



Review Article

**PHYTOCHEMISTRY AND PHARMACOLOGY OF *HELICTERES ISORA* LINN. (MARODPHALI):
AYURVEDIC INSIGHTS AND MEDICINAL OVERVIEW**

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ABSTRACT

It is a small, sub-deciduous tree or shrub that is commonly cultivated. People have used it for medicinal purposes since antiquity, in organized (Ayurveda, Unani & Siddha) and unorganized (folk, native and tribal) forms. *Marodphali* is a well-known Ayurvedic remedy for curing various diseases and has several pharmacological effects. *Marodphali*, scientifically classified as *Helicteres isora* Linn., is a member of the Sterculiaceae family. It is also referred to as *Avartani*. On the preliminary phytochemical screening, it is reported that the plant of *Marodphali* consist of several bioactive compounds like alkaloids, steroids, phenolic compounds, carbohydrates, proteins, saponins and flavonoids, which proclaim various important Pharmacological effects encompass antioxidant properties, lipid-lowering (hypolipidemic) effects, antibacterial and antiplasmin actions, cardiogenic benefits, anti-oxidative and anti-peroxidative potential, neuroprotective antioxidative capacity, anticancer effects, analgesic (anti-nociceptive) properties, liver-protective (hepatoprotective) effects, anti-diarrheal benefits, and wormicidal activity. *Marodphali's* multifaceted therapeutic profile positions it as a promising natural remedy for a range of pathological conditions, highlighting its potential for broader clinical applications pending further research into its molecular mechanisms of action.

INTRODUCTION


Herbal medicinal plants have long been used to treat a wide range of ailments, and it would be no exaggeration to say that their use dates back to the very origins of humanity itself. Ayurveda emphasizes both the prevention and treatment of diseases. As new health challenges emerge alongside persistent conditions, there is growing interest in Ayurvedic solutions. Ayurvedic medicines are primarily classified into herbal, mineral, and herbo-mineral formulations. Among these, herbal treatments have gained widespread recognition globally due to their efficacy and minimal or negligible side effects, making them a preferred choice for many.

Currently, the majority (88%) of World Health Organization (WHO) member countries incorporate medicinal herbs in their approaches to traditional and

complementary medicine. [1] Medicinal plants have long been studied for their valuable bioactive compounds. The Ministry of Health & Family Welfare, through the Department of Ayurveda, Yoga & Naturopathy, Unani, Siddha, and Homeopathy (AYUSH), has recommended that conservation and cultivation efforts prioritize *Helicteres isora* due to its significant trade demand, which exceeds 100 metric tons annually. This emphasizes the need for sustainable practices to meet its growing demand. [2,3] Indian ancient medical systems have long used *Helicteres isora* Linn. (Serculiaceae), usually also known as the Indian Screw Tree. *Helicteres isora* Linn. (*Marodphali*) is used for relieving for the several diseases from the ancient time. This comprehensive review investigates *Helicteres isora* L., covering its botanical profile, phytochemical analysis, and pharmacological activities.

References of *Marodphali* in Ayurveda Classics

Historical investigations into Vedic literature and various *Nighantus* indicate that *Marodphali* was not a widely recognized herb in the early stages of Ayurvedic development. Its potential introduction from foreign regions, this suggests that it may be an exotic plant, overlooked by early Ayurvedic scholars,

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though later *Nighantus* provide valuable insights into its medicinal applications.

Nighantu kala

1. Priya Nighantu, Sharadi Varga, 44 (Synonyms) [4]

आवर्तितफलकान्तापरुषकसदृशीनताविटपकान्ता।

आवर्तनीतिविदितासुलभयंप्रायशोलोके ॥

Priya Nighantu Sharadi Varga, 45 (Properties and action)

तुवरारसेचशीतात्वतिसारनिवारणीभिषकशस्ता।

पित्तकफेसशूलैक्रिमिरोगेरक्तपित्तेच ॥

3. Raja Nighantu, Guduchyadi Varga, 134, 135 [5]

आवर्तकीतिन्दुकिनीविभाण्डीविषाणिकारङ्गलतामनोज्ञा।

सारक्तपुष्पीमहदादिजालीसापीतकीलाऽपिचर्मरङ्गा ॥

वामावर्तचसम्प्रोक्ताभूसङ्ख्याशशिसंयुता।

आवर्तकीकषायाम्लाशीतलापित्तहारिणी ॥

4. Bhavprakash Nighantu [6,7]

Bhavprakash mentioned “*Murva*” as *Marodphali* and classified in *Guduchyadivarga*. The description of *Murva* often mistakenly identifies *Avartani* as the same plant. However, further research clarifies that *Avartani* is a distinct species, separate from *Murva* (*Marsdenia tenacissima* W. & A.)

5. Kaiyadev Nighnatu [8]

He specified about 8 drugs at the name of *Murva*, and *Marodphali* (*Avartani*) was one of them, and mentioned in the *Aushadhi Varga*.

6. Adarsh Nighantu [9]

Adarsh Nighantu mentioned about *Marodphali* in *Arkadi varga*. It was also identified as “*Murva*” by the late *Pandit Hariprapann ji*. *Pandit hariprapann ji* was also stated *marodaphali* in Sanskrit as *Pichaskarpas*. Its fibers are very hard and it resembles those of *Murva*. Hence named as *Marodphali*.

7. Nighantu Adarsha, Purvardha, 188 [10]

आवर्तनीकषयाचशीतलाह्वतिसारहा।

त्रिदोषोदरशूलघ्नीकृमिजालविनाशिनी ॥

8. Ashtanga Hridya Chikitsa Sthana. 19/22 [11]

आवर्तकीतुलांद्रोणेपचेदष्टांशशेषितम्।

तन्मूलैस्तत्रनिर्यूहेघृतप्रस्थविपाचयेत्।

पीत्वातदेकदिवसान्तरितसुजीर्णभुञ्जीतकोद्रवमसंस्कृतकाञ्जिकेन।

कुष्ठकिलासमपचीचविजेतुमिच्छन्इच्छन्त्रजांचविपुलांग्रहणंस्मृतिच ॥

9. Dravyaguna Vigyana [12]

आवर्तनीकीकषयातिस्तम्भनीतिक्तशीतला।

रक्तपित्तातिसारघ्नीकृमिकुष्ठविनाशिनी ॥

Table 1: Names of *Marodphali* in Various Languages [13]

Language	Name
Sanskrit	<i>Murva, Avartani, Avartaphala</i>
Hindi	<i>Marodphali, Marorphali, Enthani, Gomathi</i>
Marathi	<i>Kewad, Muradsheng</i>
Bengal	<i>Antmora</i>
Gujrat	<i>Maradashing, Maradshinghi</i>
Tamil	<i>Balampuri</i>
Telugu	<i>Guvadaraa</i>
Kannad	<i>Pedumuri</i>
Oriya	<i>Murmuriya</i>
English	East India screw tree, India screw tree

Table 2: Taxonomical Categorization of *Marodphali* [12]

Kingdom	Plantae
Class	Angiosperm
Subclass	Eudicots
Order	Malvales
Family	Malvacea
Subfamily	Helicteroideae
Genus	Helicteres
Species	<i>H. isora</i>

Geographical Distribution

The plant is widely distributed across various regions of India, thriving under diverse soil types and rainfall conditions. Its range extends from Yamuna River in the east to Bengal, Nepal, and Bihar, extending further south through Western, Southern and Central India, including the Andaman Islands. [14] Beyond India, it is also distributed across different regions of Sri Lanka, Africa, China, Indochina, and the forests of Andaman Islands. This wide geographical spread reflects its adaptability to different environmental conditions. [15]

Botanical Description

The plant primarily appears as a small tree or semi-deciduous shrub, ranging from 5 to 15 feet tall. In its younger stages, the bark is gray and marked with small spots, with fine hairs covering the surface. The leaves are simple, alternately arranged, and bifarious, with an obovate or suborbicular shape. They are obliquely cordate, serrated, undersides are hairy, while the upper surfaces are scabrous. The flowers possess a stamina column typically fused with the gynophore, forming axillary clusters of 2 to 6 crimson flowers, gradually fading in color over time. The fruit is cylindrical, up to 2.5 inches long, beaked, and greenish-brown. It contains five spirally coiled follicles, giving it a distinct appearance. [16-20]

Table 3: Ayurvedic properties (Guna) of Marodphali [21]

Guna (Virtue)	<i>Laghu</i> (Light), <i>Ruksha</i>
Rasa (Taste)	<i>Kashaya</i> (Astringent)
Virya (Potency)	<i>Sheeta</i> (Cold potency)
Vipak (Post-digestion)	<i>Katu</i> (Pungent)

Dosha Karma

 [21]

Kapha Pitta Shamaka: *Pitta Shamaka* due to its *Sheeta Virya* and *Kashaya Rasa*. *Kapha Shamaka* because of its *Katu Vipaka* and *Kashaya Rasa*.

Varieties: It has two varieties [21]

1. Var. *tomentosa*- The leave surface hairy on underside and glabrous. It is primarily found in Western and Central India.

2. Var. *glabrescens*- The leaves are smooth and glabrous at both side and found in South India.

Part used: *H. isora* part uses mainly includes Fruits, seeds, bark & roots. *H. isora* blooms from April to December, while its fruiting season extends from October to June. [21]

Doses

 [21]

- **Fruit powder**: 1 to 3 grams
- **Decoction**: 50 to 100ml

Phytochemicals

The literature review highlights the plant's rich phytochemical profile, comprising carbohydrates, flavonoid, protein, steroid like diosgenin, β -sitosterol, tannin, phenolic compounds, saponins, mucilage, oleanolic acid, betulinic acid, and daucosterol. Additionally, *Helicteres isora* contains six neolignans, identified as helicterins A through F, along with cytotoxic compounds including cucurbitacin B and iso-cucurbitacin B. [21-25] Various studies have demonstrated that the plant exhibits a broad spectrum of bioactivities, including antimicrobial, antiplasmin, antioxidant, anti-inflammatory, antipyretic, antispasmodic, and anti-diabetic properties. [23,24,26] These findings underscore its therapeutic potential in addressing multiple health conditions.

Fruit

The term "Indian Screw Tree" describes a tree known for its unique fruit, which features complex pods that are spirally twisted, cylindrical and have a pointed end, resembling screws. The fruit is beaked, woody oblong, greenish-brown in color and turn blackish in color at maturity. 1-2 inches long made up the five pinnately dissected pistils which when ripe burst on the inner edges due to which the seeds come out. [27]

Table 4: Macromorphological Description of Fruit [28]

S. no	Organoleptic characters	Observation
1.	Color	Greenish brown color
2.	Odor	Characteristic odor
3.	Taste	Slightly bitter in taste
Quantitative Macro morphology		
4.	Size	1.5 to 6 cm
5.	Diameter	1 to 2 mm
Extra features		
6.	Shape	Cylindrical in shape, five spirally twisted follicles

Table 5: Preliminary Phytochemical Screening [28]

Phytochemicals	Test [*]
Alkaloid	+
Glycoside	+
Flavonoids	+
Saponins	+
Phlobatannins	-
Reducing sugar	+
Tannins	+
Terpenoids	-
Cardiacglycosides	+
Anthraquinones	+

[*] Present (+) and absent (-)

Table 6: Key bioactive principles extracted from the fruit of *Helicteres isora*

Plants Part	Bioactive principle	Reference
Fruit	<ul style="list-style-type: none"> Helisterculins A and B, along with Helisorin, caffeic acid, gallic acid, vanillin, and p-coumaric acid. 	[29]
	<ul style="list-style-type: none"> Compounds such as alkaloids, glycosides, tannins, saponins, flavonoids, cardiac glycosides, and anthraquinones. 	[30]
	<ul style="list-style-type: none"> The fruit is rich in polyphenols, ascorbic acid, carotenoids, and contains a significant amount of phosphorus as a nutrient. 	[22]
	<ul style="list-style-type: none"> fruit analysis identified the presence of 4 compounds: rosmarinic acid (1) and three novel compounds like- 4, 4'-O-di-β-D-glucopyranosyl rosmarinic acid (2), 4'-O-β-D-glucopyranosyl rosmarinic acid (3), and 4'-O-β-D-glucopyranosyl isorinic acid (4). 	[31]
	<ul style="list-style-type: none"> 2-ethoxy phenethylamine, 2- hydroxy-5- methyl benzaldehyde, and the methyl ester of 4- dihydroxy benzene propanoic acid. 	[32]
	<ul style="list-style-type: none"> The five flavonoids glucuronide compounds were identified in the plant's fruit. These included mainly isoscutellarein 4'-methyl ether 8-O-β-D-glucuronide 2", 4"-disulfate, isoscutellarein 4'-methyl ether 8-O-β-D-glucuronide 6"-n-butyl ester, and isoscutellarein 8-O-β-D-glucuronide 2", 4"-disulfate. 	[33]

Table 7. Ethnobotanical claims of the fruit and their potential scientific explanations

Plant part	Diseases	Ethno-medicinal Use	Potential scientific explanation	Experimental evidence (references)
fruit	To treat Weakness in newborn babies	<ul style="list-style-type: none"> A paste made from the fruit mixed with mustard oil and turmeric is applied through gentle massage. Additionally, the fruits are fried in mustard oil and used for the same purpose on newborns. 	<p>Antioxidant activity</p> <p>Antimicrobial action</p>	<p>[24, 34,35,36]</p> <p>[37]</p>
	For Gastro-intestinal and related problems	<ul style="list-style-type: none"> About 5 g of fruit powder mixed with salt should be taken three times a day with water. 	Antioxidant activity/ Antimicrobial effects	[24,32,33,34] [38,39,40]
	In Post-delivery Weakness	<ul style="list-style-type: none"> A mixture of fruit powder, herbs, and spices is given to women as a 	Antioxidant activity/ Antispasmodic	[24, 32, 33, 34]

		sweet dish after childbirth. It can also be provided during pregnancy.	action	[35]
	For ear sores,	<ul style="list-style-type: none"> The fruit is prepared into a liniment and applied to the affected area. 	Antioxidant activity/ Antimicrobial activity	[24,32,33,34] [38,28,41]

Leaf

The leaf of *Marodphali* has 3 to 5 nerves at its base, with a rough texture on the upper surface and a lower portion covered with star-shaped stellate and hairy. The leaf petioles are 1.2 cm in length.^[39]

The microscopic- The transverse section of *Marodphali* leaves reveals that the stomata are primarily located in the inter-coastal zone of the surface. These stomata are anomocytic, encircled by 4 to 5 subsidiary cells that share similar morphological characteristics with the epidermal cells. ^[28]

Trichome

Both surfaces, i.e., the adaxial and abaxial sides of the leaf, generally have trichomes. The trichomes are stellate, with six or more arms typically parallel to the leaf surface. Several arms grow from a common base; some contain protoplasm, while others do not. The trichomes on the epidermis of the *Marodphali* leaf consist of a foot, stem, and body. The body is made up of several cells, with the terminal cell being pointed, while the foot is embedded in the epidermal cells. ^[39]

Table 8: Major bioactive chemical constituents extracted from the leaves of *H. isora*

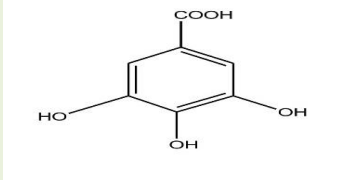
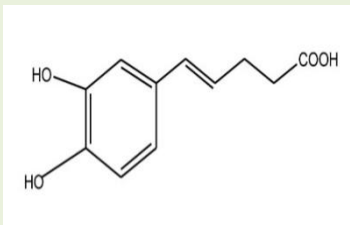
Plant Part	Bioactive chemical constituents	Structure	Reference
Leaves	Gallic acid, vanillin, p-Coumaric acid. Caffeic acid,	 <p>Gallic acid</p>	[42]
	A novel flavone methyl ether, identified as 7,4,1-di-O-methyleisoscutelearein (a methylated derivative of 5,8-dihydroxy-7,4,1-flavone), kaempferol-3-O-galactoside (trifolin) and herbacetin-8-O-glucuronide (hibifolin).	 <p>Caffeic acid</p>	[43]

Table 9. Ethnobotanical uses of plants and their potential scientific explanations (leave)

Plant part	Diseases	Ethno-medicinal Use	Possible scientific basic	Experimental evidences (ref.)
Leaves	Scabies	Paste should be applied externally to the affected area of scabies twice daily until the infection is cured.	Antimicrobial properties	[37, 38, 39]
	For skin infections	Apply fresh leaf paste to the skin infection 3 times a day.	Antioxidant activity/ Antimicrobial properties	[24, 32, 33, 34]
	In snake bites	In the case of a snake bite, apply a paste made from fresh leaves to the affected area.	Free-radical scavenging activity might be playing an important role in inflammation	[24, 32, 33, 34]

Stem Bark

Mraodphali bark is generally gray in colour and young parts covered with stellate hairs.

Table 10: Key bioactive compounds have been extracted from the bark of *H. isora*

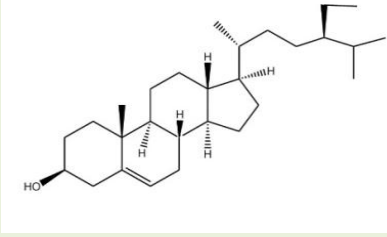
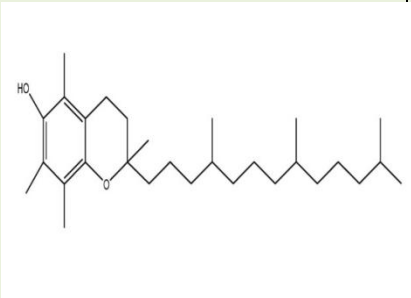
Plant part	Bioactive compound	Structure	References
Bark	β-sitosterol; 10-methyl, 4-isopropenyl and dodecahydroethanophenanthrene Tannins, flavonoids, α-tocopherol, reduced glutathione, total carbohydrates, calcium, and iron.	 <p>β- sitosterol</p>	[44]
		 <p>α-tocopherol</p>	[21]

Table 10: Ethnobotanical uses and their potential scientific explanations (bark)

Plant part	Disease	Ethno-medicinal Use	potential scientific explanations	Experimental evidences (References)
Bark	Diabetes	Consume one fresh fruit orally.	Antioxidant Activity/Antihyperglycemic and Hypolipidemic Effects: The treatment leads to a reduction in glucose levels, glycosylated hemoglobin, and plasma glycoproteins. Additionally, it results in an increase in plasma insulin and hemoglobin levels.	[24,32,33,34] [45,46,47]
	Diarrhea	Boil the bark in water and take orally three times a day.	Antimicrobial Activity/Antispasmodic Effects: exhibits antimicrobial properties and helps alleviate spasms, contributing to relief from diarrhea.	[37,38,39] [37]

Root

Marodphali features a tap root system, typically cylindrical in shape, with a diameter reaching up to 20mm. The root surface is rough, sometimes exhibiting an exfoliated texture with wrinkles, along with visible longitudinal striations and fissures. While the bark of the root fractures easily, the wood becomes fibrous in texture. The root has a distinctly bitter taste and is devoid of any notable fragrance.

Table 11: Major bioactive principles extracted from *Marodphali* (root)

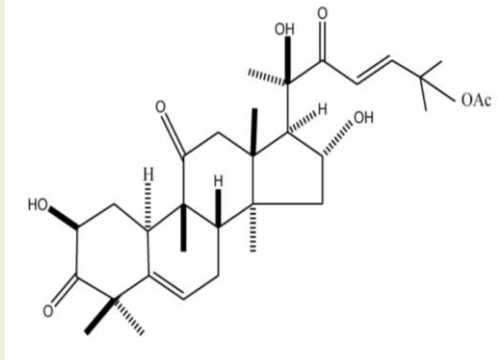
Plant Part	Bioactive principles	Structure	References
Root	Alkaloids, cardiac glycosides, carbohydrates, proteins, amino acids, terpenoids, flavonoids, steroids, saponins, and tannin, with a particularly high concentration of diosgenin. The compounds contain cucurbitacin B, isocucurbitacin B, isorin, β -sitosterol, oleanolic acid, betulinic acid, daucosterol, 3 β -diacetylup-20(29)-en-28-ol methyl ester, catechol, and gallic acid.	 <p>Cucurbitacin B</p>	[48,49] [50,51,52]

Table 12. Ethnobotanical claims and their potential scientific justifications (Roots)

Plant part	Disease	Ethno- medicinal Use	Potential scientific justifications	Experimental evidences (references)
Root	Cut and wounds	Fresh root paste mixed with turmeric paste applied externally	Antioxidant activity/ Antimicrobial activity	[24, 32, 33, 34] [37, 38, 39]
	For diarrhea,	Consume a decoction of the root.	Antioxidant activity/ Antimicrobial activity	[24, 32, 33, 34] [37, 38, 39]
	For diabetes,	Taken fresh root juice twice a day.	Anti-hyperglycemic activity	[37, 43, 45, 53,54]

Seed

The seeds are up to 3 mm in length, black in color, and feature an angular, wrinkled surface.

Table 13: Major bioactive compounds isolated from *Marodphali* (Seed)

Seed	Bioactive compound	References
	The major bioactive compounds contain fixed oils and fats, phenolic compounds, Phytosterols, tannins, amino acid and carbohydrates.	[55]

Table 14: Ethnobotanical claims and their possible scientific basis (Seed)

Plant part	Disease	Ethno-medicinal Use	Possible scientific basis	Experimental evidences (ref.)
Seed	Dysentery	Boil 5 g of seed powder in water and consume twice daily.	Antimicrobial activity for diarrhea and dysentery caused by amoebiasis.	[24, 32, 33, 34] [37, 38, 39]

Pharmacological Actions

1. Antioxidant activity

Phenolic compounds play a crucial role in the antioxidant capacity of plants owing to their redox properties. The antioxidant mechanisms of phenolic compounds involve neutralizing free radicals and inhibiting the decomposition of hydroperoxides into reactive free radicals. [56,57]

Kumar et al., By utilizing various solvent extracts such as acetone, hexane, and isopropyl alcohol (IPA), along with crude protein, revealed that the extracts of *Marodphali* having properties like antioxidant and anticancer. When compared between hexane and

IPA, it is found that the acetone fruit extract of *Marodphali* exhibited an impressive antioxidant activity of 96.44%. The crude protein and acetone extract of *Marodphali* shown action against reactive oxygen species (ROS), while acetone extract clearly demonstrated superior cytotoxic effects against human lung cancer cells (NCI-H460), indicating potent anticancer activity. The study found that dried fruit extracts from *Marodphali* has good role in both antioxidant and anticancer activity. [58]

2. Hypolipidemic activity

Kumar and colleagues demonstrated that the prolonged administration of *H. isora* bark extract notably decreased lipid levels in diabetic rats, bringing them closer to normal physiological ranges. Their study specifically examined the impact of the bark extract on serum concentrations of high-density lipoprotein (HDL), low-density lipoprotein (LDL), and very low-density lipoprotein (VLDL). Treatment with the bark extract effectively lowered these lipoprotein levels in diabetic rats to nearly normal ranges, with substantial reductions observed in cholesterol and phospholipid levels.^[59]

Boopathy Raja et al. investigated that the fruit of *H. isora* contains bioactive compounds that effectively combat hyperlipidemia in rats with diabetes induced by streptozotocin.^[52]

3. Cardiac antioxidant and antiperoxidative potency

According to Kumar et al., administration of the *Marodphali* extract to diabetic control rats resulted in a significant reduction in the activity of cardiac antioxidant enzyme.^[60] In contrast, hemagglutination inhibition (HI)-treated diabetic rats showed considerable increases in enzyme activity. Antioxidant levels were elevated in normal rats administered HI; no other significant changes were observed. The effects of tolbutamide and HI treatment were found to be similar and comparable. According to the results, the antioxidant effect of the HI aqueous extract (200 mg/kg, p.o.) was significantly greater in the rats treated with tolbutamide.^[58]

4. Brain antioxidant potency

According to Kumar et al., brain tissue in diabetics exhibited higher lipid peroxidation and was more susceptible to oxidative stress.^[61] This result indicates that aqueous bark extract of the plant of *Marodphali* has antioxidant capacity, which may also help prevent pathologic changes brought on by free radicals in streptozotocin diabetes rats.^[59]

5. Anti-nociceptive activity

Venkatesh et al. found that the aqueous ethanol, chloroform and petroleum ether extracts exhibited notable antinociceptive action. Phytochemical investigation of these bioactive extracts revealed that their primary components include sterols and triterpenoids in the petroleum ether extract, while the chloroform and aqueous ethanol extracts contained their glycosides. These constituents are likely responsible for the observed pharmacological effects.^[37]

6. Anti-cancer activity

According to Varghese et al., the treatment is highly effective against breast cancer in humans.^[23] The compounds Alkaloids and flavonoids, which are found in the *Marodphali* having drug's cytotoxic action.

7. Hepatoprotective activity

Chitra et al., found that ethanolic extract of root of *Marodphali* exhibited hepatoprotective effects against liver damage induced by carbon tetrachloride (CCl₄) in rats. The study assessed various biochemical parameters, including total protein, serum total bilirubin, alanine transaminase (ALT), alkaline phosphatase and aspartate transaminase (AST), (ALP) activities. The results from blood samples of CCl₄-treated rats revealed a marked increase in serum marker levels and a reduction in total protein levels, indicating liver damage triggered by CCl₄.^[32]

8. Anti-diarrheal activity

The fruit possess demulcent and astringent properties, making them beneficial for alleviating bowel discomfort and reducing flatulence in children. The bark is effective in treating dysentery and diarrhea.^[62]

9. Wormicidal activity

The pods of *Marodphali* are commonly fried and administered to children as a remedy for intestinal worms.^[63]

10. Antibacterial and anti-plasmid activities

Shriram et al. have reported the presence of organic extracts from *Marodphali*. It is novel and secure and has plasmid properties.^[37] These discoveries raised the prospect of developing a novel class of antibiotic-drug combinations that could be useful in combating plasmid-encoded multidrug resistance. because the bacteria in this investigation were already resistant to the amounts of curing agents utilized, the concentrations of these compounds were sub-inhibitory. It can be anticipated that bacteria have a lower probability of creating a defense mechanism against the plasmid curative effect of *H. isora* acetone extract.^[38]

The various components of the plant, whether utilized in their crude form or as solvent extracts, exhibit remarkable antimicrobial properties. The butanol extract derived from the root displays strong antifungal activity against *Micrococcus luteus*, *Candida albicans*, and *Aspergillus niger*, effectively combating these fungal pathogens.^[37, 38] In contrast, the aqueous fruit extract is notable for its significant antibacterial effects against *Staphylococcus epidermidis*, *E. coli*, *Proteus vulgaris*, and *Salmonella typhimurium*, showcasing its potential in addressing bacterial infections.^[36]

11. Antispasmodic activity

The fruit of the plant has shown significant antispasmodic effects against spasmogens such as acetylcholine, histamine, and barium chloride in in-vitro tests using Guinea pig ileum without exhibiting any acute toxicity when assessed for gastrointestinal motility in in-vivo studies on mice.^[64] Polyherbal formulations derived from the fruits of *Helicteres isora*, seeds of *Apium graveolens*, and leaves of *Mentha piperita* show potent antispasmodic activity against stimulants like acetylcholine, nicotine, and histamine in Guinea pig ileum. However, no significant effect was observed in the mouse model when the same formulation was evaluated for gastrointestinal motility.^[65]

CONCLUSION

This review suggests that *Marodphali* is a promising medicinal plant with potential therapeutic benefits. However, more rigorous studies are essential to completely understand and determine its optimal dosage, mechanisms of action, and evaluate any potential side effects. These findings are corroborated by both traditional usage and modern scientific investigations, emphasizing the plant's role in addressing contemporary health challenges.

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