



ANTIBACTERIAL ACTIVITY OF *HELICTERES ISORA*

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Abstract

Helicteres isora belongs to the family Sterculiaceae is an ayurvedic herb. It is distributed widely in forest throughout India and are commonly known as Indian Screw tree, is a medicinally important sub-deciduous shrub or small tree. Almost all parts of the plants are used in traditional medicinal system for curing various diseases. Because of its wide usage and availability, this study was set out to investigate the antibacterial activity of the plant. Petroleum ether, chloroform, benzene, acetone and methanol extracts of both the fruit and bark of *Helicteres isora* exhibited varying degrees of antibacterial activity when tested with eight bacterial strains.

Key words : *Helicteres isora*, Thirugupalai, antibacterial activity.

Introduction

Plants are still the exclusive source of drugs for the majority of the world population (Meral and Karabay, 2002). The increased incidence of bacterial resistance to most of the antibiotics has necessitated the search for new antimicrobial agents in plants. A number of studies have been conducted in different countries to prove the therapeutic efficacy of plant extracts for infectious diseases (Almagboul *et al.*, 1985; Sousa *et al.*, 1991; Shapoval *et al.*, 1994; Artizzu *et al.*, 1995; Izzo *et al.*, 1995).

One such valuable medicinal plant is *Helicteres isora* (Sterculiaceae), also known as Thirugupalai (Tamil), one such valuable medicinal plant is a wild, medium sized tree. It is abundantly found in the hills and forests, yet rarely seen in the plains. It grows in central and western India, southeast Asia and southern part of China. It forms one of the best known articles of the Hindu "Materia Medica" and is used as one of the Jamu medicines (Tezuka *et al.*, 1999).

Dried fruit was obtained from the local market. The bark of the tree collected from the hills of Kerala was authenticated by the Botanical Survey of India, Coimbatore. A voucher specimen has been deposited at the Department of Biochemistry, Avinashilingam Deemed University, Coimbatore, India.

Uses in traditional medicine

Both the fruit and bark of the plant are utilized in the treatment of various human diseases, especially, diabetes. Timbers are used as antihelmentic, colic and aphtha, while the fruit as colic, anticonvulsant and abdominalgia (Tezuka *et al.*, 1999 and Maruzzella *et al.*, 1958).

Previously isolated classes of constituents

The fruit contains five flavonoid glucuronides : isoscutellarein 4'-methyl ether 8-o- β -D-glucuronide 6''-n-butyl ester, isoscutellarein 4'-methyl ether 8-o- β -D-glucuronide 2'', 4''-disulfate and isocutellarein 8-o- β -D-glucuronide 2'', 4''-disulfate (Kamiya *et al.*, 2001) and three neolignans-helisterculins A, helisterculins B and helisorin (Tezuka *et al.*, 1999).

Materials and Methods

Tested material

The fruit and bark of the *H. isora* were shade dried, powdered and extracted separately with petroleum ether, chloroform, benzene, acetone and methanol and dissolved in dimethyl sulfoxide (DMSO). From this, 100, 200 and 250 μ g of the extracts were taken for the study. Five μ g of ampicillin was used as control. Preliminary phytochemical study showed the presence of terpenoids, alkaloids, saponins, flavonoids and phenolic components.

Studied activity

Antibacterial activity by disc diffusion method (Vedavathy *et al.*, 1997). A test solution of each extract

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Table 1 : Antibacterial activity of *Helicteres isora* – Bark.

S.No.	Bacterial strains	Petroleum ether			Chloroform			Benzene			Acetone			Methanol			Ampicillin (Control) 5µg
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1.	<i>Bacillus subtilis</i>	7	7	-	-	-	9	-	-	-	20	12	10	7	9	-	13
2.	<i>Pseudomonas aeruginosa</i>	-	-	-	-	-	8	9	8	11	8	10	11	10	12	14	15
3.	<i>Paratyphii A</i>	7	7	-	-	-	7	-	-	-	-	-	-	-	7	7	23
4.	<i>Paratyphii B</i>	24	26	29	-	-	-	14	17	15	10	-	7	20	20	20	30
5.	<i>Salmonella typhimurium</i>	9	7	-	9	9	-	-	-	-	7	-	-	21	20	20	21
6.	<i>Escherichia coli</i>	7	7	25	-	-	-	10	10	12	-	-	-	16	20	23	24
7.	<i>Staphylococcus aureus</i>	-	17	19	-	-	-	-	-	-	-	-	-	17	10	10	10
8.	<i>Proteus vulgaris</i>	-	-	-	-	-	-	-	-	-	18	19	27	12	14	19	21

Values are zone of inhibition including the diameter of the filter paper disc (6mm) and mean of five replications

1 = 100 µg, 2 = 200 µg, 3 = 250 µg of extracts.

Table 2 : Antibacterial activity of *Helicteres isora* – Fruit.

S.No.	Bacterial strains	Petroleum ether			Chloroform			Benzene			Acetone			Methanol			Ampicillin (Control) 5µg
		1	2	3	1	2	3	1	2	3	1	2	3	1	2	3	
1.	<i>Bacillus subtilis</i>	-	-	-	-	-	-	7	10	11	-	-	-	-	9	10	13
2.	<i>Pseudomonas aeruginosa</i>	7	7	7	-	-	-	8	-	-	7	8	8	10	-	-	15
3.	<i>Paratyphii A</i>	-	-	-	-	-	20	8	-	-	9	7	9	20	11	8	23
4.	<i>Paratyphii B</i>	16	10	9	16	19	21	16	18	19	7	18	33	16	16	17	30
5.	<i>Salmonella typhimurium</i>	10	20	27	-	-	-	17	9	7	-	-	-	25	28	30	21
6.	<i>E. coli</i>	14	18	19	-	-	13	17	8	7	9	9	-	17	20	22	24
7.	<i>S. aureus</i>	-	-	-	-	-	7	-	-	-	7	-	-	7	7	7	10
8.	<i>Proteus vulgaris</i>	7	7	30	-	-	-	-	-	-	-	-	-	16	19	21	21

Values are zone of inhibition including the diameter of the filter paper disc (6mm) and mean of five replications

1 = 100 µg, 2 = 200 µg, 3 = 250 µg of extracts.

was prepared in dimethylsulfoxide. Muller-Hinton agar was used as a culture media for bacterial growth. Each extract solution (20µl) and control chloramphenicol was dropped in a 6mm diameter well. Plates were incubated for 24h at 37°C for bacterial growth. The diameter of inhibition zone around each well was measured and recorded.

Used microorganisms

The bacterial strains used for the experiment include *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Paratyphii A*, *Paratyphii B*, *Salmonella typhimurium*, *Escherichia coli*, *Staphylococcus aureus* and *Proteus vulgaris*.

Results

The various extracts of *Helicteres isora* namely petroleum ether, benzene, chloroform, acetone and methanol extracts of its fruits and bark were tested against *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Paratyphii A*, *Paratyphii B*, *Salmonella typhimurium*, *Escherichia coli*, *Staphylococcus aureus* and *Proteus vulgaris*. The results are reported in tables 1 and 2.

Conclusion

Methanolic extracts of both fruit and bark of *H. isora* showed significant antibacterial activity against *Paratyphii B*, *Salmonella typhimurium*, *E. coli* and *Proteus vulgaris* and moderate activity against *Bacillus subtilis*, *Pseudomonas aeruginosa*, *Paratyphii A* and

Staphylococcus aureus. This was followed by petroleum ether extracts, which exhibited considerable activity against *Paratyphii B*, *Salmonella typhimurium* and *E.coli*. Benzene extracts were found to be effective against *Paratyphii B* and *E. coli*, while the chloroform and acetone extracts had been observed to be ineffective against most of the organisms tested. It is evident that the antibacterial compounds in both the fruit and bark of *H. isora* are best extracted with methanol. The present investigation envisages a decisive possibility of developing *H. isora* as an important source of antibacterial compounds. Further work on the identification and quantification of active principles is under progress.

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