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A Review on Pharmacognostical and Pharmacological Account on *Eclipta prostrata* Linn

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ABSTRACT

Eclipta protrata (L.) L. (Syn.; *Eclipta (L.) Hassaak , family ;(Asteraceae)* is an important medicinal plant in the tropical and subtropical region . Plant are the primary source of food, shelter and various remedial approaches. Materia medica includes about 2000 drugs of which approximately 400 are mineral and anima origin while the rest are of vegetable origin Ayurveda , Siddha and Unani systems 600-700 herbs for medicinal use . The traditional use of *Eclipta prostrate L.* (Asteraceae) reputed traditional healers known as *Vaidyas* or Hakeem were identified on the basis of a pilot survey before the study commenced. The active phytochemicals were coumestan drivatives , phenolic acid derivatives, flavonoids, triterpenoid and steroid saponins, substituted thiophenes , ets. Various extracts and isolated compounds of *E. prostrate* showed a wide range of biological activities such as antimicrobial, anticancer, hepatoprotective, neuroprotective and hair growth promoting activities. It is majorly used for enhancing the growth, strength ,and blackening of hair. It is used as the main ingredient in many hair oil. The preset review is a summary of phytomedicinal importance of *E. alba* in Ayurveda as well as folk medicine system.

INTRODUCTION

E. abla is known as *bhringraj*, it is a small branched perennial herbaceous plant along with a history of traditional medicinal uses in various countries especially in tropical and subtropical regions of the world [1]. It is one of the most well-known and valuable medicinal plants in India. It is commonly named as false daisy and *bhringaraj* and *karisilakammi* [2-3]. It is been long used for the therapy of high blood pressure , coronary heart disease, vitiligo, diabetes, skin disease, gastrointestinal diseases, respiratory diseases, cuts and wounds. It belongs to family of Asteraceae [4]. Drugs derived from plants are named as herbal drugs, botanical drugs, botanicals, phytomedicines, traditional medicines, herbal medicines, traditional chinese medicines (TCMs), traditional herbal medicinal products, product natural health products or plant food supplements [1].

This plants has several therapeutic uses like *bhringraj* oil is a famous hair tonic for maintaining dark hair and reversing baldness [4]. Eclipta prostrata (L.) L.,syn. Eclipta alba (L.), Hassk is commonly known as false daisy in English, Bhringraj In Ayurveda, and Ecliptae herba in china (puri, 2003)[5]. The alcoholic extract of the plant has shown antiviral activity against Ranikhet disease virus [6]. *E. alba* is associated with therapeutic properties such as anticancer ,antileprotic ,analgesic, antibacterial, splasmogenics ,hypotensive and ovicidal. *E.alba* is known as "*King of hair*" because it exhibits properties which enhance the growth and blackening of the hair[7]. The full taxonomic hierchy is given below:

Scientific Classification:-

Kingdom: - Plantae

Division :- Magnoleopsida

Order :- Asterales

Family :- Asteraceae

Genus :- Ecliptal

Species :- Eclipta prostrate

Vernicular name:-

English :- Bhringaraj

Sanskrit :- Bhringaraj

Hindi :- Bhangara, Bhangaraiya

Bengali :- Kesuriya , kesari

Tamil :- Karisalai guntagalagar

Marathi :- Maka

Telugu :- Guntagalagara [8]

E. prostrata is a medium-sized, branched, annual herb-bearing white flower natively found in the tropical and subtropical regions of the world[5]. It is decocted in coconut oil and as this is a 'cooling' oil it is used externally for 'hot' and inflammatory head problems such as headaches ,sinusitis and ear infection[9]. It grows mostly in moist sites such as swamp edges, river and lake banks and edges of rice -fields and easily propagated and spread through out China, India, Brazil and other parts of the world [10]. Genus Eclipta originated from the Greek world "Deficient" which means absence of the bristles and awns on the fruits [11]. It grows mostly in moist site such as swamp edges, river or lake banked and edge of rice-fields and easily propagated and spread throughout China, India, Nepal, Brazil and other parts of the world [12-16].

Fig. No 1.1 *Eclipta prostrata* Plant

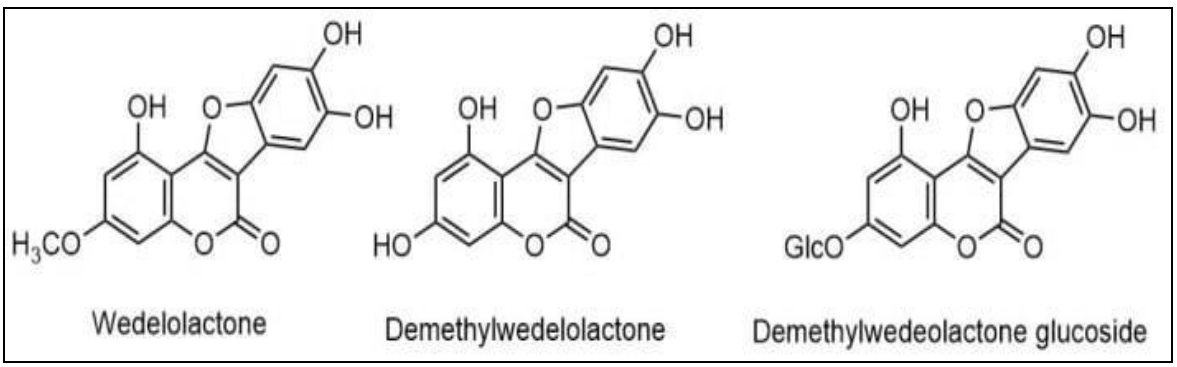
GEOGRAPHICAL DISTRIBUTION OF *E. ALBA* (BHRINGRAJ):-

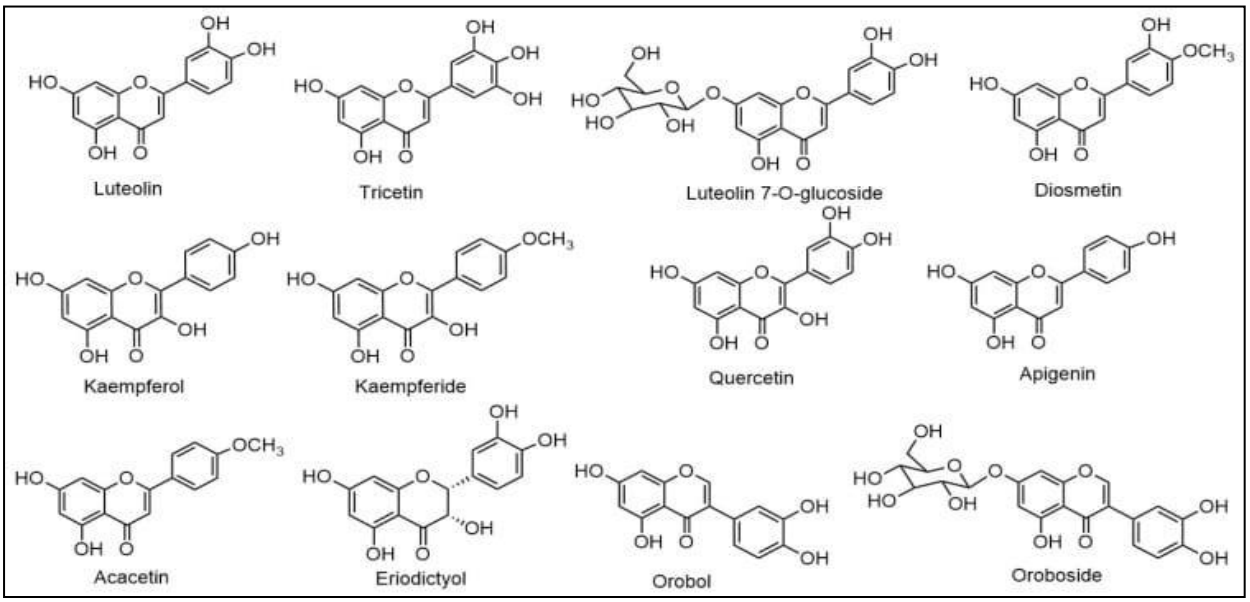
It is found as a weed in tropical and subtropical regions of the world such as South America, Asia, and Africa at an altitude of up to 2000 m. It is found throughout India, China, Thailand, and Brazil, Taiwan, Indonesia, Japan, the Philippines, Bangladesh, and United States. In India, it is mainly found in states Assam, Bihar, Uttar Pradesh, and Manipur [12-16].

Botanical Description

E. alba (L.) is an annual multi branched herbaceous plant that reaches up to the height of 30–50cm. The form of this plant may be erect or prostrate. The plant is covered with hair of white color. The hair is present on both the surfaces of leaves. The stem is of red color. There is presence of simple, sessile, and lanceolate leaves which are of length 4–10 cm, breadth 0.8–2 cm, and tallness 90 cm with slender the leaves are present in opposite manner which are attached to the stem without the presence of petiole. At the lower nodes rooting is present. The floral heads are solitary and white whose diameter is 6–8 mm. Flowers are narrowly winged. The plant has well developed root system. Grey cylindrical roots are present there. The plant is covered with flowers throughout the year. The fruiting period of *E. alba* is from September to October [17-19].

PHYTOCHEMISTRY





Many types of chemical compounds have been isolated and identified from *E. prostrata*, including alkenes, alkaloids, cardiac glycosides, flavonoids, coumestans, lipids, polyacetylene, steroids, saponins, steroidal alkaloids, phytosterol, triterpenes (Chung *et al*., 2017). Of these, triterpenes, flavonoids, thiopenes, coumestans, steroids are regarded to be primary constituents.

Toxicology

An acute toxicity study performed in mice showed that the LD50 of 70% ethanol fraction was undetectable because no mice died after administration even at a dose of 10.4 g/kg for 14 days (Zhao *et al*., 2015). Serious changes in liver enzymes after 28 days exposure to the methanol extract (300 mg/kg) were not observed, suggesting low hepatotoxicity on rats (Rahman *et al*., 2011). Moreover, Arya *et al*. 2015) revealed that the chloroform fraction (50 mg/kg, 2 weeks) didn't cause toxicity on mice.

PHARMACOLOGICAL ACTION

E.alba (bhringraj) has variety of phytochemical constituents present in it which exhibit various therapeutic properties. Some of its reported pharmacological action is summarized below.

1. Hepatoprotective activity

In vivo hepatoprotective activity was evaluated by thirumalai *et.al* [17]. Alcoholic extract of the plant is known to **show** protective effect on experimental liver damage in rats and mice[18]. The plant has been reported to exhibit hepatoprotective action on subcellular levels of functional markers [19]. Singh *et.al* conducted a study on rats and mice models in which lung injury was induced artificially by carbon tetrachloride. It was found that alcoholic extract of E.alba (Bhringraj) exhibit hepatoprotective activity at a dosage of 62.5-500.0mg/kg p.o Extract restored all the changes induced by carbon tetrachloride [20].

2. Hair growth

Eclipta alba is used in hair oil preparations since it promotes hair growth and for maintains hair black.10%w/v of Eclipta abla was an chief ingredient in the preparation of herbal formulation for hair growth[21]. Petroleum ether extract (PEE) along with other solvent fractions of E. abla was topically applied on the backs of nude mice. Prominent follicular hypertrophy was observed after the treatment with PEE. In the basal epidermal and matrix cells, follicular keratinocytes number was increased. These changes support *E. alba* use in the growth of hair [22]. The study of hair growth promotion by a poly herbal formulation containing *E. prosrata* was reported by Roy et al [23]. However ,the role of *E .prostrata* in the treatment of hair fall caused by other reasons such as diseases, aging and genetics or not clear yet [4].

3. Anticancer activity

An in vitro study was conducted by Chaudhary *et al.* Evaluate the anti-cancer potential of *E.alba*. The model systems used for the study were Human liver cancer cell line (HepG2) C6 glioma and A498cell lines. It was found that hydro alcoholic extract of this plant caused inhibition of cell proliferation [24]. The methanol extract of *E. prostrata* was administrated orally at the dose of 250 and 500mg/kg to Ehrlich ascites carcinoma (EAC) bearing mice and in was found to increase life span. It also decreased the viable cell count and tumor volume of the tumor-bearing mice when compared to that of control [25]. The Anticancer activity was examined by determining the tumor volume, tumor cell count, viable tumor cell count, nonviable tumor cell count, mean survival time and increased in lifespan in experimental animal models. The extract increased the life span of EAC treated mice and restored the hematological parameters as compared with the EAC baring mice [3].

4. Antimicrobial activity

The shoot extract showed antibacterial activity against *Staphylococcus aureus* and *Eclipta Coli*.[26]. The butanol and water extract at a concentration of 3 mg /disc inhibited the growth of baciellus cereus by 45% and 42% respectively. The highest inhibition of 63% of for butanol extract and 54% for ethyl acetate fraction where reported against *B.subtilisat* the concentrations of 3 mg /disc[27]. The alkaloids from the leaves where also studied for the antimicrobial properties against *E.coli*, *P.aeruginosa*, chigella boydii, *S. aureus* and *S.faecalis* by agar -well diffusion and broth micro dilution methods [3].

5. Immunomodulatory activity

It was found that coumestans such as Wedelolactone had inhibitory action against trypsin which supports its used as an immunomodulatory [28]. The Wedelolactone obtained from the methanol extract of the whole plant of E. *prostrata* was reported to shown immunomodulatory responses in mice at different dose range from 100 to 500 mg/kg. Various parameters such as carbon clearance, antibody titer, and cyclophosphamide immunosuppression were accessed, which showed the significant increase in the in the phagocytic index and antibody titer which resulted in a significant ratio of the phagocytic index and white blood cells(WBC) count [2].

6. Cerebroprotective and Nervous System related activites

The hydroalcoholic extract *E.prostrata* was subjected to study of cerebro-protective function in wister albino rats [1]. Studies indicated that the aqueous extract of Eclepta alba and routs hydrolyzed fraction at the dose of 300mg/kg and 300mg/kg p.o respectively showed no tropic activity in rats [2]. It was observed that ethanol extract of the plant exhibited anti-stress, activity by restoring the levels of stress hormones serum cortisol, glucose, alanine amino transferase, aspartate amino transference and enzymes lactate dehydrogenase, malate dehydrogenase, ATPase, superoxide dismutase, and catalase which showed its anti-stress activity[3].

7. Anti-diabetic/anti-hyperglycemic activity

The in vitro α-amylase inhibition activity of methanol extract of the whole plant of *E. prostrata* was evaluated. The result revealed mild potency in α-amylase inhibition indicating

the potential anti-diabetic property with the IC50 value of 322.138 ± 0.025 µg/mL [1]. Many polyherbal formulations include *E. prostrata* as an essential ingredients . It is reported to act upon the pancreas via restoration and regeneration of β-cell and to possess anti diabetic activity [2]. However, the mechanism on the chemical model related to the anti-diabetic properties has not been well studied [3].

DISCUSSION

Eclipta prostrata L. a medicinal herb, also known as Bhringraj belonging to family Asteraceae. The plant has hepatoprotective , antimicrobial and hair growth promoting properties. The important species plant is commonly used in hair oil all over India for healthy black and long hair. The plant has a reputation as an anti-aging agent in Ayurvedic medicine. Various secondary metabolites present in the plant are responsible for its medicinal value. In recent years there has been a tremendous increase in the demand and consumption of herbal medicinal drugs as they have less side effects.

The main active principles of *E. alba* are wedelolactone and demethylwedelolactone, both of which possess anti hepatotoxic activity (Wagner et al., 1986 and Franca et al., 1995). There is an immense pressure on natural resources due to urbanization and industrialization, this coupled with the harvesting of plants as source of drug has threatened their survival thus there is a great necessity for large scale multiplication of the plant which is simple, rapid, genetically stable. Sharma et al. (2013) developed method of in vitro multiplication of *Eclipta* sp. Bhansali and Kumar (2014) furthers developed methods using hairy root cultures to improve the contents of secondary metabolites.

CONCLUSION

Until now, significant progress has been witnessed in phytochemistry and pharmacology of *E. prostrata*. Thus, some traditional uses has been well supported and clarified by modern pharmacological studies. Moreover, *E. prostrata* also showed therapeutic potential in some refractory diseases such as cancer, dementia and diabetes. But, present findings are still insufficient that cannot satisfactorily explain some mechanisms of action. More well-designed studies in *vitro* especially in-vivo are required to establish links between the traditional uses and bioactivities, discover new skeletons and activity molecules, as well as ensure safety before clinical use.

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