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ANTIMICROBIAL ACTIVITY OF SOME ETHNOMEDICINAL PLANTS USED BY TRIBES OF REWA, MADHYA PRADESH

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ABSTRACT

Antimicrobial activity of 11 ethnomedicinal plant extracts were evaluated against nine bacterial. Strains, *Bacillus subtilis, Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus facalis, Escherichia coli, Klebsiella pneumonia, Pseudomonas aeruginosa, Ervinia sp, Proteus vulgaris,* and one fungal strain *Candida albicans*. The collected ethnomedicinal plants were used in folk medicine in the treatment of skin diseases, venereal diseases, repiratory problems and nervous disorders. Out of 11 plants, 10 plants exhibited antimicrobial activity against one or more of the tested microorganisms at three different concentrations of 1.25, 2.5 and 5 mg/disc. Among the plant tested, *Acalypha fruticosa, Peltophorum pterocarpum, Toddalia asiatica, Cassia auriculata, Punica granatum* and *Syzygium lineare* are most active. The highest antifungal activity was exhibited by methanol extract of *Peltophorum pterocarpum* and *Punica granatum* against *Candida albicans*.

KEYWORDS: Antimicrobial, plant extracts, zone of inhibition, Rewa

Medicinal plants are an important therapeutic aid for various ailments. Scientific experiments on the antimicrobial properties of plant components were first documented in the late 19th century(Zaika, 1975). In India, from ancient times, different parts of medicinal plants have been used to cure specific aliments. Today, there is widespread interest in drugs derived from plants. Natural antimicrobials can be derived from plants, animal tissues, or microorganisms (Gordon and David, 2001).

Rural communities in particular tribes of Rewa District, Madhya Pradesh, depend on plant resources mainly for herbal medicines, food, forage, construction of dwellings, making household implements, sleeping mats, and for fire and shade. The use of medicinal plants as traditional medicines is well known in rural areas of many developing countries.

Eleven plant species used in folk medicine to determine their antimicrobial activity (Table 1). In general, these plants are used in folk medicine in the treatment of skin disease, venereal diseases, respiratory problems and nervous disorders. The development of drug resistance in human pathogens against commonly used antibiotics has necessitated a search for new antimicrobial substances from other sources, including plants. (Erdogrul, 2002). Screening of medicinal plants for antimicrobial activities is important for finding potential new compounds for therapeutic uses.

MATERIALS AND METHODS

Plants were selected for this study based on their medicinal uses. Fresh plant parts were collected from the tribal villages in Rewa District, Madhya Pradesh in Jan April 2009. Rewa lies between 24^0 18-25^0 12 N latitudes and 81^0 2-82^0 18 E longitude. The ethnomedicinal data were obtained from tribal people, Vaidhyas, Ojhas, Village Pradhan and many other experienced informants giving knowledge of herbal drugs used by the different tribal people.

Plant extracts were prepared by cold percolation method. The plant materials were dried under shade and ground into fine Powder. 50 g of dried powder was soaked in 300 ml hexane for 48 hours. The plant extracts were filtered through Whatman N0. 1 filter paper. The filtrates were dried until a constant dry weight of each extract was obtained. The residues were stored at 40^0C for further use. The remaining plant residue was dried and soaked in 300 ml, of methanol as above.

The hexane and methanol extracts of 11 plants were screened against a total of 9 bacterial strains and one fungal strains. The test organisms were *Bacillus subtitis, Staphylococcus aureus, Staphylococcus epidermidis, Enterococcus faecalis, Escherichia coli, Klebsiella pneumoniae, Pseudomona aeruginosa, Ervinia sp, Proteus vulgaris* and one fungal strain *Candida albicans.*

Stock cultures were maintained at 40^0C on slopes of nutrient agar. Active cultures for experiments were

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Table 1: Antimicrobial activity of the hexane and methanol extracts of collected ethnomedicinal plants

S. N.	Plant name	Family	Parts used	Solvent	Conc.(mg/disc)	Zone of inhibition (mm)									
						Bs	Sa	Se	Ef	Ec	Pa	Kp	Es	Pv	Ca
1	*Acalypha fruticosa*	Euphorbiaceae	Aerial parts	H	1.5	10	9	11	-	-	10	-	-	-	-
					2.5	13	12	13	-	-	13	-	-	-	-
					5	15	14	15	-	-	15	-	-	-	-
				M	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
2	*Albizia procera*	Mimosaceae	Stem, bark	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
				M	1.5	-	9	9	-	-	-	-	-	-	-
					2.5	10	11	11	10	-	-	-	-	-	-
					5	12	13	13	13	-	-	-	-	-	-
3	*Cassia alata*	Caesalpiniaceae	Leaf	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
				M	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	9	10	-	-	-	-	-	-	-	-
4	*Cassia auriculata*	Caesalpiniaceae	Leaf	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
				M	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	9	-	-	-	-	-	-	-	-
					5	10	12	10	10	-	-	-	-	-	-
5	*Cassia auriculata*	Caesalpiniacea	Flower	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
				M	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	10	11	11	9	-	-	-	-	-	-
					5	13	14	13	12	10	-	-	-	-	-
6	*Olax scandens*	Olacaceae	Leaves	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	10	-	9	-	-	-	-
					5	8	-	-	13	-	12	9	-	-	-
				M	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-

7	*Peltophorum pterocarpum*	Fabaeeae	Flower	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
				M	1.5	9	-	-	-	-	-	-	-	-	9
					2.5	12	10	11	9	-	10	9	-	10	11
					5	14	13	13	12	-	13	12	-	13	13
8	*Punica granatum*	Punicaceae	Root	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
				M	1.5	11	12	10	-	-	-	-	-	-	9
					2.5	14	15	12	8	8	-	-	-	-	12
					5	18	19	14	9	9	-	-	-	-	15
9	*Syzygium cumini*	Myrtaceae	Seed	H	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	-	-	-	-	-	-	-	-	-	-
					5	-	-	-	-	-	-	-	-	-	-
				M	1.5	-	11	10	-	-	-	-	-	-	-
					2.5	10	15	13	-	-	-	10	-	-	-
					5	13	18	16	-	-	-	13	-	-	-
10	*Syzygium lineare*	Myrtaceae	Leaves	H	1.5	8	-	-	-	-	8	-	-	-	-
					2.5	10	-	-	-	-	11	-	-	-	-
					5	12	-	-	-	-	14	-	-	-	-
				M	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	8	8	10	8	-	8	-	-	8	
					5	10	10	13	10	-	10	-	-	10	
11	*Toddalia asiatica*	Solanaceae	Leaves	H	1.5	-	17	13	-	-	-	-	-	-	-
					2.5	-	23	17	-	-	-	-	-	-	-
					5	-	30	20	-	-	-	-	-	-	-
				M	1.5	-	-	-	-	-	-	-	-	-	-
					2.5	8	10	12	-	-	-	-	-	-	-
					5	10	15	16	-	-	-	-	-	-	-

H- Hexane, M- Methanol, (-) No activity.
Bs- *Bacillus, subtilis,* Sa- *Staphylococcus, aureus,* Se- *Staphylococcus epidermidis,* Ef- *Enterococcus aeruginosa,* Ec- *Escherichia coli,* Pa- *Pseudomonas aeruginosa,* Kp- *Klebsiella pnumoniae,* Es- *Eruvinia sp.,* Pv- *Proteus vulgaris,* Ca- *Candida albicans.*

prepared and were incubated for 24 hrs at 37^0C. The cultures were diluted with fresh nutrient broth achieve optical densities, 2.0-10^6 colony forming units for bacteria and 2.0-10^5 spore/ ml for fungal strains.

Agar disc diffusion method (Bauer et al., 1966), was used to screen the antimicrobial activity. The test microbial strains were maintained on agar slants at 40^0C. The different concentrations of extracts (1.25, 2.5 and 5 mg/disc) were lodged on 6 mm sterile disc. The loaded disc was placed on the surface of medium and the compound was allowed to diffuse for 5 minutes and the plates were kept for incubation at 37^0C for 24 hrs. At the end of incubation, inhibition zones formed around the disc. The result were obtained by measuring the zone of diameter.

RESULTS AND DISCUSSION

Different available plants and their parts were screened for their antimicrobial activity. The results have been recorded in table 1, where names of the plants are arranged alphabetically and each name has the name of its family in parenthesis.

Out of 11 ethnomedicinal plants tested for antimicrobial activity, 10 plant species showed antimicrobial activity by inhibiting one or more microorganisms. Among the plants screened, *Acalypha fruticasa, Peltophorum pterocarpum, Toddalia asiatica, Cassia auriculata,Ssyzygium cuminii and Syzygium lineare* showed promising activity against tested microorganisms. The tested plant extracts were most active against gram positive microorgawsas than the gram negative microorganisms. (Valsaray et al., 1997 ; Rajakaruna et al., 2002 and Parekh et al., 2005).

Methanol extracts exhibited a higher degree of antimicrobial activity as compared hexane extracts. Ethanolic extract of *Punica granatun* was most active against *E. coli.* Prashanth et al.(2001) reported that different extracts of *Punica granatum* fruit showed some antibacterial activity, against *P. vulgaris* and *B. subtilis.* Rajakaruna et al.(2002) reported that *Syzygiun cuminii* showed good activity against *Staphylococcus aureus* and *Bacillus sublitis*.

Both hexane and methanol extracts of *Syzygium lineare* and *Toddalia asiatica* showed antimicrobial activity. *Peltophorum pterocarpum* and *Syzygium lineare* had the highest inhibitory activity against both gram positive and gram negative bacteria. On the other hand *Cassia alata* showed only slight activity against bacteria such as *S.aureus* and *B. Subtilis.*

Syzygium lineare, *Punica granatum*, *Syzygium cuminii* and *Toddalia asiatica* produce the largest zones of inhibition against *B.subtilis*, *Staphylococcus aureus* and *Staphylococcus epidermidis*. Methanol extracts of *Peltophorum pterocarpum* and *Punica granatum* showed activity against *Candida albicans*. In general, among the tested microbial strains, bacteria were found to be more sensitive to many of the test agents the fungi.

The most sensitive bacterium was *Bacillus subtilis* which was inhibited by methanol or hexana of 10 plants. On the other hand no inhibition was observed in the *Ervinia sps.* The study also showed that *Toddalia asiatica.*, *Syzygium lineare, Acalypha fruticosa* and *Peltophorum pterocarpum* could be potential sources of new antimicrobial agents.

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