- Short communication

Antimicrobial and Cytotoxic activities of *Stereospermum chelonoides*

Mohammad R. Haque, Khondaker M. Rahman, Choudhury M. Hasan and Mohammad A. Rashid

Department of Pharmaceutical Chemistry, Faculty of Pharmacy, University of Dhaka, Dhaka-1000, Bangladesh

Stereospermum chelonoides (Syn. *S. suaveolens*; Bengali name- Atkapali, Paruli gachh; Family- Bignoniaceae) is a medium-sized tree, distributed in the subhimalayan tract and outer hills, Central India, Western Peninsula, Burma, Bangladesh and English Forest.[1] It is famous for its medicinal uses. The decoction of root is antipyretic and used in excessive thirst, cough and asthma.[1] Lapachol, (2-hydroxy-3-(3-methyl-2-butenyl)-1,4-napthaquinone)[2], dinatin (4,5,7-tri hydroxyl-6-methoxyflavon)[1], dinatin-7-glucuroniside[1] and beta-sitosterol[2] have previously been isolated from this plant. As a part of our on the medicinal plants of Bangladesh, we investigated *S. chelonoides* and isolated naphthaquinone, sterekunthal B & sterequinone C, stigmasterol, *p*-hydroxybenzaldehyde and *p*-hydroxyphenylmethyl ketone. We, herein, report the antimicrobial and cytotoxic activities of the extracts of *S. chelonoides*.

Extraction of dried powdered stem bark of *S. chelonoides* with methanol and subsequent Kupchan partitioning[3] gave *n*-hexane and chloroform soluble fractions. The *n*-hexane and chloroform fractions exhibited mild to moderate activity against both gram-positive and gram-negative bacteria and fungi.

Stem bark of *S. chelonoides* was collected from Chittagong in the month of August 2004. It was identified by the Bangladesh National Herbarium, Dhaka, where a voucher specimen has been deposited (accession no 387, 25546). The bark was first sun dried and then ground into a coarse powder using a grinding machine. The powdered bark (533 gm) of *S. chelonoides* was extracted with methanol (1.5 L). A portion of the concentrated methanol extract (5 mg) was fractionated by using modified Kupchan partition[3] method into *n*-hexane, carbon tetrachloride, chloroform and aqueous soluble fractions and evaporated to dryness to get *n*-hexane (1.5 gm), carbon tetrachloride (0.04 gm), chloroform (2.54 gm) and aqueous soluble materials.

The pure strains of both gram positive bacteria (*Bacillus cereus, B. megaterium, B. subtilis, Staphylococcus aureus, Sarcina lutea*), gram-negative bacteria (*Escherichia coli, Pseudomonas aeruginosa, Salmonella paratyphi, S. typhi, Shigella boydii, S. dysenteriae, Vibrio mimicus, V. parahemolyticus*) and the fungi, *Candida albicans, Aspergillus niger, Sacharomyces cerevacae* were collected from the Institute of Nutrition and Food Science (INFS), University of Dhaka.

The antimicrobial activity of the *n*-hexane and chloroform extracts were investigated by disc diffusion method.[4] Standard Kanamycin disc (30 μg/disc) and blank disc impregnated with the respective solvent, were used as positive and negative control respectively to study the antibacterial activity. The antimicrobial activity of the extracts was investigated at an initial dose of 250 μg/disc against bacteria and fungi (Table 1). The extracts showed

Correspondence to: Mohammad A. Rashid
Tel.: 880-2-8612069, 9661900-73, Extn. 4363, 8137
Fax: 880-2-8612069; *E-mail:* rashidma@aitlbd.net

moderate to significant antimicrobial activity against both bacteria and fungi.

The *n*-hexane and chloroform soluble materials were screened for cytotoxic activity using brine shrimp lethality bioassay.[5,6] For cytotoxicity study by brine shrimp lethality bioassay,[5,6] DMSO was used as a solvent and negative control. A series of concentration of the test samples were used to get a representative LC_{50}. A concentration range of vincristine sulphate was used as a positive control.

Table 1. Antimicrobial activity of different extracts of *S. chelonoides*

Test bacteria and fungi	Diameter of Zone of Inhibition (mm)		
	n-hexane extract	Chloroform extract	Kanamycin
Gram Positive			
Bacillus cereus (BTCC-19)	14	12	25
Bacillus megaterium (BTCC-18)	15	17	24
Bacillus subtilis	16	14	26
Staphylococcus aureus (BTCC-43)	15	13	25
Sarcina lutea (ATCC-9341)	18	17	23
Gram Negative			
Escherichia coli (BTCC-172)	20	13	25
Pseudomonas aeruginosa (BTCC-1252)	12	10	25
Salmonella paratyphi	15	13	23
Salmonella typhi	16	12	24
Shigella boydii	13	18	20
Shigella dysenteriae	13	14	24
Vibrio mimicus	17	16	25
Vibrio parahemolyticus	16	13	24
Fungi			
Candida albicans	21	13	24
Aspergillus niger	14	13	22
Sacharomyces cerevacae	16	17	24

The *n*-hexane and chloroform extract of *S. chelonoides* showed significant cytotoxic activity against brine shrimp nauplii and the LC_{50} values for them were found to be 0.98 and 1.00 μg/ml, respectively. An approximate linear correlation was observed when logarithm of concentration versus percentage of mortality[7] was plotted on the graph paper and the values of LC_{50} were calculated using Microsoft Excel 2000. All the values were compared with vincristine sulphate whose LC_{50} was found to be 0.33 μg/ml.

ACKNOWLEDGEMENT

The authors like to thank the Institute of Nutrition and Food Science (INFS), University of Dhaka for supplying the test microorganism.

REFERENCES

1. Ghani, A. 1998. *Medicinal Plants of Bangladesh: Chemical Constituents and Uses*, 1st edition, Asiatic Society of Bangladesh, p. 390 and references cited therein.
2. Rao, K., McBride, T..J. and Oleson, J.J. 1968. Recognition and evaluation of lapachol as an antitumor agent. *Cancer Res.* **28**, 1952-1954.
3. Van Wagenen, B.C., Larsen, R., Cardellina, J.H. II, Ran dazzo, D., Lidert, Z.C. and Swithenbank, C. 1993. Ulosantoin, a potent insecticide from the sponge *Ulosa ruetzleri*. *J. Org. Chem.* **58**, 335-337.
4. Villanova, Pa. National Committee for Clinical Laboratory Standards: 1988. Performance standards for antimicrobial disk susceptibility tests for bacteria and fungus that grow aerobically. 2nd edition.
5. Goldstein, A.L. and Kalkan, S.M. 1974. *Principles of drug action*, 2nd edition, Willey Biochemical Health Publications, pp. 376-381.
6. Meyer, B.B., Ferringi, N.R., Futman, F.J., Jacobsen, L.B., Nichols, D.E. and Mclaughlin, J.L. 1982. Brine shrimp a convenient general bioassay for active plant constituents. *Planta Medica*. **5**, 31-34.
7. Persoone, G. 1988. *Proceedings of the international symposium on brine shrimp, Artemia salina*. University Press, Wittern, Belgium, pp. 1-3.