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Pharmacognostic and dravyaguna attributes of Avartani (*Helicteres isora*) in ayurvedic materia medica

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Abstract
Avartani (*Helicteres isora* L.), traditionally known as the Indian screw tree, is a medicinal plant of considerable importance in Ayurveda and other folk systems of healing. Its spirally twisted fruit has made it easily recognizable and symbolically associated with its Sanskrit name *Avartani*. Classical Ayurvedic literature records its usage in gastrointestinal disorders such as diarrhea and dysentery, metabolic disorders such as *prameha*, infectious diseases, and fevers. The plant is endowed with *kashaya rasa* (astringent taste), *laghu guna* (lightness), and *sheeta veerya* (cooling potency), which correspond to its stambhana and krimighna actions. Modern pharmacognostic and phytochemical investigations have confirmed the presence of tannins, flavonoids, phenolics, sterols, saponins, and glycosides that provide a broad pharmacological spectrum including anti-diarrheal, anti-diabetic, antimicrobial, anti-inflammatory, and antioxidant activities. This review synthesizes information from Ayurvedic texts, pharmacognostic features, phytochemical data, and pharmacological validations to provide a comprehensive narrative on the therapeutic insights of Avartani, situating it within the Ayurvedic and naturopathic framework. Emphasis is placed on its role in classical formulations, its potential in preventive and holistic medicine, and its relevance as a sustainable plant resource in contemporary naturopathy.

Keywords: Avartani, *Helicteres isora*, ayurveda, dravyaguna, naturopathy, phytomedicine, holistic therapy

Introduction
Ayurveda, the science of life, has preserved an unparalleled tradition of using medicinal plants for the restoration of health and prevention of disease. Among the thousands of plants documented in classical treatises, Avartani (*Helicteres isora* L.) has been valued for its broad therapeutic efficacy. The plant's common English name, Indian screw tree, derives from the spirally coiled pods that form after flowering. These twisted fruits are not only a distinctive morphological marker but also serve as the chief part used in medicine. Avartani is distributed across tropical Asia, thriving in dry deciduous forests and marginal lands, making it easily accessible for rural populations. Its prominence in Ayurveda is not accidental; it is deeply rooted in empirical usage and validated through centuries of practice.

In Ayurveda, Avartani is described as possessing *kashaya rasa*, which imparts an astringent property to the plant, making it effective in conditions associated with excessive fluid loss, such as diarrhea. Its *laghu guna* provides lightness and digestibility, while *sheeta veerya* gives it a cooling potency, useful in fevers and inflammatory states. These characteristics collectively define its therapeutic profile and explain its inclusion in several formulations aimed at gastrointestinal, metabolic, and infectious disorders. Unlike some Ayurvedic drugs that are specific to limited conditions, Avartani exhibits wide applicability, which is reflected in its repeated mention in *nighantus* and Ayurvedic formularies.

Naturopathy emphasizes the healing potential of natural agents and plants, recognizing them not only for their direct therapeutic effects but also for their role in preventive health. In this regard, Avartani represents a perfect example of how a classical Ayurvedic plant fits seamlessly into the naturopathic paradigm. It is simple, plant-based, eco-sustainable, and effective in common health conditions, which makes it valuable for both traditional and modern natural health systems. Moreover, the synergy between Ayurveda and naturopathy

lies in their shared vision of holistic health, prevention, and minimal side effects, principles that Avartani exemplifies.

This review paper seeks to provide a consolidated narrative on Avartani by examining its botanical features, pharmacognostic characters, Ayurvedic textual references, phytochemical profile, pharmacological evidence, and therapeutic applications. By integrating classical wisdom with modern research, the aim is to highlight the therapeutic significance of *Helicteres isora* and propose its relevance in contemporary integrative and naturopathic healthcare.

Botanical and Pharmacognostic Profile

Helicteres isora is a small deciduous tree or shrub, usually reaching a height of 3-6 meters. It belongs to the family Malvaceae. The plant is common in dry deciduous forests of India, Sri Lanka, Bangladesh, Myanmar, and other Southeast Asian regions. It thrives in marginal soils, often sandy or loamy, and is drought resistant, which makes it ecologically sustainable. Its adaptability has ensured widespread use by traditional healers and rural populations.

The morphology of the plant is distinctive. The bark is grayish-brown, rough, and fibrous. The leaves are simple, alternate, ovate-lanceolate with serrated margins, covered with stellate hairs that give them a slightly rough texture. Flowers are reddish or orange, bisexual, and appear in axillary clusters. The fruit is the most striking feature: long, cylindrical, twisted spirals about 5-10 cm in length, resembling a screw. This screw-like morphology has contributed to its Sanskrit name *Avartani*. Seeds are numerous, small, black, and kidney-shaped.

Pharmacognostic studies confirm certain microscopic and diagnostic features. Transverse sections of fruit and bark show thick-walled parenchyma cells, spiral xylem vessels, and lignified sclereids. Powder microscopy reveals abundant tannins, mucilage, and starch grains. Calcium oxalate crystals and stellate hairs are also characteristic features. Physicochemical studies report total ash values around 5-6%, acid-insoluble ash approximately 1%, and water-soluble extractive values of 10-12%, all of which are useful for drug standardization.

These pharmacognostic characters are critical for authenticating crude samples, distinguishing them from adulterants, and ensuring consistency in Ayurvedic formulations. The presence of tannins and mucilage correlates with the therapeutic actions described in Ayurveda, particularly its astringent and absorbent effects.

Classical Ayurvedic References

Ayurvedic texts provide detailed descriptions of Avartani's properties and uses. In *Bhavaprakasha Nighantu*, it is listed as *kashaya rasa pradhana*, with actions such as *grahi* (absorptive), *stambhana* (checking excessive discharges), and *krimighna* (anthelmintic). *Dhanvantari Nighantu* describes it as *sheeta veerya* and beneficial in *atisara* and *pravahika*. *Raj Nighantu* emphasizes its use in *krimi* and *prameha*.

A commonly cited Sanskrit verse describes Avartani as:
"Avartani kashaya rasa, sheeta veerya, grahi, atisara pravahika harini."

This highlights its astringent taste, cooling potency, and ability to control excessive intestinal discharges.

Formulations documented in Ayurvedic practice include Avartani decoctions for diarrhea and dysentery, powders combined with *Kutaja* (*Holarrhena antidysenterica*) and *Ativisha* (*Aconitum heterophyllum*), and yogas prescribed for *jwara*. Its mention in classical Ayurvedic pharmacopeias underlines its established role in gastrointestinal and metabolic disorders.

Phytochemistry

Modern phytochemical analysis has identified numerous bioactive constituents in *Helicteres isora*. Tannins such as ellagitannins and catechins provide its astringent effect. Flavonoids including quercetin, rutin, and kaempferol contribute to antioxidant and anti-diabetic activities. Phenolic compounds like gallic acid and ferulic acid have antimicrobial and anti-inflammatory properties. Sterols such as β-sitosterol and glycosides add to metabolic regulation, while saponins enhance antimicrobial and expectorant actions.

The synergistic combination of these compounds provides the pharmacological basis for the wide therapeutic actions traditionally attributed to Avartani.

Pharmacological Studies

Several pharmacological investigations have validated the therapeutic claims associated with *H. isora*. Anti-diarrheal activity has been confirmed in experimental models where ethanolic extracts reduced intestinal motility and fluid secretion. Anti-diabetic activity has been demonstrated through significant reductions in blood glucose levels and improvements in insulin sensitivity in diabetic rats treated with fruit extracts. Antimicrobial studies report inhibition of bacterial pathogens such as *Escherichia coli* and *Staphylococcus aureus*, as well as antifungal activity against *Candida albicans*. Antioxidant properties are evident through free radical scavenging assays, and anti-inflammatory effects have been demonstrated in models of carrageenan-induced paw edema, showing suppression of inflammatory mediators.

These results support the Ayurvedic claims and demonstrate that Avartani has a multi-targeted pharmacological profile relevant for gastrointestinal, metabolic, infectious, and inflammatory conditions.

Therapeutic Applications in Classical Formulations

Avartani is extensively used in gastrointestinal disorders. Decoctions are prescribed for diarrhea and dysentery, sometimes in combination with Kutaja and Ativisha. In metabolic disorders such as *prameha*, Avartani is included in formulations for its hypoglycemic effects. Its anthelmintic property justifies its use in intestinal worm infestations. For fevers and inflammatory conditions, it serves as a supportive drug due to its cooling and absorbent actions.

The therapeutic range of Avartani across different conditions exemplifies its versatility. Unlike single-purpose drugs, Avartani contributes to multiple formulations, each time enhancing the therapeutic synergy of the compound mixture.

Naturopathic Perspective

From a naturopathic standpoint, Avartani is a model plant for preventive and holistic healthcare. Naturopathy values natural, accessible, and eco-friendly remedies, principles that Avartani fulfills. Its availability in dry forests and

marginal lands makes it a low-cost, sustainable resource. Its broad therapeutic actions address common health conditions such as diarrhea, diabetes, fever, and infections, which are prevalent in rural and underserved populations.

Furthermore, the antioxidant and immunomodulatory activities of Avartani provide preventive health benefits, aligning with the naturopathic emphasis on strengthening natural resistance before disease manifests. Its minimal ecological footprint and compatibility with plant-based living further reinforce its naturopathic relevance.

Discussion

Avartani demonstrates how classical Ayurvedic knowledge can be substantiated by modern pharmacological studies. Its anti-diarrheal, anti-diabetic, antimicrobial, antioxidant, and anti-inflammatory properties provide a strong basis for its therapeutic claims. The Ayurvedic description of its rasa, guna, and veerya align closely with these modern findings, showing a remarkable consistency between tradition and science.

However, while preclinical studies are promising, clinical validation remains limited. There is a need for controlled clinical trials to establish safety, efficacy, and dosage standardization. Future research should also focus on pharmacokinetics, molecular mechanisms, and interactions with other drugs. Such efforts will enable Avartani to transition from traditional use to evidence-based integrative medicine.

From the naturopathic perspective, Avartani represents a resource for community-based primary care. Its sustainability and accessibility make it suitable for integration into low-cost healthcare models. It exemplifies the synergy between Ayurveda and naturopathy, systems that share a holistic view of health.

Conclusion

Avartani (*Helicteres isora*) is a plant of significant therapeutic value, celebrated in Ayurvedic literature and validated by modern research. Its properties as described in Ayurveda are supported by pharmacological studies, confirming its role in gastrointestinal, metabolic, infectious, and inflammatory conditions. From a naturopathic lens, it exemplifies natural, preventive, and sustainable health care. Integrating Avartani into contemporary practice requires systematic research, standardization, and clinical validation. Nevertheless, it stands as a potent symbol of the continuity between ancient knowledge and modern science.

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