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A Systematic Review on Traditional Ethnomedicinal Uses of *Heliotropium indicum* L. (Boraginaceae)

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Abstract: This study aimed to summarize the available data on the traditional ethnomedicinal uses of *Heliotropium indicum* L. (Family: Heliotropiaceae, Subfamily: Boraginaceae) based on available database reports. *Heliotropium indicum* Linn., commonly known as 'Indian heliotrope' is very common in India with a long history of traditional ethnomedicinal uses in many countries in the world. In present survey its traditional ethnomedicinal uses enlisted from four different continents namely Asia, Africa, and North and South America. Currently, no one traditional ethnomedicinal uses from three continents viz. Europe, Australia and Antartica reported. The comprehensive account of the traditional ethnomedicinal uses are presented in this review such that the potential use of this plant in various traditional medicines can be systematically evaluated.

Keywords: *Heliotropium indicum*, Boraginaceae, review, traditional, ethnomedicinal

Introduction

Heliotropium indicum Linn. is an extensive plant that evolves like a weed and is usually dubbed as 'Hatisund' in Marathi. *Helitropium Indicum* is a plant identified from the Family Heliotropiaceae & Subfamily Boraginaceae , the borage or "forget-me-not" family that is usually shrubs, includes different shrubs, trees, and herbs, making-up about 2,000 species in 146 genera found worldwide. The name "heliotrope" is derived from the idea that plants of this species turn their leaves to the sun, however, this is not the habit of this species (Selvi & Bigazzi,2001; Oluwatoyin, et.al.2011; Zihad et.al.2019). It is native to Southern America and has happened naturalized in North America, Africa, Asia and Australia.

It is also known as *Heliophytum indicum* (L.) DC., *Tiaridium indicum* (L.) Lehm., *Eliopia riparia* Raf., *Eliopia serrata* Raf., *Heliophytum foetidum* DC., *Heliophytum velutinum* DC., *Heliotropium africanum* Schumach. & Thonn., C.F.Schumacher, Beskr. *Heliotropium anisophyllum* P.Beauv., *Heliotropium cordifolium* Moench, *Heliotropium*

foetidum Salisb., *Heliotropium horminifolium* Mill., *Heliotropium lanceolatum* Noronha, *Heliotropium parviflorum* Blanco, *Tiaridium anisophyllum* G.Don, *Tiaridium indicum* var. *mexicanum* M.Martens & Galeotti, and *Tiaridium velutinum* Lehm

Heliotropium indicum Linn. contains many important phytochemicals such as tannins, saponins, steroids, oils, and glycosides (Nawaz et.al.2009, & Kugelman et.al. 2015). It also possesses many important pharmacological activities, including anti-inflammatory, wound-healing, anticancer and anticataract activities (Srinivas et.al.2000, Reddy et.al.2002, Kugelman et.al. 2015, Veda, et.al. 2016).

Plant Morphology and Description

Heliotropium indicum Linn. Sp. Pl. 130. 1753; C. B. Cl. in Hook. f. Fl. Brit. India 4: 152. 1883; Cooke, Fl. Pres. Bombay 2: 273. 1958 (Repr.). “Hathisund”, 'Bhurundi'. **(Photo Plate 01).**

Description: Erect or sometimes decumbent ascending, annual herbs; branches hirsute. Leaves 38 x 24 cm, ovate elliptic or ovateoblong, sparsely hairy on both sides, apex acute, base sometimes contracted into partially winged petiole. Flowers white or bluish white, sessile in 2ranked, dense, scorpioid cymes; corolla salver shaped. Fruits deeply bifid, nutlets beaked, angled. (Singh et.al, 2001).

Methodology:

Literature search was performed using the both offline and online databases like Scopus, Google Scholar, Springer Link, BioMed Central, Science Direct, Research Gate, Web of Science, PubMed and Elsevier etc. scientific databases were chosen based on the topic covered (i.e., ethnomedicinal uses & ethnobotany of *Heliotropium indicum* Linn.) and geographical coverage of plant . Common keyword used for to search published materials as “*Heliotropium indicum* Linn.”, which was then paired with “Folklore medicinal uses” “ethnomedicinal uses” “traditional uses,”. Other offline literature sources included papers published in Related Books, National & International Conference papers, National & International Journals & reports published from Regional, International and National organizations.

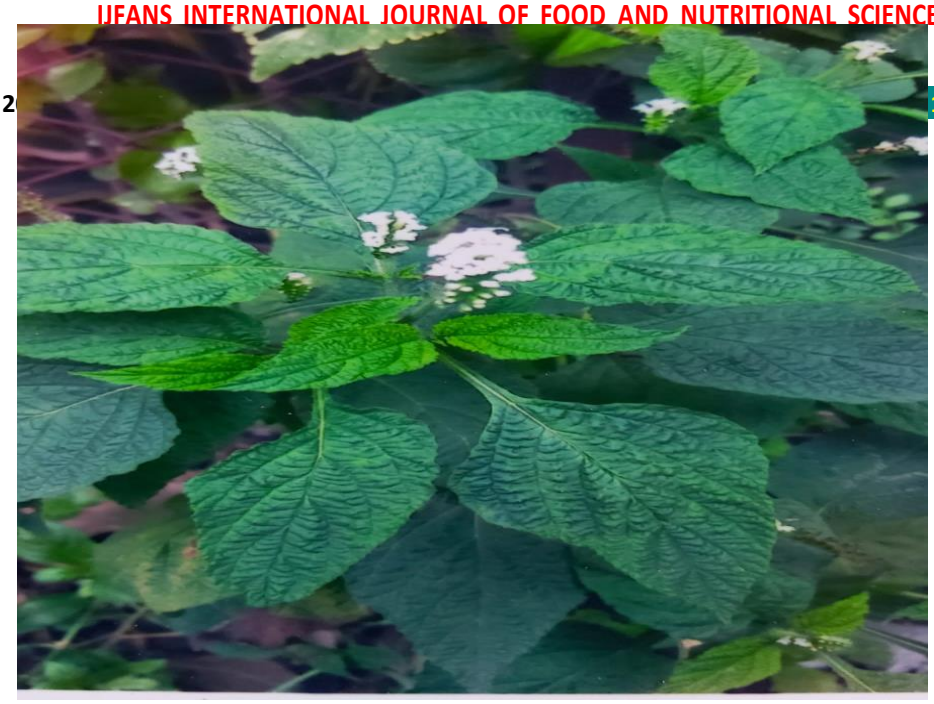

Photo Plate 01.*Heliotropium indicum* Linn. in natural Habitat.

Result and Conclusion

Traditional Ethnomedicinal Uses of *Heliotropium indicum* Linn.

Heliotropium indicum Linn. has been traditionally used in different folklore systems as whole plant of to cure several diseases in different countries over the world. Its ethnomedicinal and beneficial effects have been shown by various researchers, from four different continents of the world viz. Asia (India, Bangladesh, Burma (Myanmar), Thailand, Taiwan, Philippines, Ghana, Indonesia), Africa (Nigeria, Gabon, Tanzania, Madagascar, Mauritius, Togo, Sierra Leone, Sao Tome, Senegal, Seychelles, Siby, Rodrigues Island, Mali, Ivory Coast, Guinea, Benin, Congo, Conakry), North America (Jamaica, West Indies, Eastern Nicaragua, Mexico) and South America(Amazon, South America, Brazil, Colombia) given in Table.No. 1.

Conclusion

Heliotropium indicum Linn. has been used as a crucial phytomedicinal source for many diseases in various parts of the world viz. Asia, Africa, Norht and South America as it is briefly discussed in the review article. Traditional ethnomedicinal uses of *Heliotropium indicum* Linn. were not reported from three continents viz. Europe, Australia and Antarctica.

The review showed the different ethnomedicinal uses and taxonomical aspects of *Heliotropium indicum* Linn. The widespread literature studies reveal that the plant possesses varied traditional medicinal uses. Its wild occurrence of this species worldwide provides an opportunity to utilize this plant to paramount levels in treating diverse ailments. This review attempts to provide a systematic account of traditional ethnomedicinal in the different parts of the worlds. This plant having the bioprospecting potential are in turn responsible for its therapeutic potential for the future use.

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Table No. 1. Reported traditional ethnomedicinal uses of *Heliotropium indicum* L.

Country	Traditional uses	Plant part Used	Mode of use	References
India	Wounds and skin infections	whole plant	paste	Muthu et al., 2016
	Snake bite, scorpion sting, skin rashes	Leaf	leaf juice mixed with hot water	Alagesaboopathi, 2009
	Rheumatism	Leaf	paste	Nagaraju & Rao,1990
	Ophthalmia	Root	Juice	Das et.al.2008
	stomachache , nervous disorders , skin diseases & poison bites,			Dash & Abdullah, 2013.
Bangaldesh	Joint pain, Knee swelling & itching in leg	Root	Decoction	Kamal et. al. 2014
	Chicken pox ; allergy	Leaf	Juice	Shahnaj et. al. 2015
	Antidote to poisoning	Leaf and stem	Decoction	Nawaz et al. 2009
Gabon	Gum infection (Gingivitis)	Leaves	Powder	Walker, 1986; Schmelzer & Gurib-Fakim, 2008
Tanzania	Yaws (A chronic bacterial infection that affects the skin, bone and cartilage)	Root	Extract	Schmelzer & Gurib-Fakim, 2008
Madagascar	Diuretic	Whole plant	Infusion	Schmelzer & Gurib-Fakim, 2008
Jamaica	Ulcers, Sore throat, Intractable fever and venerable diseases	Whole plant	Decoction	Asprey & Thornton, 1955

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	Menorrhagia	Flower	Mixer of flower	Dash & Abdullah, 2013
	For abortion	Whole plant	Decoction	Asprey & Thornton, 1955
	Rectal sores	Whole plant	Decoction	Asprey & Thornton, 1955
	Cleansing and dressing of wounds and ulcers	Whole plant	Paste	Asprey & Thornton, 1955
Mauritius	Renal colic	Leaves	Infusion	Daruty, 2018; Suroowan et.al.,2019.
	Ophthalmia, ulcers, diuretic, and anthrax	Leaves	Poultice	
West Indies	Head Lice	Whole plant	Paste	Ayensu, 1978
Eastern Nicaragua	Whooping cough in childrens	Leaves, Root	Decoction	Anderson & Coee, 1996
Amazon	Scorpion stings and bug bites	Leaves, Root	Paste	Duke & Vasquez, 1994
Malaysia	Putrefaction, pyoderma and ringworm infection	Whole plant	Paste	Wiart, 2006
Burma	Gonorrhea	Whole plant	Decoction	Wiart, 2006
Thailand	Sterilization in females	Inflorescence	Powder mixed with milk or water	Berhaut, 1988.
Taiwan	Hepatitis	Leaves and root	Paste externally used	Lin & Kan,1990
Togo	Dermatosis	Leaves	Juice	Adjanohoun, 2014
	Liver diseases	Whole plant	Decoction	Kpodar et.al.,2 015
South	Insect bites and	Leaves &	Paste	Duke & Vasquez,

America	scorpion stings	root	externally used	1994
Sierra Leone	Newborn baby washing	Leaves	Decoction	Togola et.al.,2005
Sao Tome	Ulcers	Leaves	Leaves paste with palm oil externally used	Sequeira,1994
Senegal	Child skin problems like eczema, impetigo, and dermatitis	Leaves	powder	Kerharo & Adam, 1974
	Kidney stone & Diuretic	Whole plant	Decoction	Quisumbing, 1951; Berhault, 1974.
Seychelles	Chirurgical pain	Leaves	Decoction	Adjanohoun et.al. 1989.
Siby	Vomiting	Leaves	-	Togola,et.al.2005.
Rodrigues Island	Calculus	Whole plant	Decoction	Gurib-Fakim, et.al.2008.
	Bloating and loss of appetite	Leaves	Decoction	Samoisy & Mahomoodally, 2015
Philippines	Diuretic and kidney stone	Whole plant	Decoction	Quisumbing, 1951
Nigeria	Malaria	Leaves	Decoction	Adjanohoun, 2014
	Hepatitis and fever	Leaves	Decoction	Adjanohoun, 2014
	Gonorrhea	Leaves	Leaf juice with castor oil	Ainslie, 1937
	Ulcers and to cure eye infections	Leaves, Whole plant	Paste, Infusion	Kerharo & Adam , 1974; Schmelzer & Gurib-Fakim, 2008
Ghana	Ulcers and to cure eye infections	Leaves	Paste	Kerharo & Adam, 1974

Mexico	Asthma	Root	Decoction	Togola,et.al.2005.
Mali	Nausea and vomiting	Whole plant	Decoction	Nordeng et. al.,2013
	Baby thinness	Leaves	Decoction	Togola,et.al.2005
	Ocular (Eye)infection	Leaves	Decoction	Togola,et.al.2005
	Amenorrhea (The absence of monthly menstrual periods)	Root	Decoction	Togola,et.al.2005
	High blood pressure	Leaves	Decoction	Togola,et.al.2005
Ivory Coast	Colds and sinusitis	Leaves	Powder	Burkill, 1985
Indonesia	Thrush and in poultices for herpes	Leaves	Decoction	Burkill, 1985
Guinea	Febrifuge	Whole plant	Decoction	Kerharo & Adam, 1974
	Antiseptic	Leaves	Decoction	Magassouba et.al.,2007
Brazil	Skin ulcers and burns	Leaves	-	Reddy et.al., 2002; Dash & Murthy,2011
Benin	Dystocia	Leaves	Trituration with water and drops in eyes	Adjanohoun,2014
	Femal (a herbal remedy made from pollen extracts, reduces hot flushes and improves quality of life in menopausal women)	Leaves	Extract	Adjanohoun,2014
	Splenomegalia	Leaves	--	Adjanohoun,2014
	Psychosis	Root	-	Adjanohoun,2014
	Internal infection and hypertension	Stem & leaves	Decoction	Apema et.al.,2011
Congo	Stomach, fever, and	Leaves	Decoction	Kalanda &

	eye lotion			Omasombo, 2019
Colombia	Internal parasites	Leaves	Decoction	Agudelo-Lopez et.al.,2008
Conakry	Fever	Whole plant	Decoction	Togola,et.al.2005

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