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Bhringraj (Eclipta Alba): A thorough Review of its Therapeutic Benefits and Uses

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ABSTRACT

The plant Eclipta alba Hassk [Asteraceae] plays a significant role in the traditional Ayurvedic, Unani systems of holistic health, and eastern herbal medicine.

Traditional medicine uses it to cure a variety of diseases, including gastrointestinal problems, respiratory tract disorders (asthma), hair loss and graying, fever, liver disorders with jaundice, skin disorders, spleen enlargement, and cuts and wounds. Eclipta alba's main ingredients are coumestan derivatives such as wedololactone [1.6%], demethylwedelolactone, desmethyl-wedelolactone7glucoside, ecliptal, ß-amyrin, and luteolin-7-O-glucoside. hentriacontanol, heptacosanol, stigmasterol

The primary goal of this review was to gather and analyze existing data on eclipta alba traditional applications, phytoconstituents, and biological activity. Scientific information was gathered from online bibliographic databases such as Scopus, MEDLINE/PubMed, Google Scholar, SciFinder, and books and proceedings.

KEYWORDS; Eclipta alba ,Asteraceae, Keshraj

1 INTRODUCTION

In the global health care system, conventional medications are crucial. Approximately 75% of people worldwide are reliant on various portions of therapeutic plants and their extracts for health. Eclipta alba (L.) is a well-known and valued medicinal plant in India . It is referred to as the "King of Hairs" and is utilized as a hepatoprotective medication in indigenous medicine.[i]

Eclipta alba, sometimes known as E. prostata regionally, is an evergreen plant endemic to Asia that is a member of the Asteraceae family.[ii]

The fake daisy, or Eclipta alba (Asteraceae), is an annual herbaceous plant. It is an annual, erect or prostrate plant with many branches, rough hairs, and roots at the nodes. Its leaves are lanceolate and opposite, sessile. Other names for it include Bhringaraj and Karisilakanni is a common weed that grows up to 6000 feet in elevation in India. The Greek word for "deficient," which refers to the fruits' lack of bristles and awns, is the source of the genus name. Eclipta alba specifically means "white," referring to the blooms' hue. The primary active ingredients are furanocoumarins, oleanane and taraxastane glycosides, coumestans such as welolactone and desmethylwelolactone43, and others.[iii]

It is crucial for its pharmacological activity like Osteoprotective[iv] anti-HIV, and larvicidal activities,[v] nootropic and anti-stress activities .[vi] anti-haemorrhagic, anti-hyperglycemic, and antioxidant agent [vii] anti inflammatory [viii] The water extract of Eclipta prostrata (whole plant) exhibited the most potent inhibitory activity against HIV-1 integrase (HIV-1 IN) .[ix]

2 VERNACULAR NAME

Eng. - Trailing Eclipta.

Hindi - Bhamgra, Mochakand, Babri, Bhangra.

Beng. - Bheemraja, Kesuriya, Kesari, Kesuti, Keshwri.

Guj. - Bhangra, Kaluganthi, Dodhak, Kalobhangro.

Kan. - Garagada, Soppu.

Mal. - Kannunni, Kayyonni.

Mar. - Maka, Bhringuraja.

Tam. - Kaikesi, Garuga, Kayanthakara.

Tel. - Guntakalagara, Guntagalagara.

Arab. - Kadim-el-bint.

Assam. - Bhrngaraja.

Oriya - Kesara, Kesarda

Santhal - Lal Kesari.

Sind - Tik.

Sing - Kikirindi.

Sansk. - Kesaraja, Tekaraja, Bhrnga, Markava, Bhrngaja.

Punj. - Bhangra.

Urdu. – Bhangra [x]

3 BOTANICAL AND MARPHOLOGICAL DISCRIPTION

A little annual plant with branches that is 10.0–15.0 cm height, with cylindrical, reddish-green stems that are branched and occasionally root at the nodes, sparse white hairs, and distinct nodes

Well-developed, cylindrical, grayish-brown roots with tap and lateral roots

Decussate and opposite leaves, oblong lamina, attenuated bases, subentire to serrate edges, sharp ends, white strigose on both surfaces, light green lower surface, subsessile to sessile, and exstipulate axillary, solitary, or two inflorescence capitula, and uneven axillary peduncles Reddish green, cylindrical, white pubescent, with eight involucres bracts and green ovate hairs, 4.5-6.5 cm long White, heterogeneous flowers with disc floret tubular, 20–30 tiny florets, ray floret ligulae, 15-20 florets, small not teeth, 4-lobed, without pappus

The anther is joined, syngenesious, basifixed, longitudinally dehiscence, epipetalous, thin, and free. Style thin, stigma bi-fids, inferior, basal placentation, one ovule per locule, carpel bicarpellary syncarpous. The fruit is a conical achene. Seed cuneate, water-covered, with slender wings.[xi]

Bringraj

4 MACROSCOPIC AND MICROSCOPIC PROPERTIES

Summary of macroscopic and microscopic characteristics observed for stem root and leaf tissue of Eclipta alba (L.) Hassk. [xii]

Table no 1

Feature	Description
Hair type on leaf blade	Appressed pilose
Leaf shape	Linear-oblong
Stomata type	Anomocytic
Glandular trichomes	Present
Number of ray florets	30–40
Stem shape	Circular
Number of vascular bundles (stem)	15–20
Secretory/resin ducts	Present

5 TAXONOMY HIERARCHY

table 2. Taxonomic hierarchy of *E. alba*.[xiii]

KINGDOM	**PLANTAE**
Subkingdom	Viridaeplantae
Infrakingdom	Streptophyta
Division	Streptophyta
Subdivision	Spermatophytina
Infradivision	Angiospermae
Class	Magnoliopsida
Superorder	Asteranae
Order	Asterales
Family	Asteraceae
Genus	Eclipta L.
Species	Eclipta alba (L.) Hassk.

6 CHEMICAL CONSTITUENTS

table 3. Parts containing chemical constituents of Eclipta alba [xiv]

SR NO.	PARTS	CHEMICAL CONSTITUENTS
1	Leaves	Wedelolactone[1.6%], Desmethylwedelolactone,Desmethylwedelolactone-7-glucoside, stigmasterol
2	Roots	Hentriacontanol, Heptacosanol& Stigmasterol, Ecliptal, Eclalbatin.
3	Arial parts	β-amyrin & Luteolin-7-0-glucoside, Apigenin, Cinnaroside, Sulphur compounds, Eclalbasaponins I-VI
4	Stems	Wedelolactone
5	Seeds	Sterols, Ecliptalbine (alkaloid)
6	Whole plant	Resin, Ecliptine, Reducing sugar, Nicotine, Stigmasterol, Triterpene saponin, Eclalbatin,Ursolic acid, Oleanolic acid

7 PHYTOCHEMISTRY OF ECLIPTA ALBA

Wedololactone [1.6%], demethylwedelolactone, and desmethyl-wedelolactone-7glucoside are the main ingredients of Eclipta alba. Other constituents include ecliptal, β-amyrin, luteolin-7-O-glucoside, hentriacontanol, heptacosanol, and stigmasterol.[xv]

The plant Eclipta alba contains the triterpenoid saponins eclalbasaponin I, eclalbasaponin II, eclalbasaponins III–VI, XI and XII, eclipta saponin C and D, eclalbatin, the flavonoids apigenin and luteolin7-glucoside.[xvi]

Wedelolactone is active principle compound of this liver disorder treating drug . It also exhibits Trypsin inhibitory effect suppresses LPS-induced caspase-11 expression in cultured cells by directly inhibiting the IKK complex, treatment of cirrhosis of the liver and infectious hepatitis.[xvii]

Phytochemicals obtained from Eclipta Alba possess impressive pharmacological properties that are effective against microbes responsible for skin diseases, as well as various inflammatory skin conditions. Skin infections may result from different types of pathogens, including bacteria (such as those causing acne, impetigo, leprosy, boils, and scarlet fever), fungi (like those responsible for candidiasis, athlete's foot, and fungal nail infections), and viruses (including those that lead to condylomata acuminata and herpes simplex labialis).[xviii]

E.alba contains Wedelolactone, Luteolin, and β-amyrin, which may contribute to its antiepileptic properties.[xix]

8 CLASSICAL VIEW OF ECLIPTA ALBA

Bhavaprakasha Nighantu –Guduchyadi varga [xx]

Raj nighantu – moolakadi gana [xxi]

9 VARIETIES

Three varieties are mentioned in Raj nighantu [21]

1]White

2]Yellow

3]Blue

10 PROPERTIES 20

Rasa –Katu [pungent] Tikta[bitter]

Vipak-Katu

Veerya-Ushna

Guna –Rooksha

Karma-Keshya,Twachya,Krumighna,Kasha,Swash

In the ayurvedic texts nighantus

11 AYURVEDIC FORMULATIONS OF ECLIPTA ALBA

table no 4 [xxii]

Formulation	Key Ingredients	Proportions/Details	Primary Uses
Grahani Mihira Taila	E. alba, Sesame oil	12 g of *E. alba* / 4 L of sesame oil	Fever, acidity (Amlapitta), respiratory disorders
Kayyanyadi Taila	E. alba juice, *Tinospora cordifolia* paste, *Glycyrrhiza glabra* paste, *Phyllanthus emblica*, Anjana (Pathrapakam), Milk, Sesame oil	- *E. alba* juice, Yashti & Amrutha paste 2.26% - Dhatri 8% - Pathrapakam 0.58% - Milk 5%, Sesame oil 84%	Pitta disorders, especially in the head and scalp; commonly used for hair and skin issues
Nilakadya Taila	E. alba, Sesame oil	12 g *E. alba* / 3 L of sesame oil	Abhyanga (external oil application)
Neelibhringadi Taila	Leaf juice of *E. alba*, Sesame oil	768 ml *E. alba* juice / 6.5 L sesame oil	Shirashula (headache), external use, promotes hair health
Bhringaraja Churna	*E. alba*, *Terminalia chebula* (Haritaki), Jaggery	Equal parts of *E. alba* & *Haritaki* + jaggery	Amlapitta (gastritis), taken post-meals
Bhringarajadi Churna	*E. alba*, *Sesamum indicum*, *Phyllanthus emblica*, jaggery/sugar	1 part *E. alba* 0.5 part sesame & Dhatri 2 parts jaggery/sugar	Rasayana (rejuvenation), anti-aging, general health support
Churna (dose info)	—	0.5–1 g daily	As Rasayana

12 DOSAGE

Oil – 3-5 drops

Fresh juice – 5-10ml

Powder – 2 – 3 gm in divided doses [xxiii]

13 PHYSICOCHEMICAL CHARACTERS OF DRIED POWDER [xxiv]

table no 5

Sr. No.	Parameter	Value
1	Foreign matter	1.5% w/w
2	Acid-insoluble ash	8.4% w/w
3	Water-soluble extractive	21.1% w/v
4	Alcohol-soluble extractive	9.5% w/v
5	Loss on drying at 110 °C	5.5% w/w

Sr. No.	Parameter	Value
6	Total ash value	19.8% w/w

14 PHARMACOLOGICAL ACTIVITY

14.1 HEPATOPROTECTIVE

In India, it is used to treat a variety of liver and gallbladder conditions, including infectious hepatitis, liver cirrhosis, and liver enlargement.[xxv]

The study discovered that the primary active ingredients in the ethyl acetate-soluble fraction of the medication Eclipta alba (L.) Hassk. Asteraceae were the coumestans wedelolactone and demethyl-wedelolactone, in addition to a flavonoid and simple phenolcarboxylic acids. Assays using CCl4-, GalN-, and phalloidin-cytotoxicity in rat hepatocytes demonstrated antihepatotoxic activity for both components. Additionally, they had a strong stimulatory effect on the regeneration of liver cells.[xxvi]

Eclipta Alba is considered a powerful liver tonic. The hepatoprotective potential of Eclipta Alba was studied by assessing the biochemical parameters like lipid peroxide (LPO), superoxide dismutase (SOD), Catalase (CAT), glutathione peroxide (GPx), glutathione reductase (GR), ascorbic acid and α-tocopherol. Oral administration of the Eclipta Alba significantly decreased levels of LPO and elevated the activity of antioxidant enzymes SOD, CAT, GPx, and GR as well as endogenous levels of ascorbic acid and α-tocopherol. Eclipta Alba has show protective effect on experimental liver damage in rats and mice and also used for the treatment of liver cirrhosis and infective hepatitis by reducing centrilobular necrosis, hydropic degeneration and fatty change of the hepatic parenchymal cells .[xxvii]

14.2 HAIR GROWTH PROPERTY

The plant's methanol extract was tested for its capacity to promote hair growth in pigmented C57/BL6 mice that were preselected for their telogen phase of hair growth. Melanin-producing melanocytes are absent from the truncal epidermis of these animals, and melanin generation is only associated with the anagen phase of hair growth. The extract was applied topically to assess the telogen to anagen transition. Eclipta alba methanol extract promotes hair development by inducing anagen in telogen (resting) phase hair follicles. Animals administered 3.2 mg/15 cm2 of Eclipta alba methanol extract showed better efficacy than those given lower doses. [xxviii]

The impact of petroleum ether and ethanol extracts of E. alba Hassk. on albino rat hair formation was investigated. The extracts were applied topically to the shaved, debared skin of albino rats after being combined with oleaginous cream, a water-in-oil cream basis. The amount of time (measured in days) needed to start and finish the hair growth cycle was recorded. A 2% solution of minoxidil was applied topically and served as a comparison positive control. When compared to control mice, the extracts cut the hair growth initiation time in half. Additionally, the time needed for complete hair growth was significantly reduced. [xxix]

14.3 ANTIANAPHYLACTIC ACTIVITY

The antianaphylactic activity of an alcoholic extract of Eclipta alba at two different doses of 250 and 500 mg/kg was examined using a range of animal models, such as the effect on mast cell degranulation using rat mesentery, passive cutaneous anaphylaxis using rat, measuring Evans blue dye leakage in skin, and passive paw anaphylaxis. Measure the paw volume using a plethysmometer and a rat. The trachea of guinea pigs was used to measure different blood cells, the amount of histamine in lung tissues, and a bronchoalveolar lavage (BaL) fluid. Eclipta alba showed beneficial effects on paw anaphylaxis caused by antiserum, the infiltration of various immune cells, and histamine production from the lungs. The antianaphylactic action of Eclipta alba's alcoholic extract may be attributed to its capacity to stabilize membranes, inhibit the release of histamines brought on by antigens, and reduce the release of other inflammatory mediators. .[xxx]

14.4 CEREBROPROTECTIVE AND ANTI OXIDANT

The purpose of the study was to assess the potential antioxidant and cerebroprotective effects of Eclipta alba hydroalcoholic extract against global cetrebral ischemia in rats. The study demonstrates the antioxidant properties of Eclipta alba in brain ischemia and reperfusion-induced oxidative damage. The results show that Eclipta alba scavenges reactive oxygen species, inhibits the production of free radicals, and modifies intracellular antioxidants to minimize reductions caused by ischemic reperfusion, thereby reducing ischemia-induced oxidative stress..[xxxi]

14.5 ANTIBACTERIAL PROPERTY

Extracts from the aerial parts of Eclipta alba can inhibit the development of some gram-positive and gram-negative bacteria in a variety of solvents, including acetone, ethanol, methanol, water, and hexane. Agar well diffusion techniques were used in the antibacterial investigations. Additionally, the MIC and MBC approaches were applied. While acetone, ethanol, methanol, and aqueous extracts demonstrated intermediate action, hexane extract shown high antibacterial activity against S. aureus, B. cereus, E. coli, S. typhi, K. pneumoniae, S. pyogenes, and P. mirabilis. Ciprofloxacin 25 µg/ml, a common antibiotic, was used to compare the inhibitory activity of all the extracts that were described.[xxxii]

14.6 ANTI –DIABETIC EFFECT

Rats with and without alloxan-induced diabetes had their livers investigated for the presence of gluconeogenic enzymes, including fructose 1,6-bisphosphatase, glucose-6-phosphatase, and liver hexokinase, as well as for the antihyperglycemic action of E. alba. and their findings show a significant drop in blood glucose, glycosylated hemoglobin, reduced activity of fructose 1,6-bisphosphatase and glucose-6 phosphatase, and increased activity of liver hexokinase.. [xxxiii]

14.7 ANTI CANCER

This study examined its antiproliferative effect on liver and other related malignancies. It has been demonstrated that the hydroalcoholic extract of Eclipta alba exhibits antiproliferative, apoptotic, and anti-invasive properties .[xxxiv]

Studies have shown that Eclipta alba's methanolic extract was significantly more selective against human colorectal carcinoma (HCT-116) cells than other cancer cells..[xxxv]

14.8 ANTI OXIDANT PROPERTY

According to a study, Eclipta alba extract has significant levels of ascorbic acid, flavonoids, tannins, and phenolics. Eclipta alba's hydroalcoholic extract demonstrated strong antioxidant activity and dose-dependent effects while efficiently scavenging free radicals at all dosages. The extract from Eclipta alba has strong antioxidant qualities..[xxxvi]

14.9 ANALGESIC

An experimental study was conducted using common experimental models, including the tail clip method, the tail flick method, and the acetic acid-induced writhing response, to ascertain the analgesic activity of the total ethanol extract of Eclipta alba and the isolated alkaloids of Eclipta alba in albino mice. The study's findings demonstrate that in each of the many analgesia models employed, the ethanol extract and the whole alkaloids both exhibited strong analgesic effects. In every model that was studied, the overall alkaloidal percentage was the most effective..[xxxvii]

14.10 WOUND HEALING ACTIVITY

The ethanolic extract of Eclipta alba leaves was tested for wound healing activity in ether-anesthetized Wistar rats at two doses (150 and 300 mg/kg) utilizing the incision, excision, and dead space wound models. There was a significant increase in skin breaking strength, granuloma breaking strength, wound contraction, hydroxyl proline concentration, and dry granuloma weight, whereas the epithelization period decreased.[xxxviii]

14.11 ANTIFUNGAL ACTIVITY

The antifungal activity of Eclipta alba extract against the sorghum fungal diseases Fusarium thapsinum, Alternaria alternata, Epicoccum sorghinum, and Curvularia lunata was assessed both in vitro and in vivo. The soxhlet extraction method was used to extract the dried E. alba powder in stages using hexane, ethyl acetate, methanol, and water. The agar well diffusion method was used to assess the antifungal activity of crude solvent extracts of E. alba. With a maximal 6.0 mm inhibition of E. sorghinum at 80 mg/mL and F. thapsinum (5.8 mm) at 120 mg/mL, the methanol extract had the strongest antifungal activity. In contrast, A. alternata (5.9 mm) and C. lunata (5.9 mm) were inhibited at 100 mg/mL.[xxxix]

14.12 ANTI HYPERLIPEDIMIC PROPERTY

Diacylglycerol acyltransferase (DGAT) is an essential enzyme in the final step of the glycerol phosphate pathway. Excess triglyceride synthesis results in a variety of symptoms, including type II diabetes, hypertriglyceridemia, and obesity. The active polyacetylene components of E. prostrata stem were investigated for their ability to inhibit the DGAT enzyme. Kuraridine was employed as a positive control, which is a DGAT inhibitor. Eight isolates demonstrated potent action, with IC50 values ranging from 74.4 ± 1.3 to 101.1 ± 1.1 μM, while the positive control was 10.4 ± 1.4 μM.[xl]

16 CONCLUSION AND FUTURE PERSPECTIVE

Traditional medical professionals view E. alba as a valuable medicinal plant, especially for the treatment of fever, skin conditions, hair loss, respiratory tract problems, gastrointestinal disorders, and liver illnesses. Different sections of the plant contain a wide variety of bioactive substances, including flavonoids, glycosides, alkaloids, triterpenoids, coumestans, and others. Wedelolactone and demethylwedelolactone, the active constituents extracted from the Eclipta alba plant, are what provide rats' liver damage caused by carbon tetrachloride, galactosamine, and phalloidin its strong antihepatotoxic effects. Therefore, Eclipta alba has exceptional therapeutic and preventative potential. Clinical research on Eclipta alba's health-promoting properties is ongoing.

It is necessary to conduct thorough research on the clinical examination of plant extracts and Ayurvedic/herbal formulations.

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