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ANTIBACTERIAL ACTIVITY OF SOME INDIGENOUS MEDICINAL PLANTS

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ABSTRACT

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The study was conducted in the Department of Microbiology, University of Chittagong during February to August, 2008 to identify plant species having potential antimicrobial principles, antibacterial activity from 5 indigenous plant species which were screened from 16 plant species were examined using agar disc diffusion method against ten bacteria (*Shigella dysenteriae, Salmonella typhi, Salmonella paratyphi, Bacillus subtilis, Bacillus cereus Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Vibrio cholerae, Bacillus megaterium*). The plants were extracted using 95% ethanol and showed the inhibitory effect against gram-positive and gram-negative bacteria. But gram-positive bacteria are more sensitive than gram-negative bacteria. The largest zone of inhibition (23mm in diameter) was recorded against *Bacillus subtilis* with the leaf extract of *Blumea lacera*.

Keywords: Folk medicinal plants, antibacterial activity, crude ethanolic extract, *Blumea lacera*

INTRODUCTION

Indigenous plants, widely used for folk medicinal purposes, are numerous and diverse. In Bangladesh, about 500 plant species have been identified as medicinal plant because of their therapeutic properties (Ghani, 2000). In the mean time, a large number of industries (400 herbal factories) have been established in this country for producing Ayurvedic and Unani medicines. A medicinal use of plants is the oldest form of healthcare known to mankind. It has been estimated that Bangladesh has a market of about 100-core taka worth herbal products annually. The total size of the medicinal plant market at wholesale prices was estimated at some US$ 14 million per annum, which corresponds to 17000 tones of products. Local supply accounts for about 70 percent by volume and 40 percent as value. It has been estimated that 12,500 tones of dried medicinal plant produce is sold in Bangladesh. These products are approximately worth of Tk 255/million to rural economy. At the factory level, 5000 tones of imported medicinal plant cost around 480 million taka (Alam *et al*., 1996). Although modern medicinal science has been developed to a great extent, many rural people of Bangladesh still depend on plant products and herbal remedies for treating their ailments. Being naturally gifted by a suitable tropical climate and fertile soil, Bangladesh possesses a rich flora of tropical plants. About 5000 species of Phanerogams and Pteridophytes grow in its forests, jungles, wastelands and roadsides as indigenous, naturalized and cultivated plants. Out of them more than a thousand have been claimed to posses medicinal and/ or poisonous properties, of which 546 have recently been enumerated with their medicinal properties and therapeutic uses (Yusuf *et al*., 1994). In addition of possessing various other medicinal properties, 257 of these medicinal plants have been identified as efficacious remedies for diarrhoeal disease and 47 for diabetes. A large number of plants in different location around the world have been extracted and semi-purified to investigate individually their antimicrobial activity (Dranghon, 2004).

MATERIAL AND METHODS

Plant materials

The Plants *Callicarapa arborea,Lannea coromandelica,Ficus recemosa Linn,Streblus asperLour, Lawsonia inermis, Holarrhena antidysenterica, Mentha arvensis, Enhydra fluctuans, Blumea lacera, Glinus oppositifolius, Chenopodium album, Hemidesmus indicus, Coccinea cordifolia Linn, Cuscuta reflexa Roxb, Capparis zeylanica Linn* and *Kalanchoe pinnata* were collected from the Sitakundu and Patiya , chittagong, Bangladesh in February, 2008 which were used for the treatment of infectious diseases by tribal peoples of Chittagong, Bangladesh. The plants were identified at the Bangladesh National Herbarium. The plant materials were oven-dried at 40ºC and then ground into coarse powder.

Table1. Plants details collected with the name of locality

Serial No.	Name of plant	Plant parts	Family	locality
1	*Callicarapa arborea*	Leaf	Verbenaceae	Sitakundu
2	*Lannea coromandelica*	Leaf	Anacardiaceae	Sitakundu
3	*Ficus recemosa Linn*	Leaf	Moraceae	Sitakundu
4	*Streblus asperLour*	Leaf	Moraceae	Sitakundu
5	*Lawsonia inermis*	Leaf	Lythraceae	Sitakundu
6	*Holarrhena antidysenterica*	Leaf	Apocynaceae	Sitakundu
7	*Mentha arvensis*	Aerial parts with flowers	Labiatae	Patiya
8	*Enhydra fluctuans*	Leaf and root	Compositae	Patiya
9	*Blumea lacera*	Aerial parts	Compositae	Patiya
10	*Glinus oppositifolius*	Leaf	Molluginaceae	Patiya
11	*Chenopodium album*	Leaf	Chenopodiaceae	Patiya
12	*Hemidesmus indicus*	Root	Periplocaceae	Patiya
13	*Coccinea cordifolia Linn*	Leaf and rhizome	Cucurbitaceae	Patiya
14	*Cuscuta reflexa* Roxb	Leaf	Convolvulaceae	Sitakundu
15	*Capparis zeylanica* Linn	Leaf	Capparidaceae	Patiya
16	*Kalanchoe pinnata*	Leaf	Crasselaceae	Patiya

Extraction

Briefly, The coarse powder of the *Callicarapa arborea (20 g),Lannea coromandelica(20 g),Ficus recemosa Linn(30 g),Streblus asperLou(35 g)r, Lawsonia inermis(41.0 g), Holarrhena antidysenterica(37.5 g), Mentha arvensis(19.0 g), Enhydra fluctuans(25.0 g), Blumea lacera(31.0 g), Glinus oppositifolius(37.0 g), Chenopodium album(33.0 g), Hemidesmus indicus(34.0 g), Coccinea cordifolia Linn(31.0 g), Cuscuta reflexa Roxb(34.0 g), Capparis zeylanica Linn(38.0 g)* and *Kalanchoe pinnata(42.0 g)* were extracted with ethanol for a week at room temperature. The extracts were then filtered off through Whatman filter paper number-1 and the solvent was removed under vacuum at 30ºC until dry mass were obtained by Buchi rotavapor.

Antibacterial Activity Test

Microorganisms

The bacteria used included: *Shigella dysenteriae, Salmonella typhi, Salmonella paratyphi, Bacillus cerus, Bacillus subtilis, Escherichia coli, Pseudomonas aeruginosa, Staphylococcus aureus, Vibrio cholerae, Bacillus megaterium.* Bacterial cultures were maintained on Nutrient agar media. All cultures were subcultured monthly and subsequently stored at 4°C.

Screening for Antimicrobial Activities

Disc diffusion method (Bauer *et al*., 1966) was used to test the antimicrobial activity of the extractives against ten bacteria. Dried and sterilized filter paper discs (6mm diameter) were then impregnated with known amount of the test substances dissolved in ethanol (40µg/ml) using micropipette and the residual solvents were completely evaporated. Discs containing the test material (20µg/disc) were placed on nutrient agar medium uniformly seeded with the test microorganisms. Standard disc of kanamycin (30µg/disc) and blank discs (impregnated with solvents followed by evaporation) were used as positive and negative control, respectively. These plates were then kept at low temperature (4^{o}C) for 24 hours to allow maximum diffusion of test samples. The plates were then incubated at 37^{o}C for 24 hours to allow maximum growth of the organisms. The test materials having antimicrobial activity inhibited the growth of the microorganisms and a clear, distinct zone of inhibition was visualized surrounding the disc. The antimicrobial activity of the test agents was determined by measuring the diameter of zone of inhibition in millimeter. The experiment was carried out in triplicate and the average zone of inhibition was calculated.

RESULT AND DISCUSSION

During this study, 16 plants were selected which were used for the treatment of infectious diseases by tribal peoples of Chittagong, Bangladesh. The aforesaid are summarized in Table1. From primary Screening, it was found that only 5 plants exhibited antibacterial activity against more than 6 test organisms (Table 2). *Blumea lacera* showed

moderate to good (11-23 mm in diameter zone of inhibition) antibacterial activity against all organisms except *Pseudomonas aureuginosa*. *Enhydrus fluctuans* Lour and *Mentha arvensis* Linn moderate activity (7-10 mm in diameter) against all test organisms except *Bacillus cereus* in case of *Mentha arvensis* Linn. *Salmonella paratyphi* and *Bacillus megaterium* incase of *Enhydrus fluctuans. Chenopodim album* Linn and *Glinus oppositifolius* Linn showed comparatively better activity (9-13 mm in diameter) than *Enhydrus fluctuans* Lour and *Mentha arvensis* Linn. The largest zone of inhibition (23mm in diameter) was recorded against *Bacillus cereus* with the leaf of *Blumea lacera*. Similar antibacterial activity of other plant extracts has been reported previously (Rojas *et al*., 1992; Bartner and Grein, 1994; Ahmed *et al*., 1999; Rahman *et al*., 1998).

The present investigation ensures that crude extracts of 5 plants contain antibacterial properties, which are used in tribal area of Chittagong, Bangladesh. During the study it was observed that gram-positive bacteria are more sensitive than gram negative bacteria. From our results, it appeared that the crude extracts of some traditional medicinal plants has good inhibitory effect against selected bacterial strains. Among the medicinal plants tested herein, *Blumea lacera* showed most promising antibacterial properties indicating the potential for discovery of antibacterial principles.

Table 2. Antibacterial activity of alcoholic extracts of five plants

Average zone of inhibition in diameter (mm)											
Bacterial test organisms											
Name of plants	Parts of plant used	*Sh. dysenteriae*	*Salmonella typhi*	*Pseudomonas sp*	*Bacillus cereus*	*Salmonella paratyphi*	*Vibrio cholerae*	*Bacillus megaterium*	*E.coli*	*Bacillus subtilis*	*Staphylococcus aureus*
Blumea lacera	Aerial parts	11	11	_	23	11	9	19	13	21	15
Chenopodium album Linn	Leaf	13	_	9	10	_	11	9	13	9	11
Enhydra fluctuans Lour	Leaf and rhizome	9	7	10	11	_	10	_	10	9	8
Mentha arvensis Linn	Aerial parts with flowers	7	9	10	_	7	10	9	7	10	8
Glinus oppositifolius Linn	Leaf	13	9	9	10	11	11	11	9	_	13

REFERENCES

Ahmed, A.M.A., Rahman, M.S., and Anwar, M.N. 1999. Antimicrobial activity of extracts and crude alkaloids of *Polyalthia longifolia* (Sonn.)Thw. Stem bark. The Chittagong University Journal of Science, 23(10): 53-56

Alam, M.K., Chowdhury, J.U. and Hasan, M.A. 1996. Some folk formularies from Bangladesh. *Bangladesh Journal of Life Science*, 8(1): 49-63

Bauer, A.W., Kirby, M.M., Sherris, J.C. and Turck, M. 1966. Antibiotic susceptibility testing by a standardized single disc method. *American Journal of Clinical Pathology*, 45: 493-496

Bartner, A. and Grein, E.1994. Antibacterial activity of plant extracts used externally in raditional medicine. *Journal of Ethnopharmacology*, 44:35-40

Dranghon, F.A. 2004. Use of botanicals as biopreservatives in foods. Food Technol.58:20-28.

Ghani, A. 2000. Vheshaja Oshudh (Herbal Medicine), Bangla Academy Dhaka, Bangladesh.

Rahman, M.S., Begum, J., Chowdhury, J.U. and Anwar, M.N.1998. Antimicrobial activity of *Holarrhena antidysenterica* against *Salmonella typhi*. *The Chittagong University Journal of Science*, 22(1): 111-112

Rojas, A., Hernandez, L., Pereda-Miranda, R. and Mata, R.1992. Screening for antimicrobial activity of crude drug extracts and pure natural products from Mexican medicinal plants. *Journal of Ethnopharmacology*, 35: 275-283

Yusuf, M., Chowdhury, J.U., Wahab, M.A. and Begum, J. 1994. Medicinal plants of Bangladesh. Premirer enterprise, Chittagong pp. 8-149