



Received on 16 May 2024; received in revised form, 26 June 2024; accepted, 29 June 2024; published 30 June 2024

A REVIEW ON ATYPICAL PLANT *HELICTERES ISORA* LINN.

M. Ramya *, K. H. Ahalyadevi, B. S. Suresha and T. Balasubramanian

Department of Pharmacology, Bharathi College of Pharmacy, Bharathinagara, Mandya - 571422, Karnataka, India.

Keywords:

H. isora, Antimicrobial, Antiulcer

Correspondence to Author:

M. Ramya

Department of Pharmacology,
Bharathi College of Pharmacy,
Bharathinagara, Mandya - 571422,
Karnataka, India.

E-mail: ramyanandan1995@gmail.com

ABSTRACT: Herbal medicine, also known as Herbalism or Botanical medicine, harnesses the therapeutic properties of plants in various forms to prevent, treat, or promote health and well-being. Plants contain a diverse array of chemical compounds that interact with the body, leading to their widespread use in traditional and modern medicine worldwide. Over the past few decades, there has been a significant rise in the global and national markets for herbal drugs. Utilized since ancient times, medicinal plants are fundamental to traditional healing systems such as Ayurveda, Unani, as well as folk and native medicine. *Helicteres isora* L. (Sterculiaceae family) is renowned for its traditional uses and widespread distribution. Research indicates that extracts derived from its leaves, bark, fruits, and roots possess a range of beneficial properties, including antioxidant, anti-dysenteric, anti-diabetic, and antimicrobial activities. Notably, the fruit extract of *H. isora* demonstrates promising free radical scavenging abilities. This review aims to provide a scientific basis for the indigenous therapeutic claims associated with bioactive fractions extracted from *H. isora*.

INTRODUCTION: Throughout history, medicinal plants have served as vital components in treating and preventing various diseases, including epidemics, with each part of the plant possessing unique medicinal properties¹. Traditional medicine heavily relies on medicinal plants, serving as the cornerstone of healthcare for over 3.3 billion individuals in less developed regions worldwide². Traditional medicine is prevalent globally, and between 1990 and 1995, the World Health Organization (WHO) redefined it to encompass therapeutic practices that have endured for centuries before the advent and dissemination of modern scientific medicine, continuing to be utilized to this day³. Exploring the potential of higher plants as a source of new drugs remains largely untapped.

Despite the vast number of plant species estimated to range from 250,000 to 500,000, only a fraction has undergone comprehensive phytochemical analysis, and even fewer have been thoroughly examined for their pharmacological properties. In many instances, only preliminary pharmacological screenings have been conducted, with an estimated 5,000 species studied for medical purposes⁴. *Helicteres isora* L. (*H. isora*), a member of the Sterculiaceae family, known colloquially as the East Indian screw tree, holds medicinal significance. This sub-deciduous shrub or small tree typically grows to heights ranging from 5 to 15 feet and finds use across traditional medicinal practices, with virtually all parts of the plant utilized in treating a multitude of ailments⁵.

In traditional medicine, nearly every component of *H. isora* is employed to address a diverse range of health issues⁶. These plants, found in their natural habitat, often coexist with other tree species like *Timonius sericeus*, *Cassia siamea*, *Acacia leucophloea* and *Leucaena leucocephala*⁷. The fruits of *H. isora* consist of compound pods that



resemble screws, twisted with pointed ends. It's worth mentioning that various parts of the plant harbor significant antioxidants such as polyphenols and tannins, along with being rich sources of essential nutrients⁸. The bark contains tannins, flavonoids, alkaloids, saponins, and steroids, while the roots are rich in tannins, phenolic compounds, triterpenoids, and alkaloids. Additionally, the fruits

contain tannins, phenolic compounds, steroids, and glycosides⁹. The nutritional and medicinal benefits of these antioxidants and nutrients are extensively documented. Given their nutritive and therapeutic properties, various parts of the plant are incorporated into herbal preparations such as Gandharva Churna and Siddha Praneshwar Ras⁸.



FIG. 1: HELICTERES ISORA LEAVES



FIG. 2: HELICTERES ISORAWHOLEPLANT



FIG. 3: HELICTERES ISORA FLOWER



FIG. 4: HELICTERES ISORA FRUIT

TABLE 1: TAXONOMY³⁷:

Class	Angiosperms
Sub-class	Eudicots
Order	Malvales
Family	Malvaceae
Subfamily	Helicteroideae
Genus	<i>Helicteres</i>
Species	<i>H. isora</i>

Synonms: *Helicteres baruensis* var. *ovata* DC, *Helicteres chrysocalyx* Miq.

Ex Mast, *Helicteres corylifolia* Buch Ham. Ex Dillwyn, *Helicteres grewiaefolia* DC, *Helicteres isora* var. *glabrescens* Mast

TABLE 2: VERNACULAR NAMES³⁷:

Languages	Names
Sanskrit	Murva, Avartani, Avartaphala
Hindi	Marodphali, Marorphali, Enthani, Gomathi
Marathi	Kewad, Muradsheng
Bengal	Antmora
Gujarat	Maradashingh, Maradashinghi
Tamil	Balampari
Telugu	Guvadarra
Kannada	Yedamuri-balamuri
Malayalam	Ishwarmuri
Oriya	Murmuriya
English	East India screw tree, Indian screw tree

Discription: The plant typically grows as large shrubs, reaching heights of 5-8 meters. Its leaves are obovate or suborbicular, with 3-5 nerves at the base, scabrous on the upper surface, and stellately tomentose on the lower surface. Leaf petioles measure about 1.2 cm in length. The bark appears pale greyish and finely wrinkled, with young shoots covered in stellate tomentum. Flowers are either solitary or in cymes, with axillary bracts measuring 2-3 mm long containing two brown glands. The calyx is slightly yellow, tubular, and persistent, with a densely hairy tube about 1.5-2 cm long. Petals, varying from crimson to pale blue, are unequal in size and obovate in shape. The staminal

column is cylindrical, measuring 3-3.5 cm long, with 10 stamens and 5 staminodes. Ovaries are pentalobed, 2-2.5 mm long, located at the tip of the gynophore, and contain many ovules with 5 styles and subulate stigma. The follicles are spirally twisted, stellate-tomentose, beaked, and measure 4-6 cm long, with 5 in number. Seeds are black, angular, wrinkled, and approximately 2-3 mm long¹¹.

Distribution: Avartani is found distributed in dry forests throughout Central and Western India, from Bihar as far West as Jammu and Western Peninsula³⁷.

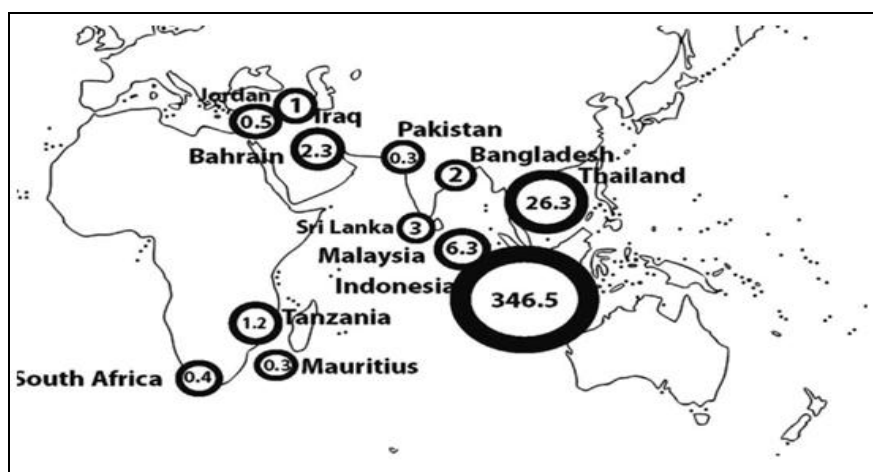


FIG. 5: DISTRIBUTION

TABLE 3: PHYTOCONSTITUENTS

Fruits	49-O-b -D-glucopyranosyl rosmarinic acid 4,49-O-di-b-D-glucopyranosyl rosmarinic acid 2R-O-(49-O-b-D-glucopyranosyl caffeoyl)-3-(4-hydroxyphenyl), lactic acid named as 49-O-b Dglucopyranosyl isorinic acid
Leaves	methyl ether, 7,41 di-o-methyle isoscutellarein i.e. (5,8-dihydroxy-7,41 flavones) kaempferol-3-o-galactoside (trifolin)
Stem bark	herbacetin-8-oglucoronide phytosterols hydroxyl carboxylic acid orangeyellow saponins
Seed	phlobotannis, sugar ang lignins phytosterols fixed oils fats phenolic compounds tannins amino acid amino acid
Root	Cucurbitacin B, isocucurbitacin B

Pharmacological Activity:

Antioxidant: The *in-vitro* Antioxidant Activity of Hot Aqueous Extract of *H. isora* Fruits. The

Aqueous (hot) extract of *H. isora* exhibit strong antioxidant activity by inhibiting nitric oxide and

scavenging superoxide anion and hydrogen peroxide radical¹².

Antimicrobial Activity: Some researchers have demonstrated antimicrobial activity from aqueous and alcoholic of fruits of *H. isora* against a number of bacterial strains. This research showed antimicrobial effects from butanol extract of roots of *H. isora* against a number of microbes. The acetone extract of the fruit is capable of removing antibiotic resistant R-plasmid of many strains of bacteria thus making them more sensitive towards low antibiotic doses³².

Such plasmid loss reversed the multiple antibiotic resistances in cured derivatives making them sensitive to low concentrations of antibiotics. Acetone extracts of *H. isora* possess potential as a natural origin for developing antiplasmid agents. They also exhibit the ability to sensitize multidrug-resistant genes in pathogenic bacteria, suggesting a promising avenue for combating antibiotic resistance¹³.

Antibacterial Activity: The discovery of organic extracts from *H. isora* as a novel and safe plasmid curing agent has opened up new possibilities for combating plasmid-encoded multiple antibiotic resistance. The use of sub-inhibitory concentrations of these curing agents in the study, despite bacteria being resistant to them, suggests a reduced likelihood of bacteria developing resistance against the plasmid-curing properties of the acetone extract from *H. isora*¹⁴.

Antifungal Activity: Leaf and fruit extracts of *H. isora* against the mycelial growth of test fungi. Poisoning of medium with leaf and fruit extracts resulted in suppression of growth of test fungi but to a varied extent.

Leaf extract caused higher inhibition of *B. sorokiniana* and *Curvularia* sp. followed by *F. oxysporum* and *C. capsici*. Fruit extract was inhibitorier to *B. sorokiniana* followed by *Curvularia* sp., *C. capsici* and *F. oxysporum*. Inhibitory activity of fruit extract was lesser when compared to leaf extract¹⁵.

Antidiabetic Activity: The *H. isora* concoction has demonstrated efficacy in effectively controlling blood glucose levels in type-2 diabetic patients.

When combined with dynamic meditation and exercise, it synergistically reduces diabetic complications within a very short interval.

As a result, *H. isora* is highly recommended as a potential hypoglycemic agent for managing type-2 diabetes mellitus¹⁶.

Anticancer Activity: The *H. isora* plant exhibits potent activity against human breast cancer, attributed to the presence of alkaloids and flavonoids contributing to its cytotoxic effects. Our ongoing strategy involves isolating and evaluating these active compounds to elucidate their exact mechanism of action¹⁷.

Anti-Inflammatory Activity: The hydroalcoholic leaf extract of *H. isora* possess wound healing activity without any dermal toxicity and also helps in acceleration of cellular proliferation, increasing collagen synthesis and rapid formation of the well-keratinized epidermal layer, with the combination of dermal fibrous connective tissue in an animal model¹⁸.

Antinociceptive Activity: Significant antinociceptive activity was observed in the aqueous ethanol, petroleum ether, and chloroform extracts of *H. isora*. Phytochemical analysis revealed that major constituents such as sterols, triterpenoids (in the petroleum ether extract), and their glycosides (in the chloroform and aqueous ethanol extracts) may be responsible for the observed pharmacological effects¹⁹.

Antispasmodic Activity: The plant *H. isora* fruits exhibit remarkable antispasmodic activity against spasmogens- histamine, acetylcholine, and barium chloride tested *in-vitro* in guinea-pig ileum and do not shows any acute toxicity when tested *in-vivo* for gastrointestinal motility in mice²⁰.

Antihyperlipidemic Activity: In conclusion, from the present findings, it is well documented that the fruit of *H. isora* has the active principle to counteract the hyperlipidemic condition occurring in streptozotocin induced diabetic rats. Further findings are going on to separate the active compound in HiFE and to elucidate the mechanism of action 21.

Anthelmintic Activity: The bark extract of *H. isora* exhibits antihelmintic potential against *Pheretima posthuma* (Indian adult earthworm). Administration of various extract at concentration of 10, 20, 50 mg/ml, but 50 mg/ml concentration of extract showed better activity with paralysis and death of earthworms²². The Antihelmintic Activity of *H. isora* Fruits Extract at various concentration (50 and 100 mg/ml) of aqueous extract, resulting in and shortest time required for paralysis and death of worms. The Antihelmintic Activity of *H. isora* fruits Extract at various concentration (50 and 100 mg/ml) of aqueous extract, resulting in and shortest time required for paralysis and death of worms²³.

Anti-Enzymatic Activity: Measuring the percentage of polyphenol oxidase activity inhibition by two water extracts of *H. isora* showed that subcritical water extract causes inhibition of 29% and the magnitude of enzyme activity inhibition for water extract was 11.2%. Statistical analysis revealed significant differences between the percentages of enzyme activity inhibition between the two extracts ($P \leq 0.05$)²⁴.

Hepatoprotective Effects: Researchers have provided a scientific rationale for the traditional use of this plant in the management of liver diseases, suggesting hepatoprotective role of ethanolic extract from bark and root. The administration of ethanolic extract of *H. isora* bark to rats resulted in total reversal and recovery of all studied biochemical and antioxidant markers²⁵.

Antiplasmodial Activities: The discovery of organic extracts from *H. isora* as a novel and safe plasmodium curing agent has paved the way for exploring new combinations of antibiotics and potential drugs effective against plasmodium-encoded multiple antibiotic resistance¹⁴.

Cardiac Antioxidant and Antiperoxidative Potency: Cardiac antioxidant enzyme activities were notably reduced in diabetic control rats, yet significantly increased in diabetic rats treated with hemagglutination inhibition. *H. isora* administration to normal rats also elevated antioxidant levels without significant differences. Notably, the antioxidant effect of the aqueous extract of HI (at 200 mg/kg, p.o.) surpassed that of tolbutamide in treated rats²⁶.

Antiulcer Activity: Our experimental findings revealed that the hydroalcoholic extract of dried fruits from *H. isora* exhibits a protective effect against DSS-induced ulcerative colitis in Wistar rats. Histopathological analyses demonstrated reduced lesions in the mucosal area of the colon and tissue repairment following treatment with the herbal extract of *H. isora* dried fruits²⁷.

CONCLUSION: In summary, *H. isora* demonstrates diverse therapeutic potentials as a medicinal plant. Chemical analysis indicates the presence of numerous bioactive compounds, showcasing promising applications in pharmacological realms such as antiulcer, hepatoprotective, and antidiabetic activities.

Utilizing the fruit, bark, leaves, and seeds for medicinal purposes underscores the necessity to further investigate their pharmaceutical significance for the development of effective treatments against a spectrum of diseases.

ACKNOWLEDGEMENT: Nil

CONFLICT OF INTEREST: Nil

REFERENCES:

1. Bamola N, Verma P and Negi C: A review on some traditional medicinal plants. International Journal of Life-Sciences Scientific Research 2018; 4(1): 1550-1556.
2. Ahvazi M, Khalighi-Sigaroodi F, Charkhchiyan MM, Mojab F, Mozaffarian VA and Zakeri H: Introduction of medicinal plants species with the most traditional usage in Alamut region. Iranian Journal of Pharmaceutical Research: IJPR 2012; 11(1): 185-194.
3. Sofowora A: Research on medicinal plants and traditional medicine in Africa. The Journal of Alternative and Complementary Medicine 1996; 2(3): 365-372.
4. Kumar V and Kumar V: An overview of herbal medicine. Int J Ph Sci 2009; 1(1): 1-20.
5. Kumar D, Singh RK and Farooq S: *In-vitro* antimicrobial activity of oleanolic acid identified in chloroform extract of fruits of *Helicteres isora* L. World Journal of Pharmaceutical Research 2016; 6(1): 1102-1112.
6. Sharma VE and Chaudhary UR: Pharmacognostic and phytochemical screening of *Helicteres isora* roots. Asian J Pharm Clin Res 2016; 9(2):96-101.
7. Umroni A, Pamungkas D and Prasetyo NA: Medicinal plant domestication of kayu ules (*Helicteres isora* Linn.) through stem cuttings: An additional prospective livelihood for the farmer at Bosen Village, East Nusa Tenggara, Indonesia. In IOP Conference Series: Earth and Environmental Science 2021; 914(1): 1-10.
8. Dayal R, Singh A, Ojha RP and Mishra KP: Possible therapeutic potential of *Helicteres isora* (L.) and its mechanism of action in diseases. Journal of Medicinal Plant Studies 2015; 3(2): 95-100.

9. Kumar S, Jena PK, Kumari M, Patnaik N, Kumar A and Tripathy NP: Validation of tribal claims through pharmacological studies of *Helicteres isora* L. leaf extracts: an empirical research. *Int J Drug Dev Res* 2013; 5(1): 279-285.
10. Kumar N and Singh AK: Plant profile, phytochemistry and pharmacology of Avartani (*Helicteres isora* Linn.): A review. *Asian Pacific Journal of Tropical Biomedicine* 2014; 4: 22-26.
11. Pandey S, Patel D, Mishra P and Tiwari R: Morphological, phytochemical and pharmacological study of *Helicteres isora* (Marorphali). *International Journal of Research in Pharmacy and Pharmaceutical Sciences* 2021; 6(3): 13-17.
12. Sharma S: Studied the total phenolic and flavonoid content of *Helicteres isora* L in different solvents may be used as a Potential Antioxidant Agent. *World Journal of Pharmacy and Pharmaceutical Sciences* 2017; 6(8): 1471-1476.
13. Tambekar DH, Khante BS, Panzade BK, Dahikar SB and Banginwar YS: Evaluation of phytochemical and antibacterial potential of *Helicteres isora* L. fruits against enteric bacterial pathogens. *African Journal of Traditional Complementary and Alternative Med* 2008; 5(3): 290-293.
14. Shriram V, Jahagirdar S, Latha C, Kumar V, Dhakephalkar P, Rojatkar S and Shitole MG: Antibacterial & antiplasmid activities of *Helicteres isora* L. *Indian Journal of Medical Research* 2010; 132(1): 94-99.
15. Varsha Varsha S, Sheetal J, Latha C, Vinay K, Prashant D, Supada R and Shitole MG: Antibacterial & antiplasmid activities of *Helicteres isora* L. *Indian J of Med Research* 2010; 132(1): 94-99.
16. Subramaniam V, Giridharan B, Devaraj D, Sachidanandam M and Vijayan S: Efficacy of Aqueous Extract of *Helicteres isora* on Glucose Level in Type-2 Diabetic Patients Practicing Yoga—A Cohort Study 2014; 2(473): 1-4
17. Elsa Varghese EV, Narayanan SS, Gopal RV, Asha Nair AN, Chittethu AB and Anson TA: Anticancer activity of chloroform extract of *H. isora* 2011; 3(2): 2560-64.
18. Mahajan RE and Itankar PR: Antioxidant, antimicrobial and wound healing potential of *Helicteres isora* Linn. Leaf Extracts. *Digital Chinese Medicine* 2020; 3(3): 188-198.
19. Venkatesh S, Laxmi KS, Reddy BM and Ramesh M: Antinociceptive activity of *Helicteres isora*. *Fitoterapia* 2007; 78(2): 146-148.
20. Pohocha N and Grampurohit ND: Antispasmodic activity of the fruits of *Helicteres isora* Linn. *Phytotherapy Research: An International Journal Devoted to Pharmacological and Toxicological Evaluation of Natural Product Derivatives* 2001; 15(1): 49-52.
21. Raja AB, Elanchezhiyan C and Sethupathy S: Antihyperlipidemic activity of *Helicteres isora* fruit extract on streptozotocin induced diabetic male Wistar rats. *European Review for Medical & Pharmacological Sciences* 2010; 14(3): 191-196.
22. Manke MB, Dhawale SC, Jamkhande PG. Anthelmintic potential of *Helicteres isora* bark extract against *Pheretima posthuma*. *Asian Pacific Journal of Tropical Disease* 2015; 5(4): 313-315.
23. Shah D, Somshekhar S and Soloman S: Anthelmintic activity of *Helicteres isora* Linn. Fruits extract. *World Journal of Pharmacy and Pharmaceutical Sciences* 2013; 4(11): 788-793.
24. Didar Z: Comparative *in-vitro* Study of the biological activity and chemical composition extracts of *Helicteres isora* L. obtained by water and subcritical water extraction. *Food Quality and Safety* 2020; 4(2): 101-106.
25. Dhevi R, Gayathri K, Shabi MM, Subashini U, Dubey GP, Rajamanickam GV and Chitra M: A preliminary biochemical screening of *Helicteres isora* L. stem bark in carbon tetrachloride induced toxicity in rats. *Bulgarian Journal of Veterinary Medicine* 2008; 11(4): 235-242.
26. Kumar G, Banu GS and Murugesan AG: Effect of *Helicteres isora* bark extracts on heart antioxidant status and lipid per oxidation in streptozotocin diabetic rats. *Journal of Applied Biomedicine* 2008; 6(2): 90-95.
27. Murudkar P, Kolhe S and Tembhumne S: Protective Effect of Hydroalcoholic Extract of Dried Fruits of *Helicteres isora* in Dextran Sulfate Sodium Induced Ulcerative Colitis in Experimental Wistar Rats. *International Journal of Pharmaceutical Sciences and Drug Research* 2020; 12(4): 325-330.

How to cite this article:

Ramya M, Ahalyadevi KH, Suresha BS and Balasubramanian T: A review on atypical plant *Helicteres isora* Linn. *Int J Pharmacognosy* 2024; 11(6): 262-67. doi link: [http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.11\(6\).262-67](http://dx.doi.org/10.13040/IJPSR.0975-8232.IJP.11(6).262-67).

This Journal licensed under a Creative Commons Attribution-Non-commercial-Share Alike 3.0 Unported License.

This article can be downloaded to **Android OS** based mobile. Scan QR Code using Code/Bar Scanner from your mobile. (Scanners are available on Google Playstore)