular Names

Language	**Name**
Hindi	Bhangra, Bhangraya
Kannada	Garagada soppu, Garga
Telugu	Kayanthakara, Kaikeshi
Marathi	Maka
Gujarati	Bhangaro
Bengali	Kesuriya
Punjabi	Bhangra
Malayalam	Jala Bhangara, Tekaraju
Arabic	Kadimulabit

Geographical Distribution

Eclipta alba L. can be found across India. It is commonly available in India, Thailand, Brazil and China. It was prevalent in marshy meadows, Waste areas, roadside ditches and Hedges specifically in the nation's more Tropical areas. It can also be discovered in other eastern nations such as Sri Lanka, Indonesia, Nepal, Malaysia, and the Philippines where the growth is good in damp ground- bunds, clay, water courses, paddy fields, and tanks in both hilly areas and plains. [4]

Botanical description:

It is a perennial herb that typically grows without difficulty in humid tropical regions.

[a] Branches

Branches can reach a height of 40 cm and are hairy, reddish brown, and brown.

Branches of Eclipta alba

[b] Leaves

The opposing, hairy, lance-shaped leaves have a toothed edge. The sap turns black when leaves are sliced with an iron knife.

Leaves of Eclipta alba

[c] Flowers

Small, white flowers in tiny clusters are seen. The leaf's axis is where the blooming stalk emerges.

Flower of Eclipta alba

[d] Dry fruit

Two carpels that do not split open and have only one seed each fuse to generate dry fruit.

Dry fruit of Eclipta alba

[e] Roots:

At the thickened nodal sites, roots are observed to be growing. Roots are cylindric, well-developed, and grey.

Roots of Eclipta alba

III. TRADITIONAL AND THERAPEUTIC USES

- Eclipta alba is an herb used in traditional medicine for a variety of diseases.
- Coughing, asthma, diabetes, stomach difficulties, inflammatory illnesses, and skin ailments are some of its traditional and therapeutic uses.
- Treatment of calculus and eye disorders".
- To darken and thicken hair.
- As a liver tonic
- To prevent hair loss, baldness, and hair fall.
- For the common cold and cough
- Anaemia treatment
- It has a strong effect on the liver. Bhringaraj treats hepatomegaly, splenomegaly, jaundice, piles, stomachache, headache, skin problems, and vertigo caused by liver ailments.
- Leprosy, itchy wounds, premature hair greying, alopecia, and scorpion stinging are treated by putting paste on the affected area and providing the patient juice to drink.

- In the case of a burn wound, its paste is treated with henna, which prevents the lesion from scarring in the future.
- Bhringaraj Oil nasal sprays are used to cure headaches, hazy eyesight, and baldness.
- In youngsters with catarrh, 1-2 drops of Bhringaraj Swaras with honey are recommended to relieve coughing.
- Its seed has aphrodisiac properties.

IV. PHYTO CHEMICAL SCREENING OF ECLIPTA ALBA:

Table 3: Tests for Screening

S.No.	Test name	Procedure	Observation
1.	Triterpenes Lieberman-Burchard's test	Add a few ml of chloroform, 2 ml of acetic anhydride, and a few drops of sulfuric acid to the extract.	The presence of triterpenes is shown by the purple colour that appears at the junction.
2.	Alkaloids		
	Dragendroff's test	5ml of distilled water should be added to the sample extract. A few ml of hydrochloric acid and a few drops of Dragendroff's reagent should then be added.	The presence of alkaloids is shown by the orange-red precipitate that formed in the test tube.
	Wagner's test	Add a few ml of hydrochloric acid and a few drops of Wagner's reagent to the sample extract.	Alkaloids are present because of the yellow-brown precipitate that formed in the test tube.
	Mayer's test	Mayer's reagents should be added in a few drops to the sample extract.	Alkaloids are present when a white or light-yellow precipitate forms in the test tube.
	Hager's test	The Hager's reagents should be added in a few drops to the sample extract.	The presence of alkaloids is shown by the test tube's yellow precipitation.
3.	Carbohydrates Fehling's test	Equal parts of the Fehling A and Fehling B solution should be added to the sample extract, which should then be allowed to boil for a few minutes.	The test tube's appearance as brick red indicates the presence of carbohydrates.
	Benedict's test	Benedict solution should be added to the sample extract before allowing it to boil for a short while.	The presence of carbohydrates is shown by the formation of coloured precipitate in the test tube.
	Molisch's test	A few drops (2–3) of 20% alcohol alpha naphthol should be added to the sample extract in the test tube. This will add 2ml of concentrated sulphuric	A red-violet ring that appears at the junction in the test tube denotes the presence of carbohydrates.

		acid through the test tube's sidewall.	
	Anthrone test	Add a few drops of Anthrone solution to the sample extract in the test tube.	The presence of carbohydrates is shown by the precipitation's colour in the test tube, which is green or blue green.
4.	Fixed oil test	The sample extract is taken, added to the filter paper, and allowed to dry for a day (or for 24 hours), at the usual room temperature.	The presence of fixed oils is indicated by the emergence of a translucent mark on the filter paper.
5.	Glycosides	Add a few millilitres of water and sodium hydroxide aqueous solution to the sample extract.	The presence of glycosides is shown by the test tube turning yellow.
6.	Phenols Ferric chloride test	Add a few millilitres of water and a 10% ferric chloride aqueous solution to the sample extract.	The presence of phenols is shown by the test tube turning green.
	Liberman's test	When sodium nitrite solution and sulphuric acid are added in small amounts to the sample extract, a red colour is produced.	In addition to changing colour to blue, which indicates the presence of phenols, it also releases sodium hydroxide aqueous solution.
	Lead Acetate test	Add a few millilitres of water and lead acetate aqueous solution to the sample extract.	The presence of phenols is indicated by the precipitate in the test tube having a yellow colour.
7.	Resins	Add a few ml of the acetic anhydride solution to the sample extract, boil it, and then let it cool. Add 0.05ml of sulfuric acid to this.	Add a few ml of the acetic anhydride solution to the sample extract, boil it, and then let it cool. Add 0.05ml of sulfuric acid to this.
8.	Saponins	Add a few drops of aqueous sodium bicarbonate solution to the sample extract and shake vigorously for a while.	The presence of saponins is indicated by the appearance of honeycomb foam.
9.	Proteins Biuret's test	Add a few drops of copper sulfate solution and a few drops of aqueous sodium solution (1-2) to the heated sample extract.	The presence of proteins is shown by the test tube turning red.
	Million's test	Add a few millilitres of water and a few drops (5–6) of the million's test solution (reagent) to the sample extract before heating it.	It reveals the presence of proteins by turning the white precipitation red.

		Add a few drops of tetra bromo phenolphthalein ethyl ester solution to the sample extract on a plate.	The presence of proteins is indicated by the emergence of blue colour.
10.	Starch	Iodine and potassium iodide should be dissolved in distilled water, then the dissolved solution should be added to the sample extract.	It is necessary to first dissolve iodine and potassium iodide in distilled water before adding the dissolved mixture to the sample extract.
11.	Steroids Lieberman-Burchard's test	Several millilitres of chloroform, two millilitres of acetic anhydride, and a few drops of sulfuric acid are added to the extract.	The presence of steroids is indicated when the colour shifts from green to blue.
	Salkowski test	Add a few ml of chloroform to the extract, and then, via the test tube's sidewall, add a few drops of sulfuric acid.	The presence of steroids is shown by the development of a brown ring at the junction in the test tube.
12.	Tannin Ferric chloride test	Add a few drops of ferric chloride aqueous solution to the sample extract before adding hydrochloric acid.	bluish-black colour disappears and indicates the presence of tannins.
	Lead Acetate test	Add a few drops of lead acetate aqueous solution to the sample extract.	The presence of tannins is shown by the test tube's appearance of yellow colour precipitation.
13.	Flavonoids Shinoda test	A little piece of magnesium ribbon and a few drops of diluted hydrochloric acid should be added to the sample extract before it is boiled for a short period of time.	The presence of flavonoids is indicated by the test tube's colour of purple or reddish pink.

Table 4: Phytochemical constituents present

PHYTOCHEMICAL CONSTITUENTS	CRUDE EXTRACT
Carbohydrates	+
Proteins	+
Steroids	+
Amino acids	+
Glycosides	+
Alkaloids	+
Flavonoids	+
Saponins	+

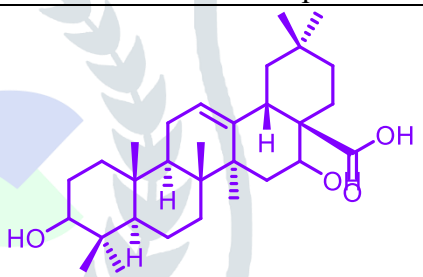
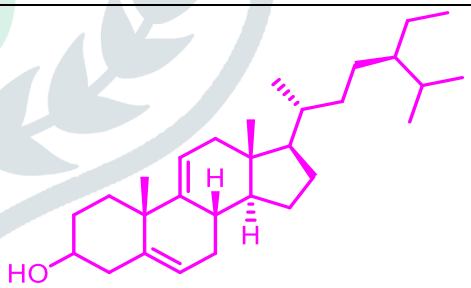
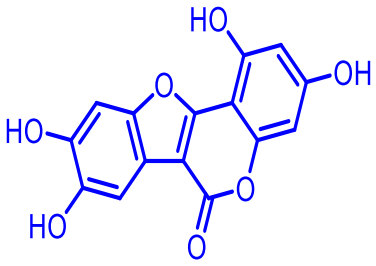
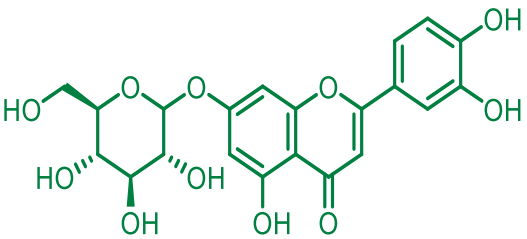
Tannins and Phenol Compounds	+
Quinones	+
Fixed oils and Fats	+
Terpenes	-

(+) Present; (-) Not present

V. PHYTOCHEMICAL CONSTITUENTS REPORTED FROM *ECLIPTA ALBA*

Coumestans, triterpenoids, flavonoids, polyacetylenes, glycosides and triterpenoids alkaloids are among the active principles found in Eclipta alba. Stigmasterol, wedelolactone, alpha-terthienylmethanol, demethylwedelolactone, and demethylwedelolactone-7-glucoside are all found in the leaves. Heptacosanol and Heptacosanol are produced by the roots. Polyacetylene-substituted thiophenes are found in the roots. In the n-hexane extract, the aerial component was found to include a phytosterol, P-amyrin, P-glucoside of phytosterol and luteolin-7-glucoside, triterpenic acid glucoside, wedelolactone. Hydrolysis of plant Polypeptides yields phenylalanine, glutamic acid, methionine tyrosine and cystine. This plant has been found to contain and nicotinic acid and nicotine. Four oleanane Glycosides-Eclalbasaponins 1-6 and three Taraxastane Triterpene glycosides-Eclalbasaponins 7-10 were identified.

Table 5: Phytochemical constituents from Eclipta alba

Name of the Compound	Structure of the compound
3,16-Dihydroxy-12-oleanen-28-oic acid	
Stigmasta-5,9(11)-dien-3-ol	
1,3,8,9-Tetrahydroxycoumestan	
Luteolin-7- glucoside	

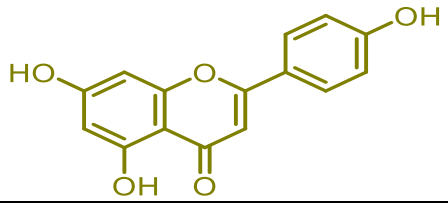
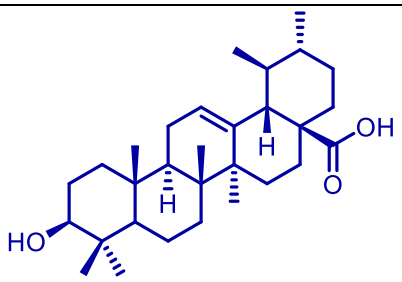
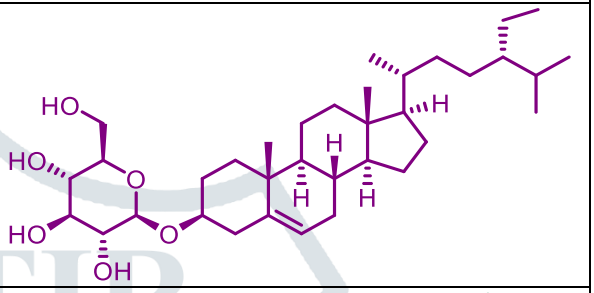
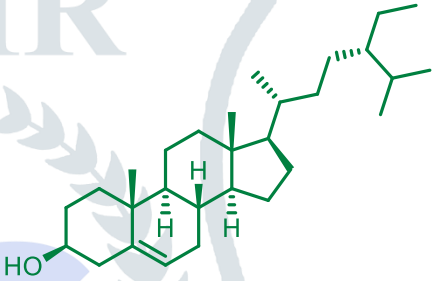
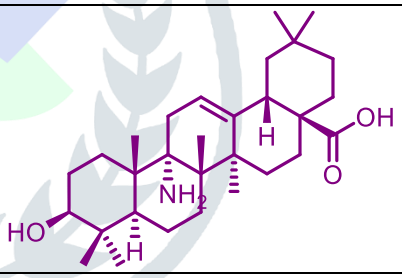
Apigenin	
Ursolic acid	
Daucosterol	
Sitosterol	
Oleanolic acid	

Table 6: Reported Phytochemical compounds in *Eclipta alba* plant

Extract of Plant part	Isolated compounds	Title of work	Author	Journal
Methanolic extract of whole plant	Six new oleanane triterpene glycosides named eclalbasaponins I-VI	Oleanane glycosides from *Eclipta alba*	Shoji Yahara et al	Chemical and Pharmaceutical Bulletin (1994) (5)
Methanolic extract of whole plant	Ecalbatin a triterpene saponin	Ecalbatin, A triterpene saponin from *Eclipta alba*	R.K. Upadhyay et al	Journal of Asian Natural Products Research (2001) (6)

Methanolic extract of whole plant	Triterpenoids	Isolation and Characterization of Triterpenoids from methanolic extract of medicinal plant: *Eclipta alba*	G.V.R. Sharma et al	International Journal of Pharmacy and Technology (2011) [7]
Methanolic extract of leaf	Oleic acid, Octadecenoic acid, Dodecanoic acid	Phytochemical analysis of leaf extract of *Eclipta alba* by GC-MS method	Anand.D et al	International Journal of Pharmacognosy and Phytochemical Research (2014) [8]
Methanolic extract of the root	Silane, Acetamide, L Alanine, c-Sitosterol, Tridecanol	Phytochemical Analysis of root extract of *Eclipta alba* by GC-MS method	K. Satheesh Naik et al	International Journal of Pharmaceutical Sciences Review and Research (2017) [9]

VI. REPORTED PHARMACOLOGICAL ACTIVITIES:

Table 7: Reported pharmacological activities:

Extract of Plant part	Reported Activity	Title of work	Author	Journal
Ethanolic extract of aerial parts	Hepatoprotective activity	Hepatoprotective effect of ethanolic extract of *Eclipta alba* on Experimental liver damage in Rats and Mice	B. Singh et al	Phytotherapy research (1993) [10]
Chloroform extract of aerial parts	Antidiabetic activity	Pharmacological Activities of *Eclipta alba*	Pranav Vashista et al	International Journal of Research and Development in Pharmacy and Life Sciences (2013) [11]
Acetone extracts of Aerial parts	Anti-bacterial activity	Pharmacological values of *Eclipta alba linn*	M.Shafi Parrey et al	World Journal of Pharmacy and Pharmaceutical sciences (2016) [12]

Ethanolic extract of leaves	Anti-inflammatory, Analgesic and Antipyretic activity	Evaluation of Anti-inflammatory, Analgesic and Antipyretic activity of *Eclipta alba* in Experimental animals	Dr Narendra Kumar et al	European Journal of Pharmaceutical and Medical Research (2017) [13]
Acetone extract of Leaves	Anti-oxidant activity	Phytochemical and antioxidant assay of *Eclipta alba* leaf extract	K. Sharad Tripathi et al	International Journal of Pharmaceutical Sciences and Research (2021) [14]

ANALGESIC ACTIVITY:

Mahesh Sawant et al worked on an experimental study that was conducted to determine the analgesic activity of the total ethanol extract of Eclipta alba, as well as the isolated alkaloids of Eclipta alba, in albino mice using standard experimental models such as the tail clip method, the tail flick method, and the acetic acid-induced writhing response. The results of this study reveal that both the ethanol extract and the whole alkaloids had good analgesic activity in all of the different analgesia models employed. In all models evaluated, the total alkaloidal percentage was the most effective. [15]

HEPATOPROTECTIVE ACTIVITY:

B. Singh et al in their work on rats and mice, an alcoholic extract of freshly obtained Eclipta alba displayed dose-dependent considerable hepatoprotective efficacy against carbon tetrachloride-induced liver injury. It demonstrated a protective role in measures such as zoxazolamine-induced paralysis, hexobarbitone-induced sleep bromosulphalen (BSP) clearance, serum levels of transaminases, protein and bilirubin. When given orally and intraperitoneally to mice, the extract showed no symptoms of toxicity and the minimum fatal dose was larger than 2.0 g/kg. [16]

HAIR GROWTH PROMOTING ACTIVITY:

R.K. Roy et al studied Alopecia which is a dermatological illness that has psychosocial consequences for those who experience hair loss. Eclipta alba Hassk. is a well-known Ayurvedic herb with claims to promote hair development. The described study attempted to assess the effect of petroleum ether and ethanol extracts of E. alba Hassk. on encouraging hair development in albino rats. The extracts were mixed into an oleaginous cream (water in oil cream base) and applied topically to albino rats shaved denuded skin. The time (in days) necessary for the commencement and completion of the hair growth cycle was noted. A 2% solution of minoxidil was applied topically as a positive control for comparison. Hair growth start time was cut in half when the extracts were used versus control animals. The period required for total hair growth was also greatly shortened. [17]

ANTIBACTERIAL ACTIVITY

Ray. A et al. conducted a study to determine the manner of antibacterial activity of Eclalbasaponins isolated from Eclipta alba against Gram-positive and Gram-negative bacteria. Various spectroscopic techniques, including Fourier transform infrared spectroscopy (FTIR) and mass spectroscopy, were used to identify the probable chemical structure. Well diffusion, pH sensitivity, chemotaxis, and crystal violet assays were used to assess antibacterial activity. Eclalbasaponins inhibited growth in both Bacillus subtilis and Pseudomonas aeruginosa and demonstrated a definite

zone of inhibition at pH levels ranging from 5.5 to 9.0. Both bacterial strains responded positively to the isolated saponin's chemoattractant properties.

The crystal violet assay results and the presence of UV-sensitive components in the cell-free supernatant corroborated the cellular damage produced by Eclalbasaponins therapy. Sodium dodecyl sulfate-polyacrylamide gel electrophoresis was used to evaluate the release of intracellular proteins caused by membrane disruption. FTIR and scanning electron microscopy investigations indicated additional changes in cell surface structure and membrane rupture. According to the findings, the isolated saponin from E. alba disrupts the bacterial cell membrane, resulting in the loss of bacterial cell viability. (18)

CEREBROPROTECTIVE AND ANTIOXIDANT ACTIVITY:

K.P. Mansoorali et al. conducted a study to assess the potential cerebroprotective and antioxidant impact of a hydroalcoholic extract of Eclipta alba against global cerebral ischemia in rats. Adult Wistar albino rats were given Eclipta alba extract for 10 days. Occluding bilateral common carotid arteries (BCCA) for 30 minutes, followed by 4 hours reperfusion, resulted in global cerebral ischemia-reperfusion damage. The reference ingredient was quercetin (20 mg/kg, i.p.). Following that, the animals were decapitated, the brain was extracted, and various biochemical estimations, cerebral edema, assessment of cerebral infarct size, and histological investigations were performed. BCCA depleted superoxide dismutase, glutathione peroxidase, reduced glutathione, glutathione-S-transferase, catalase, glutathione reductase, and increased malondialdehyde significantly in the brain. When compared to the ischemic control group, pretreatment with hydroalcoholic extract of Eclipta alba significantly reversed the levels of biochemical markers and significantly reduced edema and cerebral infarct size. Higher doses of Eclipta alba significantly decreased ischemia-induced neuronal death in the brain.

One of the most important treatments for lowering eventual chronic neurological damage in stroke is the reduction of cerebral edema, an early indicator of ischemia. The study's findings demonstrate that Eclipta alba pretreatment reduces cerebral ischemia/reperfusion injury and boosts antioxidant defense against BCCA occlusion-induced I/R in rats, indicating that it has cerebroprotective properties. (19)

HYPOGLYCEMIC ACTIVITY:

J. Ananthi et al studied Eclipta alba, an indigenous medicinal plant, that has a folk (Siddha and Ayurveda) reputation in rural southern India as a hypoglycemic agent. To confirm this claim, this study was carried out to evaluate the antihyperglycemic effect of E. alba and to study the activities of liver hexokinase and gluconeogenic enzymes such as Gucose-6-phosphatase and fructose 1,6-bisphosphatase in the liver of control and alloxan-diabetic rats. Oral administration of leaf suspension of E. alba (2 and 4 g/kg body weight) for 60 days resulted in a significant reduction in blood glucose, glycosylated haemoglobin, a decrease in the activities of glucose-6 phosphatase and fructose 1,6-bisphosphatase, and an increase in the activity of liver hexokinase. E. alba at the dose of 2 g/kg body weight exhibited better sugar reduction than 4 g/kg body weight. Thus, the present study clearly shows that the oral administration of E. alba possesses potent antihyperglycemic activity.

E. alba at a dose of 2 g/kg body weight reduced blood sugar levels more effectively than E. alba at a dose of 4 g/kg body weight. Thus, the current investigation reveals that E. alba has a significant antihyperglycemic effect when taken orally. (20)

ANTIOXIDANT ACTIVITY:

Monali Patil et al studied Superoxide radical scavenging activity, hydroxyl radical scavenging activity, nitrous oxide radical scavenging activity, 1,1-diphenyl-2-picrylhydrazyl (DPPH) radical scavenging activity, reducing ability, and Fe+2 chelating ability of hydro-alcoholic extract of Eclipta alba in vitro using standard procedure. The hydroalcoholic extract of Eclipta alba successfully scavenged free radicals at all doses and demonstrated high antioxidant potential, with effects being dose-dependent. Eclipta alba extract has strong antioxidant effects. (21

ANTI-INFLAMMATORY ACTIVITY:

Suresh et al reported that the anti-inflammatory effect of the plant Eclipta alba (Family - Asteraceae) was evaluated in rats using carrageenin, mediators such as histamine and serotonin-induced paw oedema, and cotton pellet-induced granuloma tests. The maximum inhibition (55.85%) was observed after 3 hours of drug therapy in carrageenin-induced paw oedema, whereas Indomethacin (standard medication) caused 61.30% inhibition. In the chronic model (cotton pellet produced granuloma), CEEA and standard medication reduced granuloma tissue formation by 49.7,41.5,22.1%, and 53.48%, respectively. The findings show that Eclipta alba extract has a powerful anti-inflammatory impact and therapeutic efficacy in animal models when compared to Indomethacin. (22)

ANTIAGRESSIVE ACTIVITY:

In his work, Otilia J F Lobo evaluated the efficacy of 100 and 200mg/kg aqueous extract of Eclipta alba to avoid aggression. Foot shock generated aggression and the water competition test was used to screen for anti-aggressive activity. In the water competition test, Eclipta alba considerably reduced dominance, which is connected to the amount of aggression, especially at 200mg/kg. In the foot shock-induced test, there was a noticeable behavioural submission with 100 and 200mg/kg and Eclipta alba. (23)

VII. CONCLUSION:

Eclipta alba is a tiny branching annual herbaceous folk medicinal plant with important anti-disease qualities. The plant has received a lot of interest since it contains important chemical components that can be used to cure a variety of infections and diseases. Even though the world has so many medicines to treat each ailment, they all have certain side effects that are quite dangerous to one's health. However, because these components are organic, metabolites extracted from Eclipta alba used to treat various diseases have no negative effects. Clinical studies have been conducted on various pharmacological activities such as anti-bacterial, anti-depressive hypoglycemic, hepatotoxicity, and so on. This plant also has a better ability to suppress the growth of bacteria and fungi.

VIII. FUTURE PROSPECTIVES:

Finally, further investigation of the plant can open the door to modern medicine by isolating new bioactive molecules that will be useful for the investigation of various pharmacological activities against incurable human diseases and will save the world from economic and environmental losses.

IX. REFERENCES

1. Sarker SD, Latif Z, Gray AI 2005. Natural products isolation: an overview. 2nd edn. Humana Press, New Jersey.
2. Chin Y-W, Balunas MJ, Chai HB, Kinghorn AD 2006 Drug discovery from natural sources. AAPS J 8: E239–E253.
3. Md Liton Rana, 2020. A review on traditional uses, phytochemistry and pharmacological properties of Eclipta alba Hassk- an innumerable medicinal plant.
4. Manik Sharma et al, 2012. Phytochemical constituents and Pharmacological activities of Eclipta alba linn (Asteraceae): A Review, International research journal of Pharmacy, 3(12)
5. Shoji Yahara et al; 1994. Oleanane Glycosides from Eclipta alba, Chemical and Pharmaceutical Bulletin, 42 (6). 1336-1338.
6. R.K. Upadhyay et al; 2006. Ecalbatin, A triterpene saponin from *Eclipta alba,* Journal of Asian Natural Products Research.
7. G.V.R. Sharma et al, 2011. Isolation and Characterization of Triterpenoids from methanolic extract of medicinal plant: *Eclipta alba,* International Journal of Pharmacy and Technology.
8. Anand.D et al; 2014. Phytochemical analysis of leaf extract of *Eclipta alba* by GC-MS method; International Journal of Pharmacognosy and Phytochemical Research; 6(3):562-566.

9. K. Satheesh Naik et al; 2017. Phytochemical Analysis of root extract of *Eclipta alba* by GC-MS method; International Journal of Pharmaceutical Sciences Review and Research.
10. B. Singh et al; 1993. Hepatoprotective effect of ethanolic extract of *Eclipta alba* on Experimental liver damage in Rats and Mice, Phytotherapy Research, Vol 7, 154-158.
11. Pranav Vashista et al; 2013. Pharmacological Activities of *Eclipta alba*, International Journal of Research and Development in Pharmacy and Life Sciences; 2(4), 499-502
12. M.Shafi Parrey et al; 2016. Pharmacological values of *Eclipta alba linn*, World Journal of Pharmacy and Pharmaceutical Sciences; 5(12), 504-512.
13. Dr Narendra Kumar et al; 2017. Evaluation of Anti-inflammatory, Analgesic and Antipyretic activity of *Eclipta alba* in Experimental animals, European Journal of Pharmaceutical and Medical Research; 4(3), 391-399.
14. K. Sharad Tripathi et al; 2021. Phytochemical and antioxidant assay of *Eclipta alba* leaf extract, International Journal of Pharmaceutical Sciences and Research; 12(4), 2288-2295.
15. Mahesh Sawant et al, 2004. Analgesic studies on total alkaloids and alcohol extracts of Eclipta alba (Linn) Hassk, Phytotherapy Research, 18, 111-113.
16. B. Singh et al, 1993. Hepatoprotective effect of ethanolic extract of Eclipta alba on experimental liver damage in rats and mice, Phytotherapy Research, 7(2).
17. R.K. Roy et al, 2008. Hair growth promoting activity of Eclipta alba in male albino rats, Archives of Dermatological Research, 300, 357-364.
18. A. Ray et al, 2013. Mode of Antibacterial activity of Eclalbasaponin isolated from Eclipta alba, Applied Biochemistry and Biotechnology, 171, 2003-2019.
19. K.P. Mansoorali et al, 2012. Cerebroprotective effect of Eclipta alba against the global model of cerebral ischemia-induced oxidative stress in rats, Phytomedicine, 19, 1108-1116.
20. J. Ananthi et al; 2003. Antihyperglycemic activity of Eclipta alba leaf on alloxan-induced diabetic rats, Yale Journal of Biology and Medicine, 76(3).
21. Monali Patil et al, 2016. Antioxidant activity of Eclipta alba extract, Journal of Medicinal Plant Studies, 4(5): 92-98.
22. S. Suresh Kumar et al, 2005. Evaluation of Anti-inflammatory activity of Eclipta alba in rats, Ani Sci Life, 24(3),112-8.
23. Otilia J F Lobo et al, 2008. Evaluation of Anti-aggressive activity of Eclipta alba in Experimental animals, Pakistan Journal of Pharmaceutica Sciences, 21(2):195-9.