



Phytochemical Screening of *Eclipta prostrata* (L.)

Vaibhav Shukla*, Sadhana Chaurasia** & Ravindra Singh***

*Department of Biological Sciences, MGCGV, Chitrakoot Satna,

(M.P.) 485334

**Department of Energy & Environment MGCGV, Chitrakoot Satna,

(M.P.) 485334

***Department of Biological Sciences, MGCGV, Chitrakoot Satna,

(M.P.) 485334

ABSTRACT

Medicinal plants possess therapeutic potential and are used to treat various diseases around the world. *Eclipta prostrata* (L.) is a medicinal herb that has extensive application in the native medicinal system. In any therapeutic activity chemical constituents play an important role. The extracts of *Eclipta prostrata* exhibited antioxidant activity. The objective of this study is to provide an overview of the chemical constituents present in the crude dried whole plant extract of *Eclipta prostrata*. Phytochemical screening of *Eclipta prostrata* was done by extracting the powder of whole plant with four different solvents, water, ethanol, hexane and ethyl acetate. Preliminary phytochemical screening revealed the presence of Carbohydrates, Amino acids, Alkaloids, Tannis, Phenolic compounds, Terpenoids, Steroids, Flavonoids Cardiac glycosides, Saponins and Anthraquinone glycosides. Phytochemical analysis of *Eclipta prostrata* reveals absence of Resins. Presence of above phytochemicals may be responsible for the therapeutic effects of *Eclipta prostrata* on various diseases. It was concluded that *Eclipta prostrata* (L.) contains medicinally important bioactive compounds and this finding justifies the ethno medical use of this plant.

Keywords: *Eclipta prostrata*, Phytochemical analysis, Indigenous Medicine; Ethno medicine, Bhringraj.

Introduction

Eclipta prostrata is an erect or prostrate annual herb commonly found in marshy lands, abundant paddy fields and road sides. The *Asteraceae* is the largest flowering plant family in the world. (Priya et al 2018) It is very common weedy plant used as a home remedy for different types of diseases by Sri Lankan indigenous medical practitioners. (Silalahi Marina 2022) Plant is well known for its hair growth and hair coloring effect as mentioned in Ayurveda due to which the plant is termed "*Bringharaja*" in Ayurveda texts. In Unani medicine, this plant is named as "*Bhangra*". (Khan et al 2006) In India, *Eclipta prostrata* is used externally in chronic skin diseases, ulcers, elephantiasis, conjunctivitis. The plant stimulates hair growth (Herapathdeniya et al 2020) The plant has an essential ingredient of compound drugs used for arthritis, dropsy and in

decoctions used for hepatic and splenic enlargement. This plant is stimulant to digestive system which augments appetite and digestion. It is an effective cholegogue, hence it is beneficial in hepato- spleenomegaly as well as hepatitis. Presence of different phytochemicals may be responsible for different therapeutic effects of the plant (Khan et al 2020). The familiarity about the nutritive and medicinal properties of plants has been passed within and among civilizations. (Rani et al 2020)

Objective

The objective of this study was to screen phytochemical constituents present in *Eclipta prostrata* (L.) whole plant by using aqueous and different solvent extracts.

Materials and Methods

Fresh plants of *Eclipta prostrata* was collected randomly from Chitrakoot. Plants were washed with tap water to remove soil and dust particles Than dried under laboratory condition for three weeks. Sequentially hexane, ethylacetate, ethanol extracts and the aqueous extract of *Eclipta prostrata* were subjected to phytochemical analysis.

One gram of extract of *Eclipta prostrata* was mixed with 100 ml of each solvent (hexane, ethyl acetate, ethanol and water) separately to obtain stock solutions (1% w/v). All samples were analyzed for phytochemical study using accepted methods (Ramawat et al 2013).

Tests for Alkaloids

Mayer's Test: A few drops of Meyer's reagent was added to 2 ml of each aqueous solution (test solution). The appearance of pale yellow/ white colour precipitate indicates the presence of alkaloids (Roopalatha et al 2012).

Tests for Tannins and Phenolic Compounds

Ferric Chloride Test: 2 ml of each aqueous solution (test solution), was mixed with a few drops of 5% FeCl₃. The appearance of deep blue/dark green precipitate indicates the presence of tannins and phenolic compounds. (Saklani et al 2012).

Tests for Terpenoids and Steroids

Salkowski Test: 2 ml of each aqueous solution (test solution) is added to 1 ml of concentrated H₂SO₄. The appearance of red colour in lower layer indicates the presence of steroids and yellow colour in the lower layer indicates the presence of triterpenoids. (Joshi et al 2013).

Tests for Flavonoids

Alkaline Test: A few drops of 5% NaOH solution and drops of dilute HCl were added to 2 ml of each aqueous solution (test solution). The appearance of an intense yellow colour with the addition of few drops of 5% NaOH solution and the disappearance of that colour with the addition of few drops of dil. HCl indicates the presence of flavonoids (Roopalatha et al 2012), (Vimalakumar et al 2014).

Tests for Cardiac Glycosides

Legal Test: 2 ml of each aqueous solution (test solution) was added with 2 ml of pyridine and 1 ml of alkaline sodium nitroprusside solution. The appearance of pink to red colour in the solution indicates the presence of glycosides (Joshi et al 2013).

Tests for Saponins

Two different tests were performed (Foam test and olive oil test) to identify saponins.

Foam Test: 5 ml of each aqueous solution (test solution) was shaken vigorously until a stable persistent foam.

Test for carbohydrates

To identify carbohydrates, Fehling test were performed

Fehling's Test: Fehling's A-1 ml and Fehling's B- 1 ml was heated for 1 minute. Heated Fehling's solution was added to 2 ml of each aqueous solution (test solution). Then this setup was heated for 2 minutes in a water bath. The appearance of brick red precipitate indicates the presence of carbohydrate. (Joshi et al 2013), (Saklani et al 2012).

Tests for Amino acids

Millon's test: 2 ml of each aqueous solution (test solution) and 1 ml of Millon's reagent was mixed. Then it was heated for 2 minutes. The appearance of white colour precipitate with the addition of 1ml of Millon's reagent and the colour turn to red with heating indicates the presence of amino acid (Yadaw et al 2011).

Test for Anthraquinone Glycosides

Borntrager's test: 2 ml of each aqueous solution (test solution) was added to 2 ml of dil. Sulphuric acid. Then it was boiled and filtered and allowed to cool. The filtrate was added equal volume of chloroform and shaken well. The organic solvent was separated and ammonia solution was added. The appearance of a pink or red colour in the ammonia layer indicates the presence of hydroxyl anthraquinone glycosides (Iqbal et al 2015).

Results and Discussions

The phytochemical analysis was done on aqueous extracts and solvent extracts of dried whole plant of *Eclipta prostrata* and the result is given in Table 1. Importance of various phytochemicals is given in Table 2.

Dried whole plants of *Eclipta prostrata* with four different solvents, aqueous(water), ethanol, Hexane and ethyl acetate revealed that the number of primary and secondary phytochemicals such as alkaloids, tannins & phenolic compounds, terpenoids and steroids, flavonoids, cardiac glycosides, saponins, carbohydrates, amino acids, antraquinone Glycosides present in different concentrations. *Eclipta prostrata* aqueous extract and other solvent extracts were not positive for the resins. According to table mentioned below, aqueous extract and different solvent extracts of dried whole plant of *Eclipta prostrata* contains alkaloids, tannins, phenolic compounds, terpenoids, steroids, flavonoids, cardiac glycosides, saponins, carbohydrates and Anthraquinone glycosides. Terpenoids, steroids, flavonoids and cardiac glycosides in aqueous extract were present in high concentrations in comparison to that of ethanol, hexane and ethyl acetate extracts. Tannin and phenolic compounds were present in high concentration in ethanolic and hexane extract in comparison to aqueous extract.

Table 1: Phytochemical screening of aqueous and different solvent extracts of dried whole plant of *Eclipta prostrata* (L.).

Phytochemical	Tests	Aqueous extract	Ethanol extract	Hexane extract	Ethyl acetate extract
Alkaloids	Mayer's Test	+	++	++	+
Tannins and Phenolic compounds	FeCl ₃ Test	+	+++	+++	+
	Gelatin Test	±	++	++	±

Terpenoids and Steroids	Salkowski Test	+++	+	+++	+
Flavonoids	Alkaline Test	+	+	+	+
Cardiac Glycosides	Legal Test	+	++	+	++
Saponins	Foam Test	++	++	++	++
Carbohydrates	Fehling's Test	++	++	++	++
Amino Acids	Millons Test	++	-	++	-
Antraquinone glycosides	Hydroxyantraquinone Test	+	±	+	±

Table 2: Importance of different phytochemicals present in *Eclipta prostrata(L.)*.

Phytochemicals	Importance	Reference
Alkaloids	Anti-malarial, Anti-cancer	Kittakoop et al 2014
Anthraquinone glycosides	Antimalarial, Laxative, Antineoplastic	Patel et al 2019
Carbohydrates & protiens	Play a vital role in satisfying human needs for energy and life processes	Novak et al 2000
Cardiac glycosides	Treatment of congestive cardiac failure due to its direct action which increases the force of myocardial contraction. Also, it acts directly on the smooth muscles.	Paranjpe et al 2005
Flavanoids	Anti-oxidant effect, Inhibit theinitiation, promotionand progression of tumours	Kim et al 1991
Phenolic compounds	Delayed aging, Decreased risk of chronic disease development E.g. Cardio vascular diseases, Arteriosclerosis,Cancer, Diabetes, Cataract, Disorders of cognitive function and Neurological diseases.	Derong et al 2016
Steroids	Anti-inflammatory	Patel et al 2015
Tannins	Anti-viral, Anti-bacterial	Haslam et al 1996

Conclusion:

These phytochemicals having specific therapeutic effects to the human body. Therefore, due to presence of these phytochemicals *Eclipta prostrata* whole plant possess Anti-malarial, anti-cancer, anti-microbial, anti-fungal, anti-hyperglycemic, anti-inflammatory, anti-oxidant as well as cardiac protective action. Presence of this phytochemical compounds suggests that the whole plant of *Eclipta prostrata* is rich in primary and secondary metabolites which are directly responsible for its effect on different disorders. This study reveals that *Eclipta prostrata* should be considered as a useful source for herbal medicine. The difference in medicinal activities between organic extracts suggests that for the isolation and characterization of the active compounds in *Eclipta prostrata*, a comparative metabolic activity of whole plant would be needed.

References –

1. Braunwald E, Bloodwell RD, Goldberg LI, Morrow AG, Studies on digitalis in observations in man on the effect of digitalis preservation on the contractility of the non-failing heart on total vascular resistance, **Journal of clinical investigation**, 40(1):52–59.
2. Derong L, XiaoM, ZhaoJ, LiZ, Xing B, LiX, KongK, LiL, ZangQ, LiuY, ChenX, QinW, WuH, Chen S (2016) An overview of plant phenolic compound and their importance in human nutrition and management of Type 2 Diabetes: **Journal of Molecules**, 21(10):1374.
3. Edoga HO, Okwu DE, Blessing MO (2005) Constituents of some Nigerian Medicinal plants, **African journal of biotechnology** 4(7):685-688.
4. Haslam E (1996) Natural polyphenols (vegetable tannins) as drugs: possible mode of action, **Journal of natural products**, 59(2): 205–215.
5. Herapathdeniya S, Samarkoon S and Jayasiri A. (2020) Photochemical screening of different extracts of *Eclipta prostrata* (Bhringraj), **Indian J. of Ancient Medicine and Yoga** 13(3):119-124
6. Iqbal E, Abusaleem K, Linda BH, (2015) Phytochemical screening total phenolic anti-oxidant activities of bark and leaf extracts of *Goniothalamusvelutinus* (Airy shaw from Brunei Derussalam), **Journal of Kings South University** 27(3):224–232.
7. Joshi A, Bhub M, Sattakar A (2013) Phytochemical investigations of the roots of *Grewiamicrocoss* Lin, **Journal of chemistry and pharmacy**, 5(7):80–87.
8. Khan A.V. and Khan A.A. (2008) Ethno medicinal uses of *Eclipta prostrata* Linn., **Indian J. of Traditional Knowledge** 7(2):316-320.
9. Khan Z A, Khare S, Dubey B K, (2020) Comparative extraction, photochemical screening and in vitro biological activities of *Eclipta prostrata* extract, **Journal of Drug Delivery and Therapeutics** 10(4):148-152.
10. Kim SY, Kim JH, Kim SK, Ohm, Jung MY (1991): Antioxidant activities of selected oriental herb extracts. **Journal of the American oil chemist's society**. 71(6): 633–640.
11. Kittakoop P, Mahidol C, Ruchirawat S (2014) Alkaloids as important scaffolds in therapeutic drugs for the treatments of cancer, tuberculosis and smoking cessation, **Journal of current topics in medicinal chemistry**,
12. Kumar P, John P, P.T.A. Usha, Kariyil B.J, R., Uma and Hogale M.S (2018) Photochemical analysis of *Eclipta prostrata* L.(L.) leaves, **Int. J. Curr. Microbiol. App. Sci.** 7(8):1069-1075.
13. Novak WK, Haslberger AG (2000) Food chemistry toxicology, Substantial equivalence of anti-nutrients and inherent plant toxins in genetically modified novel food. **Food Chem. Toxicol.** 36(6):473–483.
14. Paranjpe, P (2005) Indian medicinal plants, forgotten healers, a guide to Ayurveda herbal medicine, **American Journal of Plant Science**, 8(5):148-149.
15. Patel SS, Savijini (2015): Systemic review of plant steroids as potential anti-inflammatory agents: current status as future perspectives, **The Journal of Phytopharmacology** 4(2),121–125.
16. Ramawat KG, MichelMerillon J, (2013) Natural products phytochemistry, Botany and metabolism of alkaloids, phenolic and terpenes, **Springer, Berlin, Heidelberg Publishers** :2665–2691.

17. Rani J, Manish K, and Rupinder K. (2020) In-Vitro phytochemical screening of *Eclipta prostrata* leaves extract, **Plant Archives** 20(1):2055-2060.
18. Saklani S, Mishra AP, Sati B and Sati H (2012) Phytochemical and antimicrobial screening of *Aphanamixispolystachya*, an endangered medicinal tree, **Int. J. Pharm. Sci.** 4: 234–240.
19. Vimalakumar CS, Hosagaudar VB, Suja SR, Vilash V, Krishnakumar N.M, Latha PG, (2014) Comparative Preliminary Phytochemical Analysis of Ethanolic extracts of leaves of *Bleadioila* Roxb, infected with the rust fungus *Zaghouania Aleae* (EJ Butler) Cummins and No infected plants, **Journal of Pharmacognacy and Phytochemistry** 3(4): 69–72.
20. Yadaw RNS, Agrawal M (2011) Phytochemical analysis of some medicinal plants, **Journal of Phytology** 3 (12):10-14.

