Review Article
ISSN: 0974-6943

V. M. Jadhav et al. / Journal of Pharmacy Research 2009, 2(8),1229-1231

Available online through
www.jpronline.info

Chemical composition, pharmacological activities of *Eclipta alba*

V.M. Jadhav*, R. M.Thorat, V.J. Kadam and K.P. Salaskar
**Department of Quality Assurance, Bharati Vidyapeeth's College of Pharmacy, Sector 08, CBD Belapur, Navi-Mumbai – 400614, India*

Received on 27-03-2009; Accepted on: 26-06-2009

ABSTRACT

World Health Organization appreciated the importance of medicinal plants for public health care in developing nations. *Eclipta alba* (Bhringaraja) having important role in the traditional Ayurvedic and Unani systems of holistic health and herbal medicine of the east.The principal constituents of *Eclipta alba* are coumestan derivatives like wedololactone[1.6%], demethylwedelolactone, desmethyl-wedelolactone-7glucoside and other constituents are ecliptal, ß-amyrin, luteolin-7-O-glucoside, hentriacontanol, heptacosanol, stigmasterol. All the parts of *Eclipta alba* and chemical constituents are used as anticancer, antileprotic, analgesic, antioxidant, antimyotoxic, antihaemorrhagic, antihepatotoxic, antiviral, antibacterial, spasmogenic, hypotensive, ovicidal, promoter for blackening and growth of hair. This article highlights chief constituents their biological activities, uses of various parts, pharmacological activities, toxicity and clinical studies of *Eclipta alba*.

Keywords: Chemical constituents, Biological activity, Parts, Toxicity and Clinical Studies of *Eclipta alba*.

INTRODUCTION

Eclipta alba Hassk [Asteraceae] is a small genus of herbs commonly known as Bringaraja [Sanskrit], Maka [Marathi] and Bhangra [Hindi]. The plant is distributed throughout India in wet or moist wastelands, ascending upto 2000m on the hills. It is an erect or prostrate, much branched herb with white flowers.

The plant has a bitter, hot, sharp, dry taste and is used in Ayurveda [a primary health care system of India], for the treatment of vitiated conditions of kapha and vata. Traditionally, it is extensively used against jaundice, in treatment for night blindness, headache and diseases pertaining to hair and its growth. It is also considered as a rejuvenator[1].

CHEMICAL COMPOSITION OF *Eclipta alba*

The chemical composition of *Eclipta alba* is major containing coumestan derivatives such as wedelolactone[1.6%] and demethyl wedelolactone[2]. Although all parts including seeds, stems, roots and leaves have significant and differing medicinal properties. Bhringaara [Charaka, Sushruta] used the plant juice, with honey for asthama, cough and senility[3].

Table 1 shows that chemical constituents present in the parts of *Eclipta alba*.

Table 1 : Chemical constituents of parts of *Eclipta alba*

Sr.No.	Parts	Chemical constituents
1.	Leaves	Stigmasterol,a-terthienymethanol, Wedelolactone[1.6%], Desmethylwedelolactone,Desmethyl-wedelolactone-7-glucoside[4]
2.	Roots	Hentriacontanol[14], Heptacosanol[11]& Stigmastero[14], Ecliptal[12-14]
3.	Aerial parts	ß-amyrin & Luteolin-7-0-glucoside[5], Apigenin, Cinnaroside, Sulphur compounds[8]
4.	Stems	Wedelolactone[6]
5.	Seeds	Sterols[6]
6.	Twigs of the plant	Unnamed alkaloid[7]
7.	Whole plant	Large amounts of resin, Ecliptine, Reducing sugar[6], Nicotine, Stigmastero[9], Triterpene saponin, Eclalbatin together with a-amyrin, Ursolic acid, Oleanolic acid[10]

***Corresponding author.**
Dr. (Mrs.) Varsha M. Jadhav
HOD and Professor
Bharati Vidyapeeth's College of Pharmacy, Sector 8, CBD Belapur, Navi Mumbai.
Tel.: + 91-(022) 27722919, 09869046618
Telefax: +91-(022) 27722919
E-mail: drvmjadhav_bvcop@rediffmail.com

Biological activities of chemical constituents of *Eclipta alba* are given to in table 2.

Table 2 : Biological activities of Chemical constituents of *Eclipta alba*

Sr. No.	Chemical Constituents	Biological Activities
1.	Wedelolactone	Antihepatotoxic[15], Selective 5 –lipoxygenase inhibitor with an IC_{50} of 2.5µM[16]
2.	Demethylwedelolactone	Antihepatotoxic, Antimyotoxic, Antihaemorrhagic[17]
3.	Coumarin Compounds	Antinociceptive, Anti-inflammatory, Bronchodialator[18]

Biological activities of parts of *Eclipta alba* are shown in table 3.

Table 3 : Biological activites of parts of *Eclipta alba*

Sr.No.	Parts	Activity
1.	Seeds	Sexual debility, Tonic, Aphrodisiac[4]
2.	Juice of Leaves	Skin diseases, allergic Urticaria, Asthma, Inflatulence, Colic and liver affections, Bronchitis, Enlarged glands, Dizziness, Vertigo, Blurred vision[19]
3.	Paste of leaves	Applied over swelling[4]
4.	Powder	Bronchitis, Cough, Rheumatism and Skin diseases[4]
5.	Decoction	Invigorate the liver, Graying of hair, To staunch Bleedings, Spermatorrhoea, Menorrhagia[4]
6.	Paste of herb	Healing effect, Headache, Toothache[19]
7.	Root	Liver tonic, Emetic, Purgative, Antiseptic to ulcers, Wounds in cattle[20]
8.	Whole plant	Rejuvenating, Age-sustaining tonic, Detoxifying, Deobstruent, Antiseptic herb in vitiated blood, Anaemia, Splenic and liver enlargements, Catarrhal jaundice, Hyperacidity, Gastritis, Dysentery[3], Anticatarrhal, Spasmogenic, Hypotensive properties[4]

Eclipta alba Hassk (Asteraceae) is a widely grown plant. It has been included as a hair-growth promoter[21] and most of its activities that include Hepatoprotective, antiviral, antibacterial, spasmogenic, hypotensive, ovicidal, antileprotic, analgesic, antioxidant, antimyotoxic, antihaemorrhagic, anticancer, antihepatotoxic[22].

PHARMACOLOGICAL STUDIES :

1. Hepatoprotective activity

There have been an extensive studies carried out to substantiate the hepatoprotective activity of *Eclipta alba*. Alcoholic extract of the plant is known to show protective effect on experimental liver damage in rats and mice[23]. The plant has been reported to exhibit hepatoprotective action on subcellular levels of functional markers[24], in inflammation and liver injury[25]. The ethanol / water (1;1) extract of *E. alba* significantly counteracted CCl_4 induced inhibition of the hepatic microsomal drug metabolizing enzyme amidopyrine N-demethylase and membrane bound glucose 6-phosphatase. The loss of hepatic lysosomal acid phosphatase and alkaline phosphatase was significantly restored by the extract. The plant is reported to exhibit protective effect on carbon tetrachloride induced acute liver damage by reducing centrilobular necrosis, hydropic degeneration and fatty change of the hepatic parenchymal cells[26]. The ethyl acetate fraction showed improved and effective protection in doses of 20, 40 and 80 mg/kg in rats[27]. Coumestan constituents of the plant wedelolactone and demethylwedelolactone are responsible for the potent antihepatotoxic activities in carbon tetrachloride, galactosamine and phalloidin induced liver damage in rats[15]. Wedelolactone has been reported to be a potent and selective 5-lipoxygenase inhibitor with an IC_{50} of 2.5 µM and it doses. So by an oxygen radical scavenging mechanism[16].

2. C.N.S. activity

Recent studies indicated that the aqueous extract of *Eclipta alba* and its hydrolyzed fraction at a dose of 300 mg/ kg and 30 mg/kg p.o., respectively showed nootropic activity in rats[28].

3. Antimicrobial activity

Studies revealed the antihepatitis B. virus properties of *E.alba*[29].

4. Miscellaneous activity

An alcoholic extract of the plant showed antinociceptive effect in a dose of 200 mg/kg in rats[30]. The plant has been reported to possess antinociceptive, anti-inflammatorry and bronchodialator activites, due to the coumarin compounds18. Further studies reported confirmed analgesic activity of *E. alba*[31]. Preliminary studies revealed the immunomodulatory activity of methanolic extract of *E. alba*[32]. Wedelolactone and Demethylwedelolactone isolated from *Eclipta alba* exhibited trypsin inhibition in vitro. Both compounds showed potent activity with IC_{50} values of 2.9 and 3.0 µg/ml, respectively[33].

Further Trasina, an Ayurvedic herbal formulation comprising of *Withania somnifera, Tinospora cardifolia , Eclipta alba, Ocimum sanctum, Picrorrhiza kurroa* and *Shilajit* induced a dose related decrease in STZ hyperglycaemia and attenuation of STZ induced decrease in islet SOD activity[34]. Recently it has been reported that in alloxan induced diabetic rats the oral administration of the leaf suspension of *E. alba* in a dose of 2 and 4 gm/kg resulted in significant reduction in blood glucose, glycosylated hemoglobin and a decrease in the activites of glucose 6-phosphatase and fructose 1,6-bisphosphatase and an increase in the activity of liver hexokinase[35].

Further, recent studies have revealed that the aqueous extract of *E. alba* and its hydrolyzed fraction at a dose of 300mg/kg and 30 mg/kg p.o.; respectively provided protection against cold restraint induced gastric ulcer formation in rats[28].

TOXICITY STUDIES

In studies conducted the alcoholic extract of *E.alba* shows no signs of toxicity in rats and mice and the minimum lethal dose was found to be greater than 2.0g/kg when given orally and intraperitonially in mice[23].

CLINICAL STUDIES

The herbal drug Tefroli, containing extracts of the plant in combination with others, when administered to the patient of viral hepatitis, produced improvement and good results[36]. There has been clinical studies conducted that prove the effectiveness of *E.alba* therapy in jaundice in children[37] and Bhringaraja. Ghanasatwavati on the patients of kostha-shakhasrita kamala with special reference to hepatocellular jaundice[38].

Eclipta alba thus offers remarkable preventative and curative potential on going clinical investigation of *Eclipta alba* is health-promoting qualities.

REFERENCES

1. Sivarajan, V. V., Ayurvedic drugs and their plant sources, 1 st Edn, Oxford IBH Publishing Co. PVT. Ltd., New Delhi, 1994, 119.
2. Indian Herbal Pharmacopoeia, Vol-I, A Joint publication of regional lab, Jammu-Tavi, 1998, 85.
3. Khare, C. P., Encyclopedia of Indian Medicinal plants, Springer-Verlag Berlin Heidelberg, New York, 2004, 197.
4. Khare, C. P., Encyclopedia of Indian Medicinal plants, Springer-Verlag Berlin Heidelberg, New York, 2004, 198.
5. Bhargava, K.K., Krishnaswamy, N.R.& Seshadri, T. R., Isolation of desmethylwedelolactone and its glucoside from *Eclipta alba*, Indian J.

Chem ., Vol-8, 1970, 762.
6. Mehra, P. N & Handa, S. S., Pharmacognosy of Bhringraja antihepatotoxic drug of Indian Origin, Indian J. Pharm., Vol-30, 1968, 284.
7. Willaman, J. J. & Li, H. L., Alkaloid bearing plants and their contained alkaloids, Lloydia, J. Nat. Prod. Suppl., Vol-3, 1970, 33.
8. Bohlmann, F. & Zdero, C., Polyacetylene Compounds. Parts 173, Constituents of *Eclipta erecta*, Chem. Ber., Vol-103, 834-841.
9. Pal, S. N. & Narasimhan, N., The alkaloid in *Eclipta alba* (Hassk), J. Indian Chem. Soc., Vol-20, 1943, 181-186.
10. Upadhyay, R.K., Pandey, M. B., Jha, R. N.& Pandey, V. B., Eclalbatin, a triterpene saponin from *Eclipta alba*, J. Asian. Nat. Prod. Res., Vol-3, 2001, 213-217.
11. Sikroria, B. C., Srivastava, S. J.& Niranjan, G. S., Phytochemical studies on *Eclipta alba*, J. Indian Chem. Soc., Vol-59, 1982, 905-909.
12. Singh, P., Naturally occurring thiophene derivatives from *Eclipta alba* species, Bioact, Mol., Vol-7, 1988, 179-186.
13. Singh, P., & Bhargava, S., A dithienyl acetylene ester from *Eclipta erecta*, Phytochemistry, Vol-31, 1992, 2883-2884.
14. Jain, S. & Singh, P., A dithienylacetylene ester from *Eclipta erecta* Linn., Indian J. Chem., Vol-27 B, 1988, 99-100.
15. Wagner, H., Geyer, B., Kiso, Y., Hikino, H.& Rao, G. S., Coumestans as the main active principles of the liver drugs *Eclipta alba* and *Wedelia calendulacea*, Planta Med. , Vol-52, 1986, 370-374.
16. Wagner, H. & Fessler, B., In vitro 5- Lipoxygenase inhibition by *Eclipta alba* extracts and the coumestan derivative wedelolactone, Planta Med., Vol-52, 1986, 374-377.
17. Daniel, M., Medicinal plants chemistry and properties, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2006, 149.
18. Leal, L. K., Ferreira, A. A., Bezerra, G. A., Matos F. J.& Viana, G. S., Antinociceptive, anti-inflammatory and Bronchodilator activities of Brazillian medicinal plants containing coumarin, a comparative study, J. Ethnopharmacol., Vol-2, 2000, 51-59.
19. Chopra, R. N., Chopra, I. C., Handa, K. L & Kapur, L. D., Indigenous Drugs of India, 2nd edition, Academic publishers, Calcutta, 1958, 78.
20. Joshi, S. G., Medicinal plants, Oxford and IBH Publishing Co. Pvt. Ltd., New Delhi, 2004, 81.
21. Roy, R. K., Thakur, M & Dixit, V. K., Hair growth promoting activity of *Eclipta alba* in male albino rats, Arch Dermatol Res, Vol-300, 2008, 357-364.
22. Sharma, P. C., Yelne, M. B. & Dennis, Database on Medicinal plants used in Ayurveda, Vol-II, Cental council for research in Ayurveda and Siddna, New Delhi, 2001, 114.
23. Singh, B. Saxena, K., Chandan, B., Agarwal, S., Bhatia, M. S. & Anand, K. K., Hepatoprotective effect of ethanolic extract of *Eclipta alba* on experimental liver damage, Phytother. Res., Vol-7, 1993, 154-158.
24. Saxena, A. K.& Singh, B. A., Hepatoprotective effects of *Eclipta alba* on subceellular levels in rats, J. Ethnopharmacol., Vol-40, 1993, 155-161.
25. Chandra, T., Sadique, J. & Somasundaram, S., Effects of *Eclipta alba* on inflammation and liver injury, Fitoterapia, Vol-58, 1987, 23-32.
26. Khin, M. M., Nyunt, N. N. & Khin, M. T., The protective effect of *Eclipta alba* on carbon tetrachloride induced acute liver damage, Toxicol. Appl. Pharmacol., Vol-45, 1978, 723-728.
27. Singh, B., Saxena, A. K., Chandan, B. K., Agarwal G.& Anand, K. K., In vivo hepatoprotective activity of active fraction from ethanolic extract of *Eclipta alba*, Indain J. phsio pharmacol. , Vol-45, 2001, 435-441.
28. Thakur, V. D. & Mengi, S. A., Neuropharmacological profile of *Eclipta alba* (Linn) Hassk. J. Ethanopharmacol. , 2005, 26.
29. Jayaram, S., Thyagrajan, S., Panchanadam, M. & Subramanian, S., Antihepatitis B virus properties of *Phyllanthus niruri* Linn and *Eclipta alba* Hassk, in vitro and in vivo safety studies, Bio-Medicine, Vol-7, 1987, 9-16.
30. Pandey, P. S., Pandey, K. K., Upadhyay, O. P.& Pandey, D. N., Experimental evaluation of the analgesic property of *Eclipta alba* Linn Hassk, Ancient Science of life, Vol-17, 1997, 36-40.
31. Sawant, M., Jolly, I. & Shridhar, N., Analgesic studies on total alkaloids and alcohol extracts of *Eclipta alba* (Linn) Hassk, Phytotherapy Research, Vol-18, 2004, 111-113.
32. Jayatirtha, M. G. & Mishra, S. H., Preliminary immunomodulatory activities of methanolic extracts of *Eclipta alba* and *Centella asiatica*, Phytomedicine, Vol-11, 2004, 361-365.
33. Syed, S. D., Deepak, M., Yogisha, S., Chandrashekar, A. P., Muddarachappa, K. A., D'Souza, P., Agarwal, A.& Venkataraman, B. V., Trypsin inhibitory effect of wedelolactone and demethylwedelolactone, Phytother. Res., Vol-17, 2003, 420-421.
34. Bhattacharya, S. K., Kalkunte, S. S. & Ghosal, S. Antioxidant activity of glywithanolides from *Withania somnifera*, Indian J. Exp. Biol., Vol-35, 1997, 236-239.
35. Ananthi, J., Prakasam, A. & Pugalendi, K. V., Antihyperglycemic activity of *Eclipta alba* leaf on alloxan induced diabetic rats, Yale J. Biol. Med. , Vol-76, 2003, 97-102.
36. Sankaran, J., An all India multicentric clinical survey on a herbal curetefroli for hepatitis, J. Natl. Integ. Med. Ass., Vol-26, 1984, 255-261.
37. Dixit, S. P. & Achar, M. P., Study of Bringaraj therapy in jaundice in children, J. Sci. Res. Pl. Med., Vol-2, 1981, 96-100.
38. Anon., Atrial of Bhringaraja Ghanasatwavati on the patients of Kostha -Shakharita Kamala (With special reference to hepatocellular jaundice), J. Natl. Integ. Med. Ass., Vol-24, 1982, 265-269.

Source of support: Nil, Conflict of interest: None Declared