WORLD JOURNAL OF PHARMACEUTICAL RESEARCH
SJIF Impact Factor 8.084
Volume 11, Issue 15, 531-550. Review Article ISSN 2277– 7105

AYURVEDIC, PHYTOCHEMICAL AND PHARMACOLOGICAL INFORMATION OF BHRINGRAJ (*ECLIPTAALBA*): A REVIEW ARTICLE

Dr. Swapnali Kambli[1]*, Dr. Prachi Khaire[2] and Dr. Manu Kushwaha[3]

[1,3]PG Scholar, Dravyaguna Department, 3rd Year, GAC Osmanabad.

[2]Assistant Professor, Dravyaguna Department, GAC Osmanabad.

Article Received on
05 September 2022,
Revised on 26 Sept. 2022,
Accepted on 16 Oct. 2022
DOI: 10.20959/wjpr202215-26034

***Corresponding Author**
Dr. Swapnali Prakash Kambli
PG Scholar, Dravyaguna Department, 3rd Year, GAC Osmanabad.

ABSTRACT

Eclipta alba is a common folk medicinal plant known as *bhringraj*. It belongs to Asteraceae family and found in tropical and subtropical regions of india. In *Ayurveda Bhringraj* is considered to be "*Rasayana*", herb for longevity and rejuvenation. Main principle of Ayurveda is to balance *tridosha* and this herb works wonderfully on *tridosha* and maintains their imbalance. This herb has been better known for its curative property and exibits many pharmacological activities like analgesic, anti-inflammatory, antihepatotoxic, antihyperglycemic, antioxidant, immunomodulatory and good rejuvenating property. This contribution provides a comprehensive review of the plant *Bhringraj* on *Ayurvedic*, Phytochemical, Pharmacological as well as its medicinal uses, dosages, formulations, its traditional uses in *Ayurvedic* texts.

KEYWORDS: Analgesic, anti-inflammatory, antihepatotoxic, antihyperglycemic.

INTRODUCTION

From the very beginning of civilization, people are using many plants in the traditional medicine and nowadays also in the modern medicine as the synthetic medicine has so many side effects and drawback. The presence of chemical molecules in these plants are mainly responsible to the medicinal properties which helps to discover new drugs.[1]

Eclipta alba is a well-known traditionally acclaimed medicinal herb all around the world specially in tropical and sub-tropical countries. It belongs to Asteraceae sub family.[2] Commonly known as *Bhringraj* in *Ayurveda* and unani system of medicines, for the uses as

hepatoprotective drug in the indigenous system of medicine it is called as “King of hairs”.[3]

In *Ayurveda*, *Bhringraj* has special attention because of its multidimensional and traditional applications; in modern science also, it is an important research drug due to its proven pharmacological activities.[4] *Bhringraj* offers protection to the liver from harmful chemicals that can damage it. It also possesses certain chemical compounds which have anti-toxic activities contributing to the regeneration of liver cells.

The plant is thus commonly used as a hair oil all over the India for healthy black and long hair. The fresh juice of leaves is used for increasing appetite, improving digestion and as a mild bowel regulator. The plant has a reputation as an anti-ageing agent in *Ayurveda*. *Eclipta alba* is used as a general tonic for debility. Externally, it is used for inflammation, minor cuts and burns and the fresh leaf-juice is considered very effective in stopping bleeding. Leaf juice mixed with honey is also used for children with upper respiratory infections and also used in eye and ear infections. *Eclipta alba* is a source of coumestan type compounds used in phytopharmaceutical formulations of medicines prescribed for the treatment of cirrhosis of the liver and infectious hepatitis.[5]

Vernacular names[6]

Though the drug *Eclipta alba* Hassk. is very well known by its scientific name, still the knowledge of local name of a particular plant in a particular place is very important to achieve any drug from any region.

The vernacular names of the plant *Bhringraj* is as follows.

Sanskrit – *Keshraj, Tekraja, Bhrunga, Markava, Bhangara*.

Hindi – *Bhangara, Bhangaraiya, Mochkand, Babri.*

English – *Trailling Eclipta.*

Marathi – *Bhangara, Bhringiraja, Maka.*

Bengali – *Bheemraja, Kesuriya, Kesari, Kesuri, Kesuti.*

Gujrati – *Bhangaro, Bhangro, Kalugranthi, Dodhak, Kalobhangro*.

Kannada – *Garujalu, Gurugada, Soppu, Keshavardhana, Kodigaraju*.

Malayalam – *Kayyonni, Knnunni.*

Tamil – *Karisalankanni, Karisalanganni, Karisalai, kaikeshi*.

Telugu – *Guntakalagara, Guntagalagara*.

Arab – *Kadim-el-bint*.

Assam – *Bhringraja.*

Oriya – *Kesara, Kesarda.*

Santhal – *Lal Kesari*.

Sindh – *Tik*.

Punjabi – *Bhangra*.

Urdu – *Bhangra*.

Ayurvedic Properties

The Ayurvedic properties of the plant according to the kala.

Vedic period

In *Atharva Veda Mahrarishi Sayana* has mentioned *Bhringraj* in treatment of *Kustha* and *Palit*. Samhita Kala.

- In (*Cha. Chi*. 26/264) *Acharya Charak* has indicated *Bhringraj* for the treatment of *Khalitya* and *Palitya*. He also stated *Bhringra*j is the ingredients of '*Sahacharadi Taila'* and '*Mahanil Taila'* which are mostly used in the form of *Nasya* in the treatment of *Palitya.*[7]

- It is used as an *Aharakalpana* in the form of *Rochandipanrog* (*Cha.Chi*. 24/181).[8]
- In *Charak Kalpasthana Bhringraj* is also used in Vamana and *Virechana yoga* (*Cha.k.* 7).[9]
- *Acharya Sushruta* has mentioned in *Chikitsa* and *Kalpasthana Bhringraj* is used in the treatment of *Khalitya* and *Palitya* and he proved its *Keshya* activity[10] (*Su. Chi*.25/28-32; *Ka*. 8/54)
- *Harita* also stated *Bhringraj* is used in the form of *Lepa* in *Indralupta* and *Kustharoga*[11] (*H*. 43/6-7). Also mentioned one of the ingredients of *Shadbindu Tail*[12] (*H*. 40/25).
- *Bhringraj* is used for the treatment of *Khalitya* & *Palitya* in different forms such as *Nilikadhya Tail, Bhringraj Tail, Ayashchurnadi lepa*, *Triphaladi lepa* , *Nimbabija Tail*, etc[13] (*Sa. M*. 10,11).
- In *Kshudrarog Chikitsa*, *Bhringraj* is mentioned for the treatment of *Palitya* and*Khalitya* in the form of *Triphaladi Lepa, Kashmaryadi Tail* and *Gunjadi Tail*[14] (*B.P.M.* 62/4,5,18). It is also one of the ingredients of *Shadbindu Tail* for the treatment of *Shiroroga* and *Urdhvajatrugata roga*[15] (*B.P.M*. 63/69).
- *Ashtanga Hrudaya* placed a synonym *Markav* in two places and he mentioned it is one of the ingredients of *Rasayana Kalpa* for *Rasayana Karma*[16] (*A.H.U.* 39/163), itis also used in the treatment of *Palitya* in the form of *Swarasa*[17] (*A.H.U.* 13/35-37).

Ashtanga Sangraha

In *Uttar tantra* 28 *Shiroroga Chikitsa* it is been mentioned for the treatment of *Khalitya* & *Palitya* in the form of *Lepa*[18] (*A.S.U* 28/39,44,48,58). He also stated that *Bhringraj* is one of the ingredients of *Mahanil Tail, Bhringraj Tail*.[19] (*A.S.U*. 28/51,53).

Chakradatta

In *Kshudrarog Chikitsa* Acharya *Chakradatta* mentioned *Bhringraj* is one of the ingredients of 7 different *Taila Kalpana* like *Snuhyadi Taila, Triphaladi Taila, Nimba Taila, Gunja Taila, Bhringraj Taila, Mahanimba Taila, Chandanadi Taila*[20] (*Ch. D*. 55/91,92,104,112).It is also used in *Lepa* & *Nasya* in treatment of *Keshroga*. He mentioned *Keshraj* as the synonym of the drug for the first time.

Vaidya Manorama

In this book, author described the drug *Bhringraj* in 5 Various *Kalpanas*, such as *Dhoompan* for *Kasa*, *Parishek* for *Kamla*, *Pralepa* for *Khalitya*, *Palitya* & *Indralupta*[21] (*V.M.*

Indralupta /89-96).

Rasa Ratna Samucchaya

In this *Rasgrantha, Bhringraj* is mentioned as an ingredient of *Snuhyadi Taila* and *Mahanil Taila* which are used in *Khalitya* and *Palitya* respectively[22] (R.R.S. 30/39,100).

Bhaisajya Ratnavali

In *Kshudrarog Chikitsa Bhringraj* is mentioned for the treatment of *Indralupta*, *Palitya* and *Khalitya* as one of the ingredients of *Bhingraj Ghrit, Kesharanjanyoga, Bhingraj Taila, Chandanadi Taila, Mahanil Taila*, etc.[23] (*B.R.* 60/71,80,94,99,129). It is also indicated as a *Rasayana dravya* in *Rasayanadhikara*[24] (*B.R.* 73/39).

Nighantu

The term *Nighantu* is made up of *Nigama*. It means it brings out hidden and undisclosed meaning of words in universally accepted way. In *Dravyaguna, Nighantu's* are considered as an important source of knowledge. Initially they were limited up to synonyms but later on it was included with description of properties, actions, indications, uses of drug etc.

Bhringraj is included in different Vargas as shown below in the table:Table no. 1 : Nighantu and Vargas.

NIGHANTU	***VARGA***
Kaiydeva Nighantu[25]	*Aushadhi Varga*
Dhanvantari Nighantu[26]	*Karviradi Varga*
Nighantu shesh Nighantu[27]	*Shaka khand Varga*
Bhavprakash Nighantu[28]	*Guduchyadi Varga*
Madanpal Nighantu[29]	*Abhayadi Varga*
Raj Nighantu[30]	*Shatahwadi Varga*
Rajavallabh Nighantu[31]	*Aushadhashray Pariched*
Laghu Nighantu[32]	---
Shabdachandrika Nighantu[33]	*Vrukshadi Varga*
Saraswati Nighantu[34]	*Ulap Varga*
Shodhal Nighantu[35]	*Karviradi Varga*
Nighantu Adarsh[36]	*Sahdevyadi Varga*

Synonyms of *Bhringraj* according to the Nighantus

Synonyms are much more significant and most applicable for the identification of the plants. Study and Knowledge of synonyms is an important aspect in both *Samhitas* and *Nighantus* to Ayurveda Vaidya. Morphological characters, properties, therapeutic action as well as indication are best known with the help of synonyms.

Sr.No	NIGHANTU	SYNONYMS
1	***Kaiydev Nighantu***[25]	*Pankjat, Bhringraj, Bhringhwah, Keshranjan, Bhringaraka, Bhekaraj, Mahanil, Ravipriya, Keshraj, Suryavarta, Markava*
2	***Dhanvantari Nighantu***[26]	*Bhringraj, Markava, Bhringa, Bhringaraka, Bhringrenu, Bhringara, Keshranjan*
3	***Nighantu Shesh Nighantu***[27]	*Bhringraj, Bhringara, Keshranjan, Angarak, Bhekraj, Bhringa, Markava*
4	***Bhavprakash Nighantu***[28]	*Bhringraj, , Markava, Bhringa, Angarak, Keshraj, Bhringara, Keshranjan*
5	***Madanpal Nighantu***[29]	*Bhekraj, Markava, Keshranjan, Angarak, Bhringraj, Bhringwah Suryavallabh*
6	***Raj Nighantu***[30]	*Markava, Bhringwah, Kesharanjan, Pitrupriya, Rangak, Keshya, Kuntalavardhan, Harivas, Haripriya, Devpriya, Vandan, Pavan, Shabdavhaya, Mahanil, Nilak, Mahabhrung, Nilpushpa Shyamal*
7	***Rajavallabh Nighantu***[31]	*Bhringara, Bhringraj, Keshranjak Bhekaraj, Markava, Bhringaraka,*
8	***Laghu Nighantu***[32]	*Bhringraj*
9	***Shabdachandrika Nighantu***[33]	*Markava, Bhringaraka,*
10	***Saraswati Nighantu***[34]	*Markava, Keshranjan, Bhekaraj, Meshaksha, Machalilo*
11	***Sodhal Nighantu***[35]	*Markava, Bhringraj, Bhringa, Bhringaraka, Bhekrujo, Keshranjaka, Bhringara*

MORPHOLOGY[37]

1. **Root –** Variety of secondary branches arise from the main root up to about 7 mm in diameter, grayish, achromatic and cylindrical.
2. **Stem** – Nonwoody branched, seldom maturation at nodes, cylindrical or flat, rough dueto broken white hairs, nodes, discrete, greenish and rarely brownish.
3. **Leaf** – Opposite, sessile to subsessile, 2.2 – 8.5 cm long, 1.2 – 2.3 cm wide, sometimes regular, lanceolate, sub- entire, sub-acute or acute, strigose with adpressed hairs on both the surfaces.
4. **Flower** – Solitary or two together on unequal axillary peduncles; involucral bracts concerning eight, ovate, obtuse or acute herbaceous, strigose with laden hairs; ray flowers ligulate, ligule small, spreading scarcely as long as bracts, not toothed, white; disc flowers tubular corolla often four toothed; pappus absent, except occasionally veryminute teeth on the top of achene; stamen five, filaments epipetalous free, anthers unitedinto a tube with base obtuse; pistil bi-carpellary, ovary inferior, unilocular with one basalovule.
5. **Fruit** – Achenial cypsela, one-seeded, cuneate with a narrow wing, covered with wart excrescences and brown in color.

6. **Seed** – 0.2 – 0.25 cm long, 0.1 cm wide, dark brown, hairy and endospermic.

Taxonomy and Family Characteristics[38]

Systematic Classification –Class: Dicotyledone **Subclass:** Gamopetalae **Series:** Inferae **Order:** Asterales **Family:** Asteraceae, Compositeae.

General Information

Common name: Asteraceae, Compositeae.

Number of genera: Asteraceae is also known as Compositaeae. It is considered one of the largest families of flowering plants. This family includes 900 genera and nearly about 13000 species.

Propagation type: Seeds and fruits.

Distribution: The distribution of the members of the family is throughout the world. In India this family is represented by above 138 genera and 708 species and are found mainly in the Himalayas and mountains of southern and western India.

Vegetative Characters

Habitat: Most of the plant members of the family are mesophytes and few are xerophytes.

Root system: The root system is branched taproot. Tuberous are present in Dahliya, root and stem may contain oil passages.

Stem: Herbaceous or woody, erect branched. *Helianthus tuberoses* produce stem tubers; Stems are often covered by trichomes.

Leaf: They are simple, alternate, opposite or whorled, exstipulate, petiolate, hairy, reticulate venation. They are simple or pinnately or palmately lobed. In Corymbium the leaves are parallel- veined. Leaves may present in basal rosettes as in Taraxacum.

Floral Characters

Inflorescence: The primary inflorescence is racemose head, terminal or axillary in position. Aggregation of several head to form a compound head or umbel or panicle may find in some species. A green membranous bract involucre subtends each head for protection. The flowers here are called as florets and the number varies from few to many. The flowers open in

acropetal session. The florets borne on a flat, concave or convex receptacle. Each floret is subtended by a receptacular bract called palea.

Flower: They are bracteates, sessile, bisexual, pentamerous, epigynous. The form mayvary in head and head may be homogamous or heterogamous.

Homogamous: All the florets are alike in structure and function. They are bisexual andeither regular (veronica) or liguate (Cichorium).

Heterogamous: Florets in heterogamous heads are of two types described below.

Disc Florets

They are centripetally arranged complete florets. They are bracteate, actinomorphic and bisexual, tubular and epigynous. They do not possess any extra-appengade. So, this floret is illinguate.

Calyx: Absent or modified into pappus.

Corolla: Sepals 5 in number, Gamosepalous, tubular

Androecium: Stamens 2, epipetalous, Syngenesious dithecous

Gynoecium: Bicapillery, Syncarpous, Unilocular, one ovule, on basal placentation style stigma, stigma bifid.

Ray florets

They are peripherally placed incomplete florets. The florets are zygomorphic and unisexual or neutral. This helps in increasing the attraction of the flower. They possessextra appandages called ligule.

Calyx: Absent or hairy pappus or scaly persistent. **Corolla:** Petals 5 in number, polypetalous, ligulate.**Androecium:** Absent.

Gynoecium: Bicarepellary, syncarpous, unilocular, one ovule, locule, basal placentation,style narrow and stigma branched, ovary inferior.

Pollination: The plants of Asteraceae are cross- pollinated by a variety of insects. Small flowers are made conspicuous by aggregation of heads. The flower heads are made more

attractive by ray florets. A single visit of insect may pollinate large number of flowers.

The nectar is secreted by a ring-shaped disc and is in corolla tube. Cross-pollination is promoted by the protandrous conditions of the Androecium. In some species of Asteraceae self-pollination is a rule.

Fruit: The fruit is Cypsela which is dispersed by pappus hairs.

Seed: Non-endospermic with straight embryo.

Availabilty and Habitat[39]

It is found throughout India ascending to 1700 meters altitude from sea level. It grows as a weed near moist places.

Macroscopic Examination[39]

Root- Well developed, a number of secondary branches arise from main root, upto about 7 mm in dia., cylindrical, greyish.

Stem – Herbaceous, branched, occasionally rooting at nodes, cylindrical or flat, rough due to oppressed white hairs, node distinct, greenish, occasionally brownish.

Leaf - Solitary or 2, together on unequal axillary peduncles; involucral bracts about 8, ovate, obtuse or acute, herbaceous, strigose with oppressed hairs; ray flower lingulate, ligule small, spreading, scarcely as long as bracts, not toothed, white; disc flowers tubular, corolla often 4 toothed; pappus absent, except occasionally very minute teeth on the top of achene; stamens 5, filaments epipetalous, free, anthers united into a tube with base obtuse; pistil bicarpellary; ovary inferior, unilocular with one basal ovule.

Fruit – Achenial cypsela, one seeded, cuneate, with a narrow wing, covered with warty excrescences, brown.

Seed – 0.2-0.25 cm long, 0.1 cm wide, dark brown, hairy and non-endospermic.

Microscopic examination[39]

1. **T.S. of the root of *Eclipta alba* Hassk**

- Outer layer is a cork layer that has only 3-5 rows of thin-walled cells which are tangentially elongated.

- Few stone cells are scattered in cork cells. It is followed by the outer secondarycortex, 1-2 layered.
- Cells are tangentially elongated and have air spaces.
- Inner secondary cortex consists of comparatively bigger, irregular shapedparenchymatous cells with prominent air spaces.
- Even cortex has stone cells scattered in it as singles or in groups, having differentshapes and sizes.
- Pericyclic fibres are present as tangentially arranged bands.
- Secondary phloem consists of phloem fibres and multiseriate phloem rays.
- Xylem consists of numerous xylem vessels, tracheids, xylem fibres and xylem parenchyma immersed by xylem rays.

2. T.S. of stem of *Eclipta alba* Hassk

- An outermost layer of epidermis, cortex and vascular bundle covered with per cyclic fibres with pith.
- The epidermis is single-layered, formed of quadrangular cells. The cortex shows the presence of layers of parenchyma.
- Below the cortex, lignified pericyclic fibres are present which cover the vascularbundle.
- Below this, a well-developed vascular bundle is present innermost layer of pithconsists of large, thin-walled, rounded cells.
- Large air cavities are present below the epidermal region.

3. T.S. of leaf of *Eclipta alba* Hassk

- Leaf shows the presence of upper and lower epidermis, mesophyll and midrib region.
- Both epidermal layers made up of a single layer of rectangular cells. The upper aswell as lower epidermis unicellular and few glandular trichomes.
- The mesophyll region is composed of single-layered palisade and spongy parenchyma tissue.
- The midrib portion consists of collenchyma and vascular bundles.
- Single layered palisade cells, dense, radially extended and present under the upper epidermis but not in a constant layer.
- Spongy parenchyma is made up of loosely arranged parenchymatous cells and showsthe presence of intercellular spaces.

- The midrib region possesses 2-3 layers of collenchyma cells, just between the two layers of the epidermis.
- A well-developed vascular bundle is found embedded in the midrib region.

API Standards of drug powder: Identity, purity and Strength

Foreign matter	Not more than 2 %	Appendix 2.2.2
Total ash	Not more than 22 %	Appendix 2.2.3
Acid-insoluble ash	Not more than 11 %	Appendix 2.2.4
Alcohol-soluble extractive	Not less than 5 %	Appendix 2.2.6
Water-soluble extractive	Not less than 15 %	Appendix 2.2.7

Chemical Constituents[40-41]

Sr. No.	Nature of Phytoconstituents	Phytoconstituents
1.	Coumestan	Wedelolactone, demethylwedelolactone Demethylwedelolactone-7-glucoside
2.	Terpenoids andtheir glycosides	Eclalbasaponins VII-X (taraxastane triterpeneglycosides), Eclalbasaponins I-VI (oleanane triterpeneglcosides) Eclabosaponins I-VI (triterpene glycosides),ecliptasaponins C and D (triterpenoid glycosides), α-amyrin , Oleanolic acid, ursolic acid (triterpenoids)
3.	Sterol	Stigmasterol, daucosterol, Stigmasterol-3- O- glucosideβ-sitosterol
4.	Alkaloids	[(20S)(25S)-22,26-imino-cholesta-5, 22(N)-dien-3β-ol] (verazine), [20-epi-3-dehydroxy-3-oxo-5, 6-dihydro-4, 5-dehydroverazine], [(20R)-20-pyridyl-cholesta-5-ene-3β,23-diol] (ecliptalbine), [(20R)-4β-hydroxyverazine],[4β-hydroxyverazine], [25β-hydroxyverazine]
5.	Flavonoids	Luteolin-7-glucoside, luteolin,apigenin, orobol (isoluteolin)
6.	SesquiterpeneLactones	5-hydroxymethyl-(2,2' : 5' , 2")-terthienyl tiglate, 5-hydroxymethyl-(2,2' : 5' , 2")-terthienyl agelate, 5-hydroxymethyl-(2,2' : 5' , 2")-terthienyl acetate
7.	TerthienylAldehyde	Ecliptal
8.	Fatty alcohols	Hentriacontanol, heptacosanol
9.	Volatile oils	Heptadecane, 6,10,14-trimethyl-2- pentadecanone, n-hexadecanoic acid,pentadecane, eudesma-4(14), 11- diene, phytol, octadic-9-enoic acid, 1,2-benzenediacarboxylic acid diisooctyl ester, (Z,Z)-9, octadecadienolic acid, (Z)-7,11-dimethyl-3-methylene-1,6,10- dodecateriene, (Z,Z,Z)-1,5,9,9- tetramethyl-1,4,7-cycloundecatriene
10.	Saponins	Eclalbatin (triterpene saponin),dasyscyphin C
11.	Polyacetylinic	α- Terthienylmethanol, polyacetylenes,polyacetylene

	Compounds	substituted thiophenes
12.	Phenolic acids	Protocatechuic acid, 4-hydroxy benzoic acid

Traditional Indications of *Bhringraj* as per Nighantu and Samhita.

Literature Karma	K.N.	R.N.	B.P.N.	Ni.AA.	D.N.	M.N.	L.N.	Bh.R.	A.H.
Akshiroga	+	+	-	-	-	+	+	-	-
Shiroroga	+	-	-	-	-	+	-	-	-
Kaphahara	+	+	+	-	+	+	+	-	-
Vatahara	+	-	+	-	-	+	-	-	-
Dantya	+	-	-	-	-	+	-	-	-
Twachya	+	-	+	-	+	+	-	-	-
Keshya	+	+	+	-	-	-	+	+	-
Rasayana	+	+	-	-	-	+	-	-	-
Kasa	+	-	+	-	-	-	-	-	-
Krimi	+	-	+	-	-	-	-	-	-
Shwasa	+	-	+	-	-	-	-	-	-
Kushtha	+	-	-	-	-	+	-	-	-
Shopha	+	+	+	-	+	-	-	-	-
Aama	+	-	+	-	+	-	-	-	-
Panduta	+	-	+	-	+	-	+	-	-
Vishaghna	-	+	-	-	+	-	-	-	-
Vimalendriya	-	-	-	-	-	-	-	+	-
Nirvyadha	-	-	-	-	-	-	-	+	-
Shatayu	-	-	-	-	-	-	-	+	+
Yakritaroga	-	-	-	+	-	-	-	-	-
Phleeharoga	-	-	-	+	-	-	-	-	-
Kamala	-	-	-	+	-	-	-	-	-
Arsha	-	-	-	+	-	-	-	-	-
Udara	-	-	-	+	-	-	-	-	-
Bala	-	-	-	+	-	-	-	-	+
Virya	-	-	-	+	-	-	-	-	+
Hridroga	-	-	-	-	+	-	-	-	+

Ayurvedic Formulations

Bhringraj Taila, Bhringamalakadi Taila, Nili Bhringadi Taila, Bhringarajasava, Tekaraj maricha, Kshadabindu taila, Bhringrajadi ghrita.

Dose

Oil- 3-5 drops Fresh juice- 5-10 ml

Powder- 2-3 gm in divided doses

Pharmacological activities

Hepatoprotective Activity

Alcoholic extract of *Eclipta alba* Hassk. was found to have good anti-hepatotoxic activity as assessed in CCl4 induced liver damage in albino rats through liver to body ratio, pentobarbitone sleep time, serum levels of glutamate pyruvate transaminase (GPT) and glutamic oxaloacetic acid transaminase (GOT), alkaline phosphatase (ALP), and bilirubin. In CCl4 administered rats, there was an increase in liver weight, pentobarbitone sleep time and elevated GOT, GPT, SALP and serum bilirubin levels. The alcoholic extract at dose of 200mg/kg significantly reversed these effects.[42]

Ethanol extract of the whole plant was tested for hepatoprotective effect against paracetamol-induced hepatotoxicity in mice. Treatment with 100 and 250 mg of extract per 100 kg body weight showed significant reductions in paracetamol-induced serum alanine aminotransferase (ALT, also known as GOT) levels. At the same time, histopathological studies showed marked reductions in paracetamol-induced fatty degeneration and centrizonal necrosis in liver of extract treated mice.[43]

Antioxidant activity

The methanol and hydrolyzed extract of *Eclipta alba* Hassk. has been assessed for its antioxidant potential in both in vitro and ex vivo models. The *in vitro* antioxidant activity was evaluated through 2,2-diphenyl-1-picrylhydrazyl (DPPH) free radical scavenging and nitric oxide radical inhibition activity. The *ex vivo* antioxidant activity was determined through lipid peri oxidation inhibitory activity on mice liver homogentic by thiobarbituric acid reactive substances (TBARS) method. The methanolic extract and hydrolyzed extract both showed potent antioxidant activity in both models in proving to be powerful scavengers DPPH free radicals and nitric oxide radicals, as well as being inhibitors of lipid peri oxidation.[44]

Antimicrobial Activity

Various solvent (petroleum ether, benzene, chloroform, acetone, methanol, and aqueous) extracts of *E*clipta *alba* Hassk. were found to be active against clinical isolates from oral cancer cases. These isolates included various bacteria like *Staphylococcus aures, Escherichia coli, Staphylococcus epidermis, P. aeruginosa, Klebsiella pneumoniae, Proteus mirabilis and Proteus vulgaris* and funguses like *Candida albicans* and *Aspergillus fumigatus.*[45]

Ethanol and ethyl acetate extracts of leaves of the plant have been found to be active against *Escherichia coli, Klebsiella pneumoniae, Shigella dysentriae, Salmonella typhi, P. aeruginosa, Bacillus subtilis, and S.aureus* with Minimum Inhibitory Concentrations (MIC) ranging from 4.5 to 90 µL/mL.[46]

Antidiabetic Activity

In alloxan-diabetic rats, oral administration of leaf suspension of *E .alba* Hassk. (2 and 4 g/kg body weight) for 60 days resulted in significant reduction in blood glucose (from 372.0 ± 33.2 to 117.0 ± 22.8), glycosylated hemoglobin HbA(1)c, decrease in the activities of glucose-6 phosphate and fructose 1,6-bisphosphatase, and an increase in the activity of liver hexokinase, all of these activities being beneficial for amelioration of hyperglycemia and other diabetes-related complications.[47]

Antimalarial Activity

The antimalarial activity of leaf extract *E. alba* Hassk. has been tested against Plasmodium berghei ANKA strain in mice. The methanolic leaf extract (250-750mg/kg) produced a dose-dependent chemosuppression or schizontocidal effect during early and established infection and high mean survival time (m.s.t) values particularly in the group administered 750mg/kg/day of extract. The plant extract also exhibited repository activity.[48]

Antiepileptic Activity

Methanol extraction of leaf powder of *E. alba* Hassk. was evaluated for its antiepileptic activity through Maximal Electroshock Test (MES) in rats. The extract was administered orally to rats for 7 days at doses of 50, 100 and 200 mg per kg body weight. One hour after the last treatment, seizures were induced in rats by delivering electroshock of 150mA for 0.2s with an electroconvulsiometer through a pair of ear clip electrodes. A decrease in duration of hind leg extension was taken as a parameter for anticonvulsant activity. Compared to controls, rats administered extract at different doses exhibited significant decrease in the duration of time spent in extensor phase in a dose-dependent manner. The antiepileptic activity was attributed to wedelolactone.[49]

Cardiovascular Effect

The effect of administration of dried *E. alba* Hassk. leaf powder (3g per day) has been studied in mild hypertensive subjects. Subjects were given six capsules (500 mg powder per capsule) in three doses per day for 60 days. When compared with placebo given control

groups, the results showed that *Eclipta*-supplemented group showed a marked reduction in mean arterial pressure by 15%, total cholesterol (17%), low-density lipoprotein fraction (24%), triglycerides (14%), very-low-density lipoprotein fraction (14%), and plasma lipid perioxides (18%). There was a marked increase in urine volume (34%), urine sodium (24%) in the *Eclipta*-administered group. The findings indicated that the leaf powder possessed diuretic, hypotensive and hypercholesterolemic properties and helps in the alleviation of oxidative stress induced complications in hypertensives.[50]

Neuropharmacological Activity

The aqueous and hydroalcoholic extracts of *E. alba* Hassk. have been evaluated for sedative, muscle relaxant, anxiolytic, nootropic and antistress activities at doses of 150 and 300mg/kg, p.o. The findings indicated nootropic activity of the aqueous extract (300mg/kg, p.o.) and hydrolyzed fraction (30mg/kg, p.o.). The aqueous extract and the hydrolyzed fraction were observed to provide protection against cold restraint induced gastric ulcer formation and also normalized the white blood cell count in the milk induced leukocytosis challenge model.[51]

Antiulcer Activity

The ethanolic extract of *E. alba* Hassk. has been examined for its antiulcer effects in several ulcer models in rats, like cold resistant stress (CRS) and pylorus ligation (PL). The extract administered orally twice daily at doses of 50, 100 and 200 mg/kg was found to dose-dependently and significantly reduce ulcerative lesions. At the same time, extract administration led to significant attenuation of lipid peroxidation and elevated levels of catalase activity. Antisecretory activity of the extract was evidenced by significant reduction in gastric volume, acid output, and increase in gastric pH when compared to control (without extract) rats.[52]

Hair Growth Promoting Activity

Petroleum ether and ethanol extract of *E. alba* Hassk. has been tested in albino rats for promoting hair growth activity. The extracts were incorporated into oleaginous cream (water in oil cream base) and applied topically on shave denuded skin of male albino rats. The extracts significantly reduced hair growth time by half as compared to nontreated control animals. Quantitative analysis of hair growth after treatment with petroleum ether (5%) exhibited greater number of hair follicles in anagenic phase (69 ± 4) which are higher as compared to control (47 ± 13).[53]

Analgesic and Anti-Inflammatory Activity

The analgesic activity of ethanol extract of *E. alba* Hassk. whole plants as well as total alkaloid fraction was seen in experiments with albino mice by using standard experimental models such as the tail clip method, the tail flick method, and the acetic acid induced writhing response. The results from this study showed that both the ethanol extract and the total alkaloids produced good analgesic activity in all the different models of analgesic tested. Total alkaloid fraction showed better analgesic activity than ethanolic extract.[54]

The anti-inflammatory effect of the plant was evaluated using carrageenan, mediators such as histamine and serotonin induced paw edema, and cotton pellet induced granuloma tests for their effect on acute and chronic phase inflammation models in rats. The results indicated potent anti-inflammatory activity of the plant in all the models tested.[55]

Skin Diseases

An *Ayurvedic* formulation containing *E. alba* Hassk. powder has been shown to provide complete remission to 22.6% and checked the recurrence of the disease in 89.5% patients of "*Vicharchika*" (eczema).[56]

CONCLUSION

The plant Eclipta alba is considered as most valuable medicinal plant, particulary for the treatment of liver disorders, respiratory disorders, hair loss, skin disorders, gastrointestinal disorders and fever. Many important phytochemicals have been isolated and identified from the plant. It includes wedelactone, eclalbasaponins, α-amyrin, ursolic acid, oleanolic acid, luteolin and apigenin. Thus, it offers a significant property for the treatment of various diseases. The pharmacological profile of the plant has a good anti-microbial activity, anti-tumor activity, hepatoprotective activity, hair growth promoting, anti-inflammatory, anti-epileptic activity etc. In future the standardization and stabilization studies on the extract of the plant *Bhringaj* can help in proving it to be a promising source in pharmaceutical industry.

REFERENCES

1. Hosseinzadeh S, Jafarikukdhan A, Hosseini A, Armand RJIJoCM: The application of medicinal plants in traditional and modern medicine: a review of Thymus vulgaris, 2015; 6(09): 635.
2. Jahan R, Al-Nahain A, Majumder S, Rahmatullah MJIsrn: Ethnopharmacological significance of Eclipta alba (L.) hassk. (Asteraceae), 2014; 2014.

3. Kirtikar K, Basu BJIBD: Indian Medicinal plants. Dehradun, India, 2005; 1: 478-479.
4. Tathe Mangal Suresh, Kulkarni D.V., Harke Sanjay, "Bird's eye view on Bhringraj (*Eclipta alba* Hassk.)" Ayurline : International Journal of Research in Indian Medicine, 2019; 3(5): 1-30.
5. Murphy, r.c., hammarstrom, s., samuels-son, b. and leukotriene, c. 1979 a slow reacting substance from marine mastocytoma cells. *proc. natl .acad. sci*., usa, 4275-4279.
6. Khare CP, Encyclopedia of Indian Medicinal plants, Springer-Verlag Berlin Heidelberg, New York, 2007; 230-231.
7. Vidhyadhar Shukla. *Charaka Samhita*. *Chikitsa sthan*. Varanasi; Chaukhamba Sanskrit Pratisthan, Reprint, 2007; Verse no. 26/264.
8. Vidhyadhar Shukla. *Charaka Samhita*. *Chikitsa sthan*. Varanasi; Chaukhamba Sanskrit Pratisthan, Reprint, 2007; Verse no. 24/181.
9. Vidhyadhar Shukla. *Charaka Samhita. Kalpasthan*. Varanasi; Chaukhamba Sanskrit Pratisthan, Reprint, 2007; Verse no. 7.
10. Kaviraj Kunjalal. *Sushruta Samhita*. *Nidan, Sharir, Chikitsa* vol-II, 1st Edition. Varanasi; Chaukhamba Bharati academy. 1998; Verse no. *Su*. *Chi*. 25/28-32; *Ka*.8/54.
11. Ramavalamba Shastri. *Harita Samhita* (Hindi Translation). 1st ed. Varanasi; Prachya Prakashana, 1985; Verse no.43/6-7.
12. Ramavalamba Shastri. *Harita Samhita* (Hindi Translation). 1st ed. Varanasi; Prachya Prakashana, 1985; Verse no.40/25.
13. Khemraj Shrikrishnadas, *Bhavprakash Samhita* (hindi), 1st ed. Mumbai, shri Venkateshwar Prakashan, (reprint 1997), Uttarkhand Verse no. 10, 11.
14. Khemraj Shrikrishnadas, *Bhavprakash Samhita* (hindi), 1st ed. Mumbai, shri Venkateshwar Prakashan, *Kshudragrog adhikar*, Verse no. 63/39.
15. Kaviraj Atrideva Gupta. *Ashtang Hridyam, Uttar sthan* (Hindi Translation). Varanasi; Chaukambha Prakashana. Reprinted, 2009; Verse no. 39/163.
16. Kaviraj Atrideva Gupta. *Ashtang Hridyam, Uttar sthan* (Hindi Translation). Varanasi; Chaukambha Prakashana. Reprinted, 2009; Verse no.13/35-37.
17. Khemraj Shrikrishnadas, *Bhavprakash Samhita* (hindi), 1st ed. Mumbai, shri Venkateshwar Prakashan (reprint 1997), *Uttar Khand* Verse no. 10,11.
18. Kaviraj Atrideva Gupta. *Ashtang Hridyam, Uttar sthan* (Hindi Translation). Varanasi; Chaukambha Prakashana. Reprinted. 2009; Verse no. 28/39,44,48 and 58.
19. Kaviraj Atrideva Gupta. *Ashtang Hridyam, Uttar sthan* (Hindi Translation). Varanasi; Chaukambha Prakashana. Reprinted, 2009; Verse no. 28/51,53/.

20. Chakradatta, chakrapanivirachit, Gangavishnu Shrikrishnadas Publication (1998) Verse no. 55/91,92,104,112.
21. Dr. H.L. Sharma, Vaidya Manorama, (Sudha Hindi tika sahit) Chaukhamba Orientalia Delhi. Indralupta / 89-96.
22. Hari Narayan Apte, *Vagbhat* rachit *Rasaratnasamuchaya*, Anand Aashram Prakashan (1827) Verse no. 30/39,100.
23. Govind das rachit *Bhaisajyaratnavali*, (Kaviraj pandit Gopal Prasad Sharma) Tejkumar press publication Edi.3, 60/71,80,94,99,129.
24. Govind das rachit *Bhaisajyaratnavali*, (Kaviraj pandit Gopal Prasad Sharma) Tejkumar press publication Edi.3, B. R. 73/39.
25. Acharya Priyavat Sharma, Guruprasad Sharma, *Kaiyadev Nighantu* (Hindi), 1st edi. Varanasi, Chaukhamba Orientalia; P.637.
26. Mahendra Bhaugik krut *Dhanvantari Nighantu*, (e-*Nighantu*), *Karviradi varg* Verse no. 11, 12.
27. Hemachandracharya krut *Nighantu shesh*, (e- *Nighantu*); shaka kand, Verse no. 346-347.
28. Bhavmishrakrut *Bhavprakash*, (e- *Nighantu*); *Purva khand*, *Mishrakadi* prakaran, Guduchyadi varg. Verse no. 206-207.
29. Madanpalkrut *Madanpal Nighantu*, (e- *Nighantu*); *Abhayadi varg*, Verse no. 237-238.
30. Narhari Pandit Krut *Raj Nighantu*, (e- *Nighantu*); *Shatahwadi varg*, Verse no. 137-141.
31. Rajvallabh Krut *Rajvallabh Nighantu*, (e- Nighantu); *Aushadhashray parriched*, Verse no. 107-108.
32. Shri Vyas Kesshav Ram rachit *Laghu Nighantu*, (e- *Nighantu*); Verse no. 31.
33. Chakrapanidatta virachit *Shabdachandrika*, (e- *Nighantu*); *Vrukshadi varg*; Verseno.277.
34. *Saraswati Nighantu*, (e- *Nighantu*); *Ulap varga*, Verse no. 37.
35. Shodhalkrut *Sodhal Nighantu*; (e- *Nighantu*); *Pratham bhag Karviradi varg*; Verse no.491.
36. Shri. Ba.G. Vaidhya; *Nighantu adarsh*, Vol.1, Chaukhambha Bharti Akadami, Varanasi; 2nd edi. Sahdevyadi varg p. 764-769.
37. The Ayurvedic Pharmacopoeia of India Part-I, 1st Edition, Vol – II, (The Controller of publications civil lines Delhi), 21-22.
38. Sharma, P. C., Yelne, M.B. and Denn's, T.J Database on medicinal Plants used in Ayurveda, Vol 2, (Central council for research in Ayurveda and Siddha New Delhi, 2001; 112.
39. The Ayurvedic Pharmacopoeia of India Part-I, 1st Edition, Vol – II, (The Controller of

publications civil lines Delhi), 21-22.

40. N. M. Mithun, S. Shashidhara, and R. Vivek Kumar, "Eclipta alba (L.) A review on its phytochemical and pharmacological profile", Pharmacology online, 2011; 1: 345-357.
41. Devireddy Anand, Saravanan periyaswamy (2014), "Phytochemical Analysis of Leaf Extract of Eclipta Alba (L.) Hassk. bty GC-MS Method" IJPPR; Vol. 6; Issue 3; 562-566.
42. V. N. Murthy, B.P. Reddy. V. Venkateshwarlu, and C.K. Kokate, "Antihepatotoxic activity of *Eclipta alba, Tephrosia purpurea* and *Boerhaavia diffusa*", *Ancient Science of Life*, 1992; 11: 182-186.
43. N. Tabassum and S.S. Agarwal, "Hepatoprotective activity of *Eclipta alba* Hassk. against paracetamol induced hepatocellular damage in mice", *JK Practitioner*, 2004; 11(4): pp.278-280.
44. G. Kaur, R. Tuli, and M. Chintamaneni, "Antioxidant potential of methanolic and hydrolyzed extracts of *Eclipta alba*", *Pharmacologyonline*, 2009; 2: 947-956.
45. M. Panghal, V. Kaushal, and J.P. Yadav, "In vitro antimicrobial activity of ten medicinal plants against clinical isolates of oral cancer cases," *Annals of Clinical Microbiology and Antimicrobials*, 2011; 10: 21.
46. S. Karthikumar, K. Vigneshwari, and K. Jegatheesan, "Screening of antibacterial and antioxidant activites of leaves of *Eclipta prostata* (L)," *Scientific Research and Essay*, 2007; 2(4): 101-104.
47. J. Ananthi, A. Prakasam, and K.V. Pugalendi, "Antihyperglycemic activity of *Ecliptaalba* leaf on alloxan-induced diabetic rats". *Yale Journal of Biology and Medicine*, 2003; 76(1-6): 97-102.
48. B. Saroj, A. Shashank, S. Shirshat Mahendra J. Suryaji, L.S. Patil, and R. A. Deshmukh, "Anti-malarial activity of *Eclipta alba* against *Plasmodium berghei* infection in mice," *Journal of Communicable Disease*, 2007; 39(2): 91-94.
49. M.F. Shaikh, J. Sancheti, and S. Sathye, "Phytochemical and pharmacological investigation of *Eclipta alba* (Linn) Hassk leaves for antiepileptic activity." *International Journal of Pharmacy and Pharmaceutical Sciences*, 2012; 4(4): 319-323.
50. V. Rangineni, D. Sharda, and S. Saxena, "Diuretic, hypotensive, and hypocholestrolemic effects of *Eclipta alba* in mild hypertensive subjects: a pilotstudy," *Journal of Medicinal Food*, 2007; 10(1): 143-148.
51. V.D. Thakur and S.A. Mengi, "Neuropharmacological profile of *Eclipta alba* (Linn.) Hassk", *Journal of Ethnopharmacology*, 2005; 102(1): 23-31.
52. S.P. Kumar, B.S. Kumar, V.R. Chandana, M. Vijaykumar, S.K. Ojha, and M.E. Bavani,

"Antisecretory and antiulcer activities of *Eclipta alba* Linn. In rats," in *Proceedings of the 5th World Ayurveda Congress*, Oral Presentation, Abstract No. OA01.03, Bhopal, India, December 2012.

53. R.K. Roy, M. Thakur, and V.K. Dixit, "Hair growth promoting activity of *Eclipta alba* in male albino rats," *Archives of Dermatological Research*, 2008; 300(7): 357-364.
54. M. Sawant, J. C. Issac, and S. Narayan, "Analgesic studies on total alkaloids and alcohol extracts of *Eclipta alba* (Linn.) Hassk.", *Phytotherapy Research*, 2004; 18(2): 111-113.
55. S. S. Kumar, T. Sivakumar, M. J. Chandrashekhar, and B. Suresh, Evaluation of anti-inflammatory activity of *Eclipta alba* in rats," *Ancient Science of Life*, 2005; 24: 112-118.
56. M. Kaur and H. M. Chandola, "Role of *rasayana* in cure and prevention of recurrence of *vicharchika* (eczema)," *Ayu*, 2010; 31(1): 33-39.