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Pharmaceutical Applications of Helicteres isora Linn: A Review

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Abstract: As each part of an herbal plant has a medical application just like that various part of Helicteres isora is used to treat specific ailments. Fruits, roots and barks are commonly used to treat gastrointestinal issues and seeds are known to treat snake bite. This plant has been used both in ayurvedic medicine as well as tribal medicine in particular tribes. Depending upon the solvents used to extract the plant extract each extract showed varying effects of phytochemical, antimicrobial as well as antioxidant activity.

Keywords: Helicteres isora, Tribal medicine, Antimicrobial activity, Antioxidant activity

I. INTRODUCTION

In India, various parts of an herbal or medicinal plant has been used to cure different ailments. Similarly, different parts of Helicteres isora Linn (Sterculiaceae) are used to cure various health issues. Fruits of this plant are used to treat diarrhoea, griping bowl and considered antiplasmodic, roots and barks are used in the treatment of diabetes, gastropathy, dysentery and diarrhoea (D.H.Tambekar et al) [1]. Seeds are known to relieve snake bites. Helicteres isora L is a large shrub commonly found in hilly regions it grows on rocky soils that is commonly found in mountains (S. D.Salve et al) [2]. Predominantly found in Mahur forest ranges and widely distributes in Marathwada. The tribals of Mahur uses this plant as a folk medicine to treat gastro abdominal issues. The fruit, roots and leaves of this plant is used in ayurvedic medicine (Prakash R. Kanthale et al) [3].

The flowering period is April – December and the fruiting period is October – June. It commonly found in the dry forests of central and western India. It is also known as Balampari (Tamil), Guvadarra (Telugu), Pedamuri (Kannada), Ishwarmuri (Malayalam), Avartaphala (Sanskrit) and Indian screw tree (English). It is known to have Rasa, Vipaka and Virya ayurvedic properties (Nirmal Kumar et al) [4].

Table 1: Taxonomy of Helicteres isora

Kingdom	Plantae
Clade	Tracheophytes
Clade	Angiosperms
Clade	Eudicots
Clade	Rosids
Order	Malvales
Family	Malvaceae
Genus	Helicteres
Species	H.isora

II. PHYTOCHEMICAL ANALYSIS

Powdered fruits of Helicteres isora L. and prepared aqueous, acetone, ethanol and methanol solvents using Soxhlet method and dried and tested for presence of various phytochemicals (D. H.Tambekar et al) [1].

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Table 2: Represents the presence or absence of phytochemicals

Phytochemical analysis	Presence or Absence
Alkaloid	-
Flavonoids	-
Carbohydrates	+
Cardiac Glycosides	-
Anthraquinon Glycosides	+
Saponins	-
Proteins	+
Tannin and Phenolic compounds	+
Volatile oils	-
Steroids	+

+ (presence), - (absence)

Methanolic extract was extracted from the powered form of the fruit, and carried out GCMS analysis. The analysis revealed the presence of 3 components namely - 2-hydroxy-5-methylbenzaldehyde, 2 Ethoxy phenethyl amine and 4 - dihydroxy methyl ester Benzene propanoic acid (S.D. Salve et al) [2].

Dried stem of the plant and petroleum ether was used to prepare extract using Soxhlet method and ran thin layer Chromatography to isolate various compound, one of the compounds was colourless (PHI-E). When it was treated with sulphuric acid it showed red colour indicating the presence of sterol. It was studied further using UV-Vis, IR, proton NMR (V.B. BADGUJAR et al) [5].

Table 3: Represents the major datas obtained using various instrumentation

Instrumentation	Datas
uv-vis	λmax - 251,265,290 and 315
IR	3308cm-1, 1241 and 667 cm-1, 838 cm-1, 1690 cm-1, 2881 cm-1, 1464 cm-1, 2853 cm-1, 1381 cm-1, 738 cm-1, 670 cm-1, 1022 cm-1.
proton NMR	1.0 and 1.23 (two methyl group), 3.45-3.55 (olefinic proton), 5.25-5.4 (hydroxyl group), 2.27 ppm (methylenic proton) and 7.2 ppm (two aromatic protons).

Aqueous extract was prepared from the fruit powder using Soxhlet method and subjected to phytochemical analysis (Prakash R. Kanthale et al) [3].

Table 4: Represents the presence or absence of phytochemicals

Phytochemical analysis	Presence or Absence
Alkaloid	+
Glycoside	+
Flavonoids	+
Tannins	+
Reducing sugar	-
Phlobatannins	-
Saponins	+
Terpenoids	-
Anthraquinones	+
Cardiacglycosides	+

+ (presence), - (absence)

Root extract of the plant was prepared by using various solvents (hydroethanol, distilled water, ethyl acetate, ethanol, petroleum ether, benzene and chloroform) and compared their phytochemical ability by doing different phytochemical tests. All the extracts showed the presence of Tannins, pentose sugar, hexose sugar, steroids, terpenoids, flavonoids, and

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alkaloids. Whereas protein was not present in benzene, and fats and fixed oils were not present in ethyl acetate. The amino acids were present only in the ethanol, hydroethanol and aqueous extracts (Veena sharma et al) [6].

Table 5: Represents the presence or absence of phytochemicals.

Compounds	Tests	Petroleum ether	benzene	chloroform	ethyl acetate	ethanol	Aqueous	hydroethanol
Alkaloids	Dragendorff's test	+	-	-	-	+	-	+
	Mayer's test	-	-	-	-	-	+	-
	Hager's test	-	-	-	-	-	-	-
	Wagner's test	-	-	+	-	-	-	-
	Tannic test	-	+	-	+	+	-	-
Amino acids	Millon's test	-	-	-	-	-	-	-
	Ninhydrin test	-	-	-	-	+	+	+
Proteins	Biuret reaction	-	-	-	-	-	-	-
	Xanthroprotective reaction	+	-	+	+	+	+	+
	Ninhydrin test	-	-	-	-	+	-	+
	Nitroprusside test	-	-	-	-	-	-	-
	Lead sulfide test	-	-	-	-	-	-	-
Carbohydrates	Molish's test	-	-	-	-	-	-	-
	Test for reducing sugar Fehling's test	-	-	+	-	-	-	-
	Benedict test	-	+	+	-	+	+	+
	Barfoed's test	-	-	+	-	+	+	+
	Pholoroglucinol test	+	+	+	+	+	+	+
	Selwinoff test	-	-	-	-	-	-	-
	Tollen's phloroglucinol test	+	+	+	+	+	+	+
	Cobalt-chloride test	-	-	-	-	-	+	+
Flavonoids	Shinoda test	-	-	-	-	-	-	-
	Lead acetate test	-	-	+	-	-	+	+
	Alkaline reagent test	+	-	-	+	+	-	-
	Zinc HCl test	-	+	-	-	-	+	-
	Vanillin HCl test	-	-	-	-	-	-	-
Fat and fixed oils	Copper sulfate test	+	+	+	-	+	+	+
	Paper test	-	-	-	-	-	+	+
Cadiac glycosides	Keller-killiani test	-	-	-	-	+	-	+

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	Baljet test	-	+	+	-	+	+	+
	Legal's test	-	-	+	-	-	-	-
	Borntrager's test	-	-	-	-	-	+	-
Saponin glycosides	Froth formation	-	+	-	+	-	+	-
Cynogenic glycosides	Guignard reaction or sodium picrate test	-	-	-	-	-	-	-
Steroids and terpenoids	Salkowski reaction (steroids)	+	+	+	+	+	+	+
	Liebermann-Burchard reaction	-	-	-	+	+	+	-
	Zimmermann test	-	-	-	-	-	-	+
	Salkow ski reaction (terpenoids)	+	+	+	+	-	-	-
Tannins	$FeCl_3$ Test	-	-	-	-	+	+	+
	Ammonia test (for chlorogenic acid)	-	-	-	-	-	-	-
	Lead acetate test	+	+	-	+	+	+	+
	Dilute HNO_3 Test	-	+	+	-	+	+	+
	$AgNO_3$ Test	-	-	-	-	+	+	-

+ (presence), - (absence)

Chloroform extract was prepared from the stem, fruit and leaves (dried) using Soxhlet method and carried out phytochemical screening of secondary metabolites (S. P. Mahire et al) [7].

Table 6: Represents the presence or absence of phytochemicals.

Phytochemical analysis	Fruit	Stem	Leaves
Alkaloid	+	+	+
Steroid	+	-	-
Terpenoid	-	+	-
Flavonoids	-	-	-
Polyphenols	-	-	-
Tannins	-	-	-
Cardiac glycosides	-	+	-
Saponins	-	-	-

+ (presence), - (absence)

Different leaves extract (acetone, chloroform, ethanol, hydroalcoholic solvent and petroleum ether) of the plant was prepared by using Soxhlet method and screened for its secondary metabolites using various phytochemical tests. The ethanol and hydroalcoholic solvent extracts showed high number of phytochemical compounds (Renuka Mahajan et al) [8].

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Table 7: Represents the presence or absence of phytochemicals.

Phytochemical analysis	petroleum ether	chloroform	acetone	ethanol	hydroalcoholic solvent
Sterols	+	-	-	-	+
Alkaloid	-	-	-	+	+
Saponins	-	-	-	+	-
Tannins	-	-	-	+	+
Flavonoids	-	-	-	+	+
Sugars	-	-	-	+	+
Proteins	-	+	+	+	+
Amino acids	-	+	+	+	+
Fats and oils	+	-	-	-	-

+ (presence), - (absence)

III. ANTIMICROBIAL ACTIVITY

From the powdered fruits of Helicteres isora L. aqueous, acetone, ethanol and methanol solvents were prepared using Soxhlet method and dried and tested against various bacterial species (Escherichia coli, Staphylococcus aureus, Enterobacter aerogenes, Pseudomonas aeruginosa, Salmonella typhi, Staphylococcus epidermidis, Salmonella typhimurium and Proteus vulgaris) using disc diffusion method. the aqueous extract showed highest antibacterial activity compared to the other extracts (D.H.Tambekar et al) [1].

Table 8: Represents the strength of Zone of inhibition.

Bacterial species	Aqueous extract	Acetone extract	Ethanol extract	Methanol extract
Escherichia coli	+++	+	++	+++
Staphylococcus aureus	++	++	++	++
Enterobacter aerogenes	++	++	+++	++
Pseudomonas aeruginosa	+	+	+	+
Salmonella typhi	++	+	+	+
Staphylococcus epidermidis	+++	+	+++	+++
Salmonella typhimurium	+++	+++	+++	+++
Proteus vulgaris	+++	++	++	+++

+++ (maximun inhibition), ++ (moderate inhibition), + (least inhibition)

Chloroform extract was prepared from the stem, fruit and leaves (dried) using Soxhlet method and carried out antimicrobial activity of the extracts against two bacterial species (Staphylococcus aureus, Escherichia coli) and two fungal species (Candida albicans, Aspergillus niger). Chloramphenicol was used as standard antibacterial and Amphotericin-B was used as standard antifungal (S. P. Mahire et al) [7].

Table 9: Represents the presence or absence of Zone of Inhibition.

Microbial species	Fruit	Stem	Leaves
Staphylococcus aureus	+	+	+
Escherichia coli	-	+	+
Candida albicans	-	-	+
Aspergillus niger	+	+	+

+ (presence), - (absence)

Antimicrobial activity for the different leaves extract (acetone, chloroform, ethanol, hydroalcoholic solvent and petroleum ether) was done using varying concentration (10, 5, 2.5 mg/mL) against Escherichia coli, Staphylococcus

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aureus, Pseudomonas aeruginosa, Micrococcus luteus and Candida albicans. Streptomycin and fluconazole were used as the respective standard antibacterial and standard antifungal (Renuka Mahajan et al) [8].

Table 10: Represents the presence or absence of Zone of Inhibition.

Microbial species	petroleum ether			chloroform			acetone			ethanol			hydroalcoholic solvent		
	10	5	2.5	10	5	2.5	10	5	2.5	10	5	2.5	10	5	2.5
Escherichia coli	+	+	-	+	+	+	+	+	-	+	+	-	+	+	+
Staphylococcus aureus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pseudomonas aeruginosa	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Micrococcus luteus	+	+	-	+	+	+	+	+	-	+	+	+	+	+	+
Candida albicans	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

+ (presence), - (absence)

IV. ANTIOXIDANT ACTIVITY

DPPH radical scavenging activity

DPPH radical scavenging assay was performed for the chloroform extract of stem, fruit and leaves in varying concentration - 200µg, 400µg and 600µg and ascorbic acid was used as the standard. The plant extracts showed good scavenging activity indicating its good antioxidant ability. The scavenging activity was due to the presence of secondary metabolites (S. P. Mahire et al) [7].

DPPH radical scavenging assay was performed for the different leaves extract (acetone, chloroform, ethanol, hydroalcoholic solvent and petroleum ether) of the plant in varying concentration – 20, 40, 60, 80, 100µg with L-ascorbic acid as the standard. The 50% inhibition of ethanol, hydroalcoholic and L-ascorbic acid was found at 86.54µg/mL, 78.05µg/mL and 54.96µg/mL (Renuka Mahajan et al) [8].

NO radical-scavenging activity

NO radical scavenging test was performed for the different leaves extract (acetone, chloroform, ethanol, hydroalcoholic solvent and petroleum ether) in varying concentration – 20, 40, 60, 80, 100µg with L-ascorbic acid as the standard. The inhibition of NO radicals by of ethanol, hydroalcoholic and L-ascorbic acid was found at 83.13µg/mL, 76.59µg/mL and 51.69µg/mL (Renuka Mahajan et al) [8].

V. CONCLUSION

All parts of the Helicteres isora is concluded to have the medicinal property due the presence of various phytochemical as well as antioxidant ability. Extracting using different solvents showed varying phytochemical as few solvents provoked certain phytochemical. Thus, we can understand that each solvent influences the extract. The aqueous extract of the fruit as well as hydroalcoholic solvent extract of the leaves showed presence for majority of phytochemical compounds as well as better antimicrobial activity. Helicteres isora showed antibacterial against both Gram positive as well as Gram negative bacteria. Both the DPPH radical scavenging assay as well as NO radical scavenging test showed its antioxidant ability.

REFERENCES

[1]. D. H.Tambekar, B. S.Khante, B. K.Panzade, S. B.Dahikar and Y. S.Banginwar., Evaluation of phytochemical and antibacterial potential of helicteres isora l. fruits against enteric bacterial pathogens., Afr. J. Trad. CAM., 2008., 5 (3)., 290 – 293.

[2]. S.D.Salve and A.S.Bhuktar., Phytochemical evaluation of helicteres isora l. fruits., Bioinfolet., 2019., 16 (1+2)., 56 -58.

[3]. Prakash R. Kanthale, Sharad Biradar., Pharmacognostic study of Helicteres isora L., 2017., 4(1)., 47-51.

[4]. Nirmal Kumar and Anil Kumar Singh., Plant profile, phytochemistry and pharmacology of Avartani (Helicteres isora Linn.): A review., Asian Pac J Trop Biomed., 2014., 4(1)., S22–S26.

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[5]. V.B. Badgujar, P.S. JAIN., A phytochemical analysis of the medicinal plant: Helicteres Isora., 2009., 1(4)., 1376-1377.

[6]. Veena Sharma, Urmila Chaudhary., Pharmacognostic and phytochemical screening of helicteres Isora roots., Asian J Pharm Clin Res., 2016., 9(2)., 96-101.

[7]. S. P. Mahire and S. N. Patel., Extraction of phytochemicals and study of its antimicrobial and antioxidant activity of Helicteres isora L.., Clinical Phytoscience., 2020., 6(40).

[8]. Renuka Mahajan and Prakash Itankar., Antioxidant, Antimicrobial and wound healing potential of Helicteres isora Linn. Leaf extracts., Digital Chinese medicine., 2020., 3., 188-198.

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