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Payal A Kadus
HSBPVT'S College of
Pharmacy, Ahmednagar,
Maharashtra, India

Ankita A Giramkar
HSBPVT'S College of
Pharmacy, Ahmednagar,
Maharashtra, India

Sunil A Nirmal
HSBPVT'S College of
Pharmacy, Ahmednagar,
Maharashtra, India

Corresponding Author:
Payal A Kadus
HSBPVT'S College of
Pharmacy, Ahmednagar,
Maharashtra, India

A review on: Avartani (*Helicteres isora*)

Payal A Kadus, Ankita A Giramkar and Sunil A Nirmal

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Abstract

The whole plant of *Helicteres isora* Linn showed excellent medicinal merits from ancient time. The leaves, seeds, fruits and roots of this plant have been used in Ayurvedic medicine. It has great medicine importance. It have been recommended for the treatment of diarrhoea, dysentery, abdominal colic pain, intestinal parasites. Phytochemicals present in Avartani like gallic acid, caffeic acid, vanillin, and p-coumaric acid. Qualitative phytochemicals screening of, aqueous ethanol extract, pet Ether extract, chloroform extract, ethyl acetate extract, butanol extract of Avartani roots. *Helicteres isora* has Pharmacological actions like anti-oxidant, anticancer, antidiabetic, hypolipidemic, antibacterial, anti-inflammatory, hepatoprotective, Brain oxidant potency, Anti-diarrheal actions.

Keywords: *Helicteres isora* (Avartani), history, medicinal properties, pharmacological activities

Introduction

Basic information of Avartani (*Helicteres isora*)

Avartani (*Helicteres isora* Linn.) is a medicinal plant which is used in several diseases. *Helicteres isora* sometime called the Indian Screw tree, it is small tree or large shrubs found in Southern Asia and Northern Oceania. It is usually assigned the family malvaceae, but it is sometimes assigned to the family sterculeaceae. In Sanskrit *Helicteres isora* called Avartani and Avartaphala. East Indian Screw tree is an Ayurvedic herb used in treating diarrhoea, dysentery, abdominal colic pain, intestinal parasites, etc. It's roots, stem, bark, fruits are used for medicinal purpose. Avartani is used as a folk medicine to treat snake bite, diarrhoea and constipation of new born baby.

There is a famous quote in Ayurveda "Yatra A krutihi Tatra Gunaaha Vasanti" meaning, if the part of a plant resembles some organs, it is useful in treating disorders of that particular organ. Avartani means rotating. The fruits and roots of *Helicteres isora* are used in traditional medicine system of Asia, Iraq and South Africa where they are created with having value in treatment of wide variety of condition including gastrointestinal disorder diabetes, cancer and infection.

In 19th century fibres from the bark where used to make rope and sacks although nowadays the tree is harvested for the fruits and roots which are used in folk medicine. This is the first study of global trade on fruits of the widely used as traditional medicine *Helicteres isora* Linn. It is used in Ayurveda, siddha, Unani medicinal system and local folk traditional medicine in India Pakistan, Bangladesh. The roots of this plant are used in traditional Chinese medicine in China and the fruits in Jamu products in Indonesia, Malaysia and Thailand.

The fruit of Avartani are twisted. The fruits gives an imagination about intestine. Hence they are useful in treating intestinal parasite. The fruit are twisted his they are useful in twisting pain of abdomen. The red flower of this plant are pollinated mainly by sunbirds butterfly and hymenoptera. *Helicteres isora* is a rich source of antioxidants, carbohydrates, proteins, fibre, calcium, phosphorus, and iron. Active phytoconstituents include gallic acid, caffeic acid, vanillin, and p-coumaric acid. *Helicteres isora* L. is a large arborescent shrub of the family Sterculiaceae. It is used as an antigastropasmodic, anthelmintic, antispasmodic, antipyretic, antidiarrheal, antidysenteric and as a tonic after childbirth. Stems of this plant are used as anthelmintic, colic, and aphtha, while fruits are used as colic, anticonvulsant, and abdominalgia. Traditionally, the root juice is claimed to be useful in diabetes, emphysema, and snakebite.

Helicteres isora is a rich source of antioxidants, carbohydrates, proteins, fibre, calcium, phosphorus, and iron. Active phytoconstituents include gallic acid, caffeic acid, vanillin, and p-coumaric acid. Cucurbitacin b and isocucurbitacin b have been isolated from the roots. *Helicteres isora* L. is a large arborescent shrub of the family Sterculiaceae.

Taxonomy

Kingdom: Plantae

Class: Angiosperms

Sub class: Eudicots

Order: Malvales

Family: Malvaceae

Sub Family: Helicteroideae

Genus: Helicteres

Species: *H. isora*

Binomial name: *Helicteres isora*

General name: Avartani, Marorphali



Fig 1: *Helicteres isora*

Table 1: Vernacular names of Avartani in different languages

Languages	Name of Plant
Sanskrit	Murva, Avartani, Avartaphala
Hindi	Marorphali, Marodphali
English	Indian Screw tree, East India screw tree
Tamil	Balampari
Telugu	Guvadarra
Gujarat	Maradashingh, Maradashinghi
Oriya	Murmuriya

Phytochemical composition

The phytochemical studies of the plant are an important step to identify the bioactive compounds present in the medicinal plants. These compounds have various use in medicinal industries to prepare novel drugs. Phytochemical screening of crude extract and chloroform extract of the plant shows the presence of carbohydrates, saponin tannin, proteins, steroids, anthraquinon glycosides, cardiac glycosides, phenolic compounds, terpenoides, alkaloid salts, and free alkaloids. The subcritical extract of the plant (prepared at 10 bar pressure, 160oc, 1:30 sample-to-solvent ratio, and 30 minutes) shows the presence of Octadecnoic acid, hexadecanoic acid, and berberine.

Table 2: Phytochemical screening of various extracts of *Helicteres isora* L. root

Chemical Constituents	Aq. ethanol extract	Pet Ether extract	Chloroform extract	Ethyl acetate extract	Butanol extract	Left over Aq. extract
Alkaloids	-	-	-	-	-	-
Phenolic compounds and Tannins	+	-	-	+	+	+
Fixed oil and fats	-	-	-	-	-	-
Protein and amino acid	+	-	-	+	+	-
Carbohydrates and glycosides	+	-	+	+	+	+
Saponins	-	-	-	-	-	-
Steroids	+	+	+	+	+	-
Gums and Mucilage	-	-	-	-	-	-
Coumarins	-	-	-	-	-	-
Flavonoids	+	-	-	+	+	-
% Yeild(w/w)	2.26	0.04	0.48	0.25	0.90	0.55

"+" Indicates Presence and "-" indicates absence

Pharmacological Action of Avartani (*Helicteres isora*)

Antidiabetic activity

The bark of *Helicteres isora* Linn. has been used in the indigenous System of medicine in India for the treatment of diabetes mellitus since time immemorial. The roots and bark of *Helicteres isora* are expectorant, demulcent and are useful in colic stabies, gastropathy, diabetes, diarrhoea and dysentery. *Helicteres isora* Linn. is a shrub or small tree available in forests from Bengal to Ceylon. In traditional the root juice is claimed to be useful in diabetes, empyema, and a favorite cure for snakebite. The different extracts of the roots of *Helicteres isora* (Family-Sterculiaceae) were tested for anti-diabetic activity, by glucose tolerance test in normal rats and alloxan induced diabetic rats.

Antioxidant activity

Kumar *et al.* reported the antioxidant and anticancer activity using various solvent extracts (hexane, IPA and acetone) and crude protein. Dot plot assay confirmed the presence of antioxidant activity. *Helicteres isora* showed strong antioxidant activity compared to hexane and iso-propyl alcohol (IPA).

Hypolepidemic activity

Hypolipidemic activities of *Helicteres isora* Linn. (Sterculiaceae) root extracts were investigated in alloxan-induced diabetic rats and a possible mechanism of the blood glucose lowering action was studied. The effect of bark extracts of *H. isora* on serum high density lipoprotein, low density lipoprotein, very low-density lipoprotein has been studied. The treatment with *H. isora* bark extract carried down these lipoproteins in the diabetic rats to nearly normal levels.

Antibacterial activity

Shriram *et al.* reported organic extracts of *H. isora* as a new and safe plasmid curing agent. These finding resulted in the possibility of a new type of combination between antibiotics and potential drugs effective against plasmid encoded multiple antibiotic resistance. The concentrations of the curing agents used in this study were sub inhibitory, since bacteria were already resistant to these concentrations of compound. It can be assumed that bacteria are less likely to develop any mechanism to counter the plasmid curing property of the acetone extract of *H. isora*.

Anti-plasmid activity

Active fractions demonstrating antiplasmid activities were isolated from the acetone extracts of shade dried fruits of *H. isora* by bioassay. The active fraction mediated plasmid curing resulted in the subsequent loss of antibiotic resistance encoded in the plasmids as revealed by antibiotic resistance profile of cured strains. The physical loss of plasmid was also confirmed by agarose gel electrophoresis.

Brain antioxidant potency

Kumar *et al.* concluded that in diabetes, brain tissue was more vulnerable to oxidative stress and showed increased lipid peroxidation [17]. The above observation shows that the aqueous extract of bark of *H. isora* plant possesses antioxidant activity, which could exert a beneficial action against pathologic alterations caused by the presence of free radicals in streptozocin diabetes.

Cardiac oxidant and antiperoxidant potency

Kumar *et al.* reported that the activities of cardiac antioxidant enzymes were significantly decreased in diabetic control rats. They presented significant increases in the diabetic rats treated with hemagglutination inhibition (HI). Administration of *Helicteres isora* to normal rats increased the antioxidant levels with no other significant differences. The effect produced by *Helicteres isora* was comparable with that of tolbutamide. The results show that the antioxidant effect of aqueous extract of *Helicteres isora* (200 mg/kg, p.o.) was significantly higher than that of in the tolbutamide treated rats.

Anticancer activity

The ethanol extract of the plant exhibit a moderate cytotoxic activity against human cancer cell lines HeLa-B75 (34.21±0.24%), HEP-3B (25.36±1.78%), HL-60 (30.25±1.36%), and PN-15 (29.21 ± 0.52%) [47]. The cell proliferation assay confirms the chemopreventive activity of hexane fruit extract reducing the formation of prostaglandin E2 (PGE-2), the levels of tumor necrosis factor-alpha (TNF-α), and nitric oxide (NO) in human acute monocytic leukemia (THP-1) cell lines.

Varghese *et al.* reported that the drug has a potent action against human breast cancer. The cytotoxic activity of the drug is due to the presence of alkaloids and flavonoids. Our further plan is to isolate and evaluate these active principles and elucidate exact mechanism of action.

Anti-diarrheal activity

The fruits are demulcent and astringent and are useful in the gripping of bowels and flatulence of children. The bark is useful in dysentery and diarrhoea. The fruits are demulcent and astringent and are useful in the gripping of bowels and flatulence of children. The bark is useful in dysentery and diarrhoea.

Anti-inflammatory activity

The ethanolic extract of the plant shows remarkable anti-inflammatory activity against cyclooxygenase-2(COX-2), an important enzyme produced during inflammation. The hexane fruit extract shows significant activity against the production of prostaglandin E2 (PGE-2) and tumor necrosis factor-alpha (TNF-α), whereas dichloromethane fruit extract shows a significant inhibitory activity on cyclooxygenase-2(COX-2) in Human rectum adenocarcinoma cells (RCM-1) and Human monocytic leukemia cell lin (THP-1 cells).

Hepatoprotective activity

Chitra *et al.* reported that ethanolic root extracts of *H. isora* demonstrated hepatoprotective activity against carbon tetrachloride induced liver damage in rats. The parameters studied were serum total bilirubin, total protein, alanine transaminase, aspartate transaminase and alkaline phosphatase activities. Results of biochemical studies of blood samples of CCl4 treated animals showed significant increase in the levels of serum markers and decrease in total protein level reflecting the liver injury caused by CCl4.

Conclusion

Avartani is widely used for curing various disease due to its great therapeutic potential. In the developing countries increased cost of medicine as well as their side effects has become burning public health concern.

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