



## PHYTOCHEMICAL CONSTITUENTS AND PHARMACOLOGICAL ACTIVITIES OF *ECLIPTA ALBA* LINN (ASTERACEAE): A REVIEW

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### ABSTRACT

*Eclipta alba* (L.) Hassk commonly known as bhringraj. It is mainly found spreading easily in moist grounds and is widely used for its nutritional values all over the world. The plant is used to treat different diseases in human in traditional medicine. The important pharmacological activities are hepatoprotection, antibacterial, analgesic, antidiabetic hair growth, etc. This paper explains the evidence-based information regarding the photochemistry and pharmacological activity of this plant

**Key words:** *Eclipta alba*, bhringraj, photochemistry and pharmacological activity.

### INTRODUCTION

*Eclipta alba* (L.) Hassk commonly known as False Daisy and bhringraj, is a plant belonging to the family Asteraceae.<sup>1</sup> It is also named 'kehrj' in Assamese and karisalankanni in Tamil. It is a perennial herb usually found spreading easily in moist tropical countries. The branches are hairy, reddish brown and can grow up to 40 cm high. The roots are found growing at the thickened nodal points. The leaves are opposite, lance like with a toothed edge and hairy. When the leaves are cut with iron knife, it turns the sap black. The flowers are white, small and arranged in small clusters. The flowering stalk arises from the axis of the leaf. The dry fruit is formed by fusion of two carpels, which do not break open and each has just one seed. Root well developed, cylindrical and grayish.<sup>2</sup>

### Distribution

*Eclipta alba* L. occurs throughout the whole of India. It is widely distributed throughout India, China, Thailand, and Brazil. It is common in waste places, marshy lands, hedges and roadsides, particularly in the more tropical parts of the country. It is also found in other eastern countries including Indonesia, Sri Lanka, Philippines, Nepal and Malaysia where it grows well in clay and moist ground-bunds, paddy fields, water courses, tanks, both in the plains and the hilly regions.

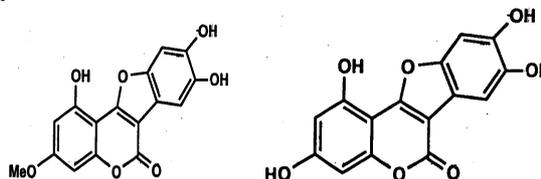
### Traditional Uses

*Eclipta alba* Linn. has been traditionally used for blackening, promoting hair growth and strengthening the hair. It is believed by some people that if it is taken internally as well as applied externally the hair will eventually turn black. As a dye it has also been used in tattoos. In Ayurveda medicine, the leaf extract is considered a powerful liver tonic and rejuvenative. It has traditional external uses, like athlete foot, eczema and dermatitis, on the scalp to address hair loss and the leaves have been used in the treatment of scorpion stings. It is used as anti-venom against snake bite in China and Brazil. It is reported to improve hair growth and colour.<sup>3</sup>

### Phytochemicals

*Eclipta alba* (L.) contains wide range of active principles, which includes coumestans, alkaloids, flavonoids, glycosides, polyacetylenes, triterpenoids. The leaves contain stigmaterol,  $\alpha$ -terthienylmethanol, wedelolactone, demethylwedelolactone and demethylwedelolactone-7-glucoside. The roots give hentriacontanol and heptacosanol. The roots contain polyacetylene substituted thiophenes. The

aerial part was reported to contain a phytosterol, P-amyirin in the n-hexane extract and luteolin-7-glucoside, P-glucoside of phytosterol, a glucoside of a triterpenic acid and wedelolactone in polar solvent extract. The polypeptides isolated from the plant yield cystine, glutamic acid, phenylalanine, tyrosine and methionine on hydrolysis. Nicotine and nicotinic acid were reported to occur in this plant<sup>4</sup>



Structures of two important isolated phytochemicals from *eclipta alba*<sup>5</sup>  
Wedelolactone                      Demethylwedelolactone

### Pharmacological activities of *Eclipta alba*

#### Analgesic activity

Analgesic effect was studied on albino mice using ethanolic and alkaloidal extract of *Eclipta alba*. Standard experimental models such as the tail clip method, the tail flick method and the acetic acid induced writhing response were used which showed both the ethanol extract as well as the total alkaloids produced good analgesic activity in all the different models of analgesia used. The total alkaloidal fraction was the most effective in all models tested.<sup>7</sup>

#### Anti-aggression activity

It was investigated the ability of 100 and 200 mg/kg of aqueous extract of *Eclipta alba* to circumvent aggression. Foot shock induced aggression and water competition test were utilized as models for screening of antiaggressive activity. *Eclipta alba* significantly minimized dominance ( $p < 0.05$ ) which was correlated to the level of aggression particularly with 200mg/kg in the water competition test. A tangible behavioral submission was observed with 100 and 200 mg/kg and of *Eclipta alba* in the foot shock induced test.<sup>8</sup>

#### Anti-bacterial activity

The antibacterial potential of aerial parts extracts of *Eclipta alba* was studied in solvents like acetone, ethanol, methanol, aqueous and hexane against selected gram positive and gram

negative bacterial species. The antibacterial studies were done by agar well diffusion methods. The hexane extract of *Eclipta alba* showed high antibacterial activity against *S.aureus*, *B.cereus*, *E.coli*, *S.typhi*, *K.pneumoniae*, *S.pyogenes* and *P.aeruginosa*. whereas acetone, ethanol, methanol and aqueous extracts showed intermediate activity against *S.aureus*, *B.cereus*, *E.coli*, *S.typhi*, *K.pneumoniae*, *P.aeruginosa*, *P.mirabilis* and *S.pyogenes*<sup>9</sup>

#### Anticancer activity

The hydroalcoholic extract of *Eclipta alba* was used as anti-cancer agent using HepG2, C6 glioma and A498 cell lines as model system. Antiproliferative and cytotoxic effects of the *Eclipta alba* hydroalcoholic extract (EAE) was determined using MTT assay. The expression level of NF-kB was analysed by western blotting and RT PCR. Gelatin zymography was done for gelatinase matrix metalloproteinases (MMP-2 and 9) analysis. EAE inhibited the cell proliferation in dose dependent manner in HepG2, A498 and C6 glioma cell lines with an IC<sub>50</sub> of 22±2.9, 25±3.6 and 50±8.7 µg/ml, respectively. The expression of MMP (2 and 9) was down-regulated with EAE treatment. DNA damage was observed following 72h of extract treatment, leading to apoptosis.<sup>10</sup>

#### Anti-diabetic activity

Leaf suspension of *Eclipta alba* (2 & 4g/kg) orally in alloxan induced diabetic rats resulted in reduction in blood glucose level, glycosylated hemoglobin. There was decreased activity of glucose-6 phosphatase and fructose 1,6-bisphosphatase, and an increase in the activity of liver hexokinase. Thus oral administration of *Eclipta alba* suspension possess potent antihyperglycemic activity. *Eclipta alba* as an ingredient in polyherbal formulation Pan-five were scientifically and clinically proved to possess antidiabetic and diuretic activity by acting upon pancreas by restoration and regeneration of pancreatic β-cell activity.<sup>11</sup>

#### Anti-helmenthic activity

The study was carried out to investigate the antihelmenthic potential of methanolic extract of whole plant of *Eclipta alba* (L.) Hassk against *Pheretima posthuma* as a species of earthworm. Various concentrations (25-100 mg/ml) of methanolic extract were evaluated for antihelmenthic activity by recording the time required for paralysis and death of worms. Albendazole was used as standard. Results indicated that methanol extract significantly ( $p<0.01$ ) exhibited paralysis at lower doses of 50, 75 and 100 mg/ml and causes death of worms at doses of concentrations 75 and 100 mg/ml when compared with standard.<sup>12</sup>

#### Anti-hepatotoxic properties

The effect of *Eclipta alba* (EA) extract was studied on paracetamol induced hepatic damage in mice. Upon the treatment with 50% ethanol extract of *E.alba* (100 and 250 mg/100g body weight) was found to protect the mice from hepato-toxic action of paracetamol as evidenced by significant reduction in the elevated serum transaminase levels and the histopathological studies showed marked reduction in fatty degeneration and centrizonal necrosis, in animals receiving different doses of *E.alba* along with paracetamol as compared to the control group. It was confirmed that the extract treated groups were partially protected from hepatocellular damage caused by paracetamol.<sup>13</sup>

#### Anti-inflammatory activity

Albino wistar rats were used to investigate anti-inflammatory activity in which methanolic extract was administered orally. 100 and 200 mg/kg showed significant anti-inflammatory

activity in carrageenin and egg white induced hind paw edema in rats which was compared with indomethacin (10 mg/kg) and cyproheptadine (8 mg/kg)<sup>14</sup>

#### Hair growth promoter activity

The methanol extract of *Eclipta alba* promotes hair growth by inducing anagen in telogen (resting) phase hair follicles. Animals treated with 3.2 mg/15 cm<sup>2</sup> of methanol extract of *Eclipta alba* showed better efficacy as compared to lower doses. The activity was assessed by studying the melanogenesis in resected skin, follicle count in the subcutis, skin thickness and surrogate markers in vehicle control and extract treated animals. Thus they suggested that methanol extract of *Eclipta alba* had potential as a hair growth promoter.<sup>15</sup>

#### Memory enhancing activity

The suspension of *Eclipta alba* containing 100 and 200 mg/kg was administered in rats to evaluate Transfer Latency (TL) on an elevated plus maze. TL was a measure of acquisition and retrieval learning. Mice were placed at the center of open field apparatus to assess spatial habitual learning, observed for 20 minutes for rearing and time spent during rearing using varied doses for 30 minutes, 24 hours and 96 hours and 144 hrs. The results revealed significant improvement of retrieval memory.<sup>16</sup>

#### CONCLUSION

This review presents some phytochemicals and detailed pharmacological information of *Eclipta alba*. The review of pharmacological studies suggests that the traditional uses of the plant are scientifically valid. Researchers are exploring the therapeutic potential of this plant as it has more therapeutic properties which are not known.

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