

Chapter 3

Bhringaraj (*Eclipta prostrata* L.): a medicinal herb of India

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Abstract

Asteraceae plants have been esteemed as medicinal assets globally, particularly in arid and semiarid regions. *Eclipta prostrata*, a member of this family, holds significant prominence in traditional medicine systems, notably in Asia. Commonly referred to as False daisy or Bhringraj. *E. prostrata* is rich in bioactive compounds and exhibits diverse pharmacological activities. The plant's therapeutic applications encompass hepatoprotective, antioxidant, anti-inflammatory, wound healing, antimicrobial, anti-diabetic, and potential anti-cancer properties. Medicinally it is used to treat eczema, boils, hepatitis, itching, haemoptysis, bleeding, haematuria, diarrhoea, diphtheria etc. The presence of various phytoconstituents like coumestans, alkaloids, flavonoids, saponins, and triterpenoids contributes to its medicinal uses. This review highlights its botanical description, medicinal uses, bioactive compounds, and pharmacological activities of *E. prostrata*.

Keywords: Asteraceae, Medicinal uses, Bioactive compounds, Pharmacological activities

Introduction

Throughout history, Asteraceae plants have been utilized as medicinal plants across the globe, with a higher concentration in subtropical regions, particularly in arid and semiarid areas. Asteraceae members exhibit significant diversity, yet they all possess a shared chemical composition. Certain Asteraceae plants have been grown for over 3,000 years for their culinary and medicinal purposes (Hussain 2024). For instance, inulin, a natural polysaccharide known for its potent prebiotic properties, is present in all members of the family. Most of the species within this family are annual, biennial, or perennial herbaceous plants, and they are distributed across various regions

worldwide (Sharma et al. 2022). *Eclipta prostrata* is a native and popular plant in Asia especially in India, China and Vietnam, mainly used as folk medicine. It is commonly referred to as False daisy or Ink plant in English and is known locally as Bhringraj, Bhumiraj, Aali jhar (Timalsina and Devkota 2021). It is a medium-sized, branched, annual herb with white flowers that is native to tropical and subtropical regions worldwide. It thrives in moist, disturbed areas with full or partial sun, wet to mesic conditions, and loamy or mucky soils. It can be found near roadsides, rivers, and ponds, as well as lowland/upland fields and disturbed habitats. It can also tolerate waterlogged and saline soils (Silalahi 2022; Trung et al. 2022). It is commonly observed as an unwanted plant in tropical and subtropical areas across the globe, including South America, Asia, and Africa, at elevations reaching 2000 m. It can be found extensively in various countries such as India, China, Thailand, Brazil, Taiwan, Indonesia, Japan, the Philippines, Bangladesh, and the United States. In India, its presence is predominantly noticed in all states of our country (Kumari et al. 2021).

Description

It is an annual plant, many branches, strigose, erect or prostrate plant, 20–90 cm tall. Stem is cylindrical, green or purplish, and often covered in long white hairs. It can also be fleshy or sappy and sometimes tinged with red. Simple leaves arrangement, opposite, ovate or oblong-lanceolate, 2-10 cm long, 1-3 cm wide, apex acute or blunt, remotely serrated, bottom sessile or petiolate. Terminal and axillary inflorescence, about 1 cm across, white or cream, and on peduncles to 7 cm long. Florets are arranged in a compound head that resembles a tiny daisy with white, petal-like ray florets surrounded by green disc florets. The head of flowers is approximate 1 cm in diameter. Ray flowers marginally has 12-3 mm long, pistillate, fertile, corolla white, and ligulate. Disk flowers numerous has 1.5-2 mm long, central, perfect, fertile, corolla whitish, and tubular. It has five stamens, separated filaments; anthers are merged to form a tube around the style. Achenes brown or black with pale margins, oblong, 2.0-2.5 mm long, flat or 3-angled, subglabrous; pappus absent or of a small puberulous rim (Saxena and Bramham 1995; Au et al. 2022; Figure 1).

Medicinal uses

E. prostrata has long been employed in Ayurveda and Unani medicine due to its wide range of therapeutic properties (Khan and Khan 2008; Timalsina and Devkota 2021; Au et al. 2022; Alam et al. 2022).



Figure 1: Leaves and flower of *Eclipta prostrata*

Whole plant: Whole plant decoction is administered orally to treat digestive problems, bronchitis, and pneumonia. Whole plant ash is given orally with honey for the treatment of asthma. Decoction is also useful in treating diarrhoea and dysentery. Extract made from this plant is used to treat fever. Whole plant extract mixed with three gm fruit powder of *Phyllanthus emblica* is given externally to treat weakness. Decoction is useful in treating blood pressure. Whole plant extract is used to treat oedema. Whole plant paste is externally used to treat eczema, boils, and other skin diseases. whole plant is used for the treatment of symptoms related to hepatitis, itching, haemoptysis, bleeding, haematuria, diarrhoea, and diphtheria.

Leaves: Leaves decoction is used to alleviate body pain. Leaf paste is used for externally to cure burns. Leaf extract is widely used to treat hair fall. Fresh leaf extract along with honey is useful in treating jaundice. Decoction of leaf is given before meal to increase appetite. Fresh leaf extract is given orally twice a day with cow milk to cure acne. Leaf juice is used in treating vision problem. A mixture of leaf juice and honey is employed to alleviate catarrh in infants. The leaves are used in preventing infection in wounds. The leaves are used for blood spitting, hematuria, tooth loss, tinnitus, dizziness, and uterine bleeding.

Root: Root extract is used in treating haemorrhoids. Root powder is given orally to treat constipation.

Bioactive compounds

Eclipta prostrata contains a wide range of active phytoconstituents, which includes coumestans, alkaloids, flavonoids, glycosides, polyacetylenes, and triterpenoids, phenolic acids, saponins, sterol, sesquiterpene lactones, proteins, amino acids, carbohydrates etc (Timalsina and Devkota 2021). Wedelolactone, demethylwedelolactone, demethylwedelolactone-7-glucoside, isodemethylewedelolactone, and strychnolactone are the main coumestans present in the leaves of *E. prostrata*. Eclalbatin, alpha-amyrin, ursolic acid, and oleanolic are novel triterpene saponin which has been isolated from the whole plant (Yu et al. 2020). Some major alkaloids present in *E. prostrata* are 20-epi-3-dehydroxy-3-oxo-5,6-dihydro-4,5-dehydroverazine, ecliptalbine, (20R)-4 β -hydroxyverazine, 4 β -hydroxyverazine, (20R)-25 β -hydroxyverazine, 25 β hydroxyverazine and Ecliptalbine. Some other reported alkaloids are ecliptine, nicotine, verazine, and dehydroverazine ecliptalbine. Column chromatography shows the presence of 3-acetylaleuritolic acid, stigmasterol, a mixture of triterpenoids, fatty esters and aromatic components were isolated from the

aerial parts of *E. prostrata* (Cherdtrakulkiat et al. 2015). Apigenin, luteolin and luteolin-7-glucoside, and orobol are the main flavonoids present in *E. prostrata*. Stigmasterol, daucosterol, stigmasterol-3-O-glucoside, phytosterol, and β -glucoside of phytosterol are the major sterols present in *E. prostrata* (Kumari et al 2021).

Pharmacological activities

Numerous studies have been conducted on the biological activities of *E. prostrata* due to their wide range of ethnomedicinal values and bioactive compounds. (Jaglan et al. 2013; Timalsina and Devkota 2021; Silalahi 2022).

Hepatoprotective Activity: *E. prostrata* has been studied for its hepatoprotective effects, meaning it helps protect the liver from damage. It's used traditionally for liver disorders and has shown promising results in research studies.

Antioxidant Activity: This herb exhibits strong antioxidant properties due to the presence of flavonoids, alkaloids, and other compounds.

Anti-inflammatory Activity: *E. prostrata* has demonstrated anti-inflammatory effects in various studies. This property can be useful in treating inflammatory conditions and alleviating associated symptoms.

Wound Healing: The herb has been traditionally used for wound healing purposes. Research suggests that it may possess wound healing properties by promoting cell proliferation and collagen synthesis.

Antimicrobial Activity: *E. prostrata* extracts have shown antimicrobial activity against various pathogens, including bacteria, fungi, and viruses.

Anti-diabetic Activity: Studies have indicated that *E. prostrata* may have hypoglycemic effects, meaning it can lower blood sugar levels.

Anti-cancer Activity: Some research suggests that *E. prostrata* extracts may exhibit anti-cancer properties by inhibiting the growth of cancer cells.

Conclusion

In many countries, *Eclipta prostrata* is commonly used as traditional medicine, particularly for skin, liver, and stomach conditions, as well as for stimulating hair growth. The documented hepatoprotective, antioxidant, anti-inflammatory, antimicrobial, wound healing, anti-diabetic, and potential anti-cancer properties

elucidate its potential as a valuable therapeutic agent. To validate its traditional uses and unlock its full potential, it is necessary to conduct further research.

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