Ancient Science of Life Vol. No. XXI (3) January 2002 Pages 198 - 201

ANTIMICROBIAL ACTION OF THE LEAF EXTRACT OF Lagerstroemia parviflora Roxb

A. MAZUMDER1, S.K. SINGN1, R.MAZUMDER1, S.P.BASU1 AND B.P. SAHA2
1. Department of Pharmaceutical Sciences
Birla Institute of Technology, Mesra, Ranchi – 835 215 (JHARKHAND)

2. Department of Pharmaceutical Technology, Jadavpur University,
Calcutta – 700 032 (West Bengal)

Received: 25.5.2001 Accepted: 18.9.2001

ABSTRACT: *The benzene extract of the leaves of Lagerstroemia paviflora Roxb was tested for its Minimum Inhibitory Concentration (MIC) against Gram Positive Staphylococcus aureus, Bacillus subtilis, Bacillus cereus, Klebsiella pneumoniae, Streptococcus pneumoniae, Lactobacillus arabinosus and gram negative strains E.Coli, Shigella dysenteriae, shigella sonnei, shigella boydii, Salmonella typhimurium, Proteus mirabilis and Vibrio cholerae. Further the zones of inhibition Produced by the crude extract against four selected bacterial strains were measured and compared with those produced by the standard antibiotic Ciprofloxacin against the same bacterial strains.*

INTRODUCTION

Lagerstroemia parviflora (Family – Lythraceae) is known for its various medicinal properties (1-6). The present investigations were under taken to test the antimicrobial potency and to find out the Minimum Inhibitory concentration (MIC) of the leaf extract of this plant against some Gram positive and gram negative bacteria. Further the antimicrobial potency of the extract was compared with that of the extract was compared with that of a standard antibiotic Ciprofloxacin against a selected number of bacterial strains.

MATERIALS AND METHODS:

Fresh leaves of the plant were collected and identified at Botanical Survey of India, Calcutta and further confirmed by experts of pharmacognosy of our department. The leaves were sun dried after washing and then grinded to a coarse powder in a grinder.

METHOD OF EXTRACT PREPARATION:

The coarse powder of the leaf (110 gm) was extracted in a soxhiet apparatus with benzene and the solvent was removed by evaporation on a heating mantle by taking care that the temperature did not rise above 50oC. A semisolid dark viscous crude extract of the leaf was obtained. The crude extract was tested for its anti microbial activity against various bacterial strains like S. aureus, B. pumilus, B. subtils, B. cereus, streptococcus pneumoniae, E.Coil, shigella dysenteriae, S. Sonnei, S. boydii, salmonella typhimurium, Proteus mirabilis, vibrio cholerae and Lactobacillus arabinosus. These bacterial strains were clinical isolates

collected from the Department of pharmaceutical technology,Jadavpur University; Central Drugs laboratory, Calcutta; S.C.B. Medical Technology, Chandigarh. All strains used were pure cultures, preserved as stab slant cultures at a temperature of 4OC.

DETERMINATION OF MINIMUM INHIBITORY CONCENTRATION BY SERIAL DILUTION TECHNIQUE:

A stock solution (25ml) of the crude of 1 mg/ml concentration was prepared by dissolving 25 mg of the same in dimethyl sulfoxide. Dimethyl sultoxide did not show any activity as such (7). Calculated volumes of this stock were dispenses in a series of Me Cartney bottles previously containing calculated volumes of sterile cooled molten nutrient agar media (40-45oC) to prepare the final volume of 30ml each with dilutions of 5,10,25,50,100 and 200 µg/ml. These molten nutrient agar media containing various concentrations of the extract were poured and solidified on to sterile 100 mm petridishes to give sterile nutrient agar plates with varying dilutions of the extract. Then these plates were kept in a refrigerator (4oC) for 24 hours for uniform diffusion of the extract throughout the nutrient agar media. The plates were then dried at 37oC for 2 hours before spot inoculation. One loopful (loop diameter :3mm) of an overnight grown peptone water culture of each test petridish was marked by checker board technique (8) for location of each inoculum and the test organisms were spotted accordingly. The spot inoculated plates were incubated at 37oC for 24 hours and the MIC values were obtained.

DETERMINATION OF ZONES OF INHIBITION BY DISC DIFFUSION METHOD:

Here we have took pure Ciprofloxacin as a standard antibiotic for comparison of the results. The stock solutions (each of 1 mg/ml concentration) of both crude extract and ciprofloxacin were prepared. From these stock solutions, 2 sets of four dilutions (25,50,100 and 200 µg/ml.) each of Lagerstroemia parviflora leaf extract (solvent: dimethyl sulfoxide) and ciprofloxacin (solvent: sterile distilled water) were prepared in sterile Me Cartney bottles. Sterile nutrient agar plates were prepared and incubated at 37oC for 24 hours to check for any sort of contamination. Then each sterile nutrient agar plates were flooded with the corresponding peptone water culture of test organisms, dried for 30 minutes at 37oC and alter illying the flooded plates, four sterile filter paper discs (Whatman no.1) of 6 mm diameter were soaked in four different dilutions of the crude extract and placed I appropriate position on the surface of the flooded plates with the corresponding filter paper discs soaked with the extract were incubated at 37oC for 24 hours and the diameters of zone of inhibition were measured in mm. Similar procedure was adopted for the pure Ciprofloxacin and the corresponding zone diameters were compared accordingly.

RESULTS AND DISCUSSIONS:

The results of determination of MIC values of leaf extract of L. Parviflora Roxb. Have been tabulated in Table – 1 it is evident form the result that the crude extract is very active against gram negative bacteria at lower concentration. The results of determination of

pages 198 - 201

inhibition of the crude extract of leaf of the plant and its comparison with the standard antibiotic ciprofloxacil against four selected strains are recorded in Table-2. The antimicrobial activity of the crude extract was found to decrease in the following order against different test bacterial strains, shigella dysenteriae, E.coli, stmptococcus pneumoniae, and Bacillus cereus as evident form table 1 and 2. The antimicrobial property of the extract may be due to certain antimicrobial substances present in leaves of lagerstroemia parviflora Roxb. We are carrying out studies in our laboratory to isolate the active principle responsible for the above effect.

ACKNOWLEDGEMENT:

The authors thank Dr. S. Jha of Department of Pharmaceutical Sciences. BIT., Mesra, Ranchi and Dr. (Mrs) Sujata Ghosh Dastidar of department of Pharmaceutical Technology, Jadvapur University, Calcutta, for their kind support in carrying out the research work.

Table –I
Determination of MIC of the leaf extract of L parviflora Roxb against different microbial strains:

Name of Bacteria	Growth in nutrient agar containing different concentrations of extract in µg / ml						
	0	5	10	25	50	100	200
Shigella dystnteriae 1	+	+	+	+	±	-	-
Shigella dystnteriae 2	+	+	+	-	-	-	-
Shigella dystnteriae 6	+	+	+	+	-	-	-
Shigella dystnteriae 7	+	+	+	+	-	-	-
Shigella sonnei 2	+	+	+	+	+	+	+
Shigella boydii 8	+	+	+	+	+	+	+
Staphylococcus aureus ML 267	+	+	+	+	+	+	+
S. aureus 8531	+	+	+	+	+	+	+
S. aureus ATCC 29737	+	+	+	+	+	+	+
S.aureus NCTC 7447	+	+	+	+	+	+	-
S. aureus 6571	+	+	+	+	+	+	+
E.coli Row 7/12	+	+	+	+	±	-	-
E. coli CD/99/1	+	+	-	-	-	-	-
E. coli VC Sonawave 3.37 C	+	+	+	+	-	-	-
Bacillus subtilis CD/99/1	+	+	+	+	+	+	+

B. cereus var. mycoides	+	+	+	+	+	+	-
B. Pumilus 8241	+	+	+	+	+	+	+
Streptococcus pneumoniae NCTC 7465	+	+	+	+	-	-	-
Klebsiella pneumoniae RM 8/98	+	+	+	+	+	+	-
Proteus mirabilis AM 8/98	+	+	+	+	+	+	+
Salmonella tyohimurium 2	+	+	+	+	+	+	+
Vibrio cholerae 8531	+	+	+	+	+	+	-
Lactobacillus arabinosis CD / 99 / 1	+	+	+	+	+	+	+

Table 2

Determination of diameters of zone of inhibition (in mm) produced by the plant extract and its comparison with those of standard antibiotic, Ciprofloxacin, against the same bacterial strains:

Name if bacteria	Extract (µg/ml)				Ciprofloxacin (µg/ml			
	25	50	100	200	25	50	100	200
Shigella dysenteriae2	13.0	16.3	20.0	27.0	22.0	26.5	30.0	36.0
E.Coli CD/99/1	8.0	9.6	11.0	13.0	7.0	8.8	10.0	312.0
Streptococcus Pneumoniae NCTC 7465	6.5	7.5	9.0	10.0	7.5	10.5	12.0	13.5
Bacillus cereus var. mycoides	6.0	6.5	7.0	8.0	7.0	8.5	10.0	13.0

REFERENCES:

1. Bhakuni, D.S., Dhar, ML., Dhar, M.M., Dhawan, B.N., and Mehrotra, B.N., "Screening of Indian Plants for biological activity, part II", India J. Exp Biol. 7.250, (1969).

2. Dhar ML., Dhar, M.M., Dhawan, B.N., and Mehrotra, B.N., "Screening of Indian Plants for biological activity, part IV", India J. Exp Biol.. 11,43,(1973).

3. Jain, S.K. and Tarafdar, C.R. "Medicinal plant-lore of the Santals", Econbot 24, 241 (1970).

4. Vohra, S.B. and Khan, M.S.Y., "Pharmacological studies on Lagerstroemia parviflora",.J. Res Ayur Siddlia 3 (1&2), 23,(1982)

5. Atal, C.K. Srivastava, J.B. and Wali, B.K., “Screening of Indian Plants for biological activity – PartVIII”, Indian J. Exp Biol 16,390 (1978).

6. Singh, R.and Singh, R, “Screening of some plant extracts for antiviral properties”, Technology, sindii, 9, 415 (1982).

7. Mondal, S.C., Mazumder A. and MazumderR., “Antibacterial 71, 439-441, (2000).

8. Mazumder R. T. Mendiratta. Mondal, S.C and Mazumder A., “Antimicrobial potency of the leaf stalk extract of Curcuma longa (Roxb)” Anc. Sc.of Life, XX,. July-Oct. 92-96, (2000).