Environment Conservation Journal 9 (1&2) 139-143, 2008
(ISSN 0972-3099)

In vitro antibacterial activity of Sahdevi (*Vernonia cineria* less)

Prabhat, Navneet, Pramod and Chhaya****
Department of Botany and Microbiology, Gurukul Kangri University, Hardwar
**Department of Chemistry, Gurukul Kangri University, Hardwar

Abstract

Sahdevi (*Vernonia cineria* less) were evaluated for antibacterial activity against human pathogenic bacterial strains i.e. *Staphylococcus aureus, Klebsiella pneumoniae, Salmonella typhi* and *Escherichia coli.* The methanolic extracts of the plant parts showed the significant activity followed by water and petroleum ether extracts. The methanolic extract of roots showed maximum activity against *K. pneumoniae*(18mm) minimum activity against *S.typhi*(14mm) by well diffusion method. The use of plant for its antibacterial activity and treatment of fever has been suggested.

Keyword: *Vernonia cineria,* Antibacterial, Fever

Introduction

Microorganisms are closely associated with the health and welfare of human beings. Human cannot escape a dynamic on going association with microbes. In Indian system of medicine, the plants are used as a curative in cough, asthma, dropsy, bronchitis, colic, vomiting, leprosy, cardiac disorders, anemia and vitiated conditions of kappa and vata and general debility (Prabhat *et al.*, 2005). The microorganisms have developed resistance to many antibiotics. This has created immense problem for the treatment of microbial diseases, therefore, there is a need of an alternative to these antibiotics for the treatment of diseases. One of the methods to reduce this resistance is by using medicinal plants. The plants are known to produce a variety of phytoconstituents that have antimicrobial properties (Prabhat and Navneet, 2007). The unripe fruits of *Mimusops elengi* showed antibacterial activity against *Bacillus anthrasis, B. subtilis, Salmonella typhi, Staphylococcus aureus, S. sanguis* and *S. mutans* (Kapoor *et al.*, 1989; Prabhat *et al.*, 2005). In the present study, we have selected different parts i.e.roots, leaves, stem and whole plant of *Vernonia cineria* against *Klebsiella pneumoniae, Salmonella typhi, Staphylococcus aureus* and *E. coli.*

Materials and Method

The plants were collected from the foot hills of Shivalik range in Hardwar, Uttarakhand. The root, stem, leaves were separated by peeling. These were washed by running tap water to remove the adhering unwanted material and cut into small pieces, dried at room temperature and then powdered by using blender. The powered plant materials were loaded in soxlet assembly and extracted in three different solvents i.e. petroleum ether, methanol and water for 72 hrs by successive method. At the end of each extract, it was passed through Whattman filter paper No. 40 and the filtrates were evaporated under reduced pressure. Muller Hinton agar media (Hi media No. 173) was used to test to antimicrobial activity against *Escherichia coli,* gram negative (MTCC 739), *Staphylococcus aureus*, gram positive (MTCC 1144), *Salmonella typhi*, gram negative, (MTCC 109) and *Klebsiella pneumoniae* (MTCC) by agar well cup plate method (Ahmad *et al.*, 1998). 8 mm diameter wells were punched in the agar and filled with

abstracts of respective solvents for control and standard antibiotic ampicillin (100 mg/ml) was used as positive control. The plates were incubated at 37°C for 24 hours. The antimicrobial activity was evaluated by measuring the diameter of inhibition zone in mm.

Results and Discussion

The plant parts showed broad spectrum antimicrobial activity (Table. 1) i.e. the petroleum ether, methanol and water extracts were active against both gram positive and gram negative bacteria. The *Vernonia cineria* extracts were found to be less effective as compared to ampicillin. The antibacterial activity of plant (*V. cineria*) parts i.e. leaves, roots, stems, whole plant and antibiotic ampicillin in all the three solvents against *Escherichia coli, Salmonella typhi, Staphylococcus aureus* and *Klebsiella pneumoniae* at concentrations of 100 mg/ml is given in Tables. 1-4. The zone of inhibitions obtained in crude extracts of different parts of plants varied against pathogens while it was same in case of ampicillin. The results revealed that antibiotic is more effective as compared to crude extracts. The methanolic extracts showed the highest activity against *Klebsiella pneumoniae* followed by *Escherichia coli, Salmonella typhi* and *Staphylococcus aureus* as compared to other extracts.

The extracts of roots showed maximum activity followed by whole plant, leaves and stem. The antibacterial therapy is going through crises due to the rapidly increasing development of resistance to existing agents. Antibiotic resistance has increased substantially in the recent years and is posing an increasing therapeutic problem. The use of plants as primary health remedies is quite common due to their pharmacological properties. The plant produced a variety of phytoconstituents that have antibacterial activity. These compounds includes flavonoids, phenols, phenolic glycosides and glycerinates etc. the natural antimicrobial compounds in plants can inhibit the growth of bacteria by means of unknown mechanisms other than that of known antibiotics and for this reason the search for new antibiotics must continue. The present study has shown that the plant and its parts are potentially a rich source of antibacterial agents. The plant extracts inhibited the growth of all pathogens. The antibacterial activity of active extracts of parts were observed in decreasing order roots>whole plant> leaves> stem. The crude extracts (100mg/ml) of each part was used for determination of their potency against pathogens and compared with antibiotic (100mg/ml). The extent of antimicrobial activity of the extracts based on inhibition zone diameter has been described as low (10-14), moderate (15-20) and strong (21-26) by Ahmad *et al.* (1999). In our study, root extracts showed moderate activity against all pathogens and followed by whole plant, leaves and stem. The methanolic extracts of each part is highly effective against all pathogens because more phytoconstituents were leached in this solvent. Our findings have validated the use of these medicinal plants for the treatment of microbial infections. It seems important to recommend that further studies using isolated constituents instead of whole extracts must be done in this field. Health foundations have to increase their funding of these studies and research to help saving the lives of many peoples. This will also offer a great help in facing the emergence and spread of antimicrobial resistance.

Table 1: The percentage of potency of plant *Vernonia cineria* roots extract and antibiotic (ampicillin) against pathogens

S.No.	Human Pathogens	Zone of Inhibition (Antibiotic 100 mg/ml)				Zone of Inhibition (Extract 100 mg/ml)				%of Potency
		Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water
1	*K pneumoniae*	15	19	18	-	16	14	-	26.32	22.22
2	*S. typhi*	14	18	17	-	14	14	-	22.22	17.64
3	*S. aureus*	14	18	20	11	15	15	21.43	16.67	25.00
4	*E coli*	14	19	20	12	14	15	14.29	26.32	25.00

Table 2: The percentage of potency of plant *Vernonia cineria* stems extract and antibiotic (ampicillin) against pathogens

S.No.	Human Pathogens	Zone of Inhibition (Antibiotic 100 mg/ml)				Zone of Inhibition (Extract 100 mg/ml)				%of Potency
		Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water
1	*K pneumoniae*	15	19	18	10	12	1	33.33	36.84	44.44
2	*S. typhi*	14	18	17	9	13	12	35.71	27.78	29.41
3	*S. aureus*	14	18	20	11	14	14	21.42	22.22	30.00
4	*E coli*	14	19	20	10	13	10	28.57	26.32	50.00

Table 3: The percentage of potency of plant *Vernonia cineria* leaves extract and antibiotic (ampicillin) against pathogens

S.No.	Human Pathogens	Zone of Inhibition (Antibiotic 100 mg/ml)			Zone of Inhibition (Extract 100 mg/ml)			% of Potency	
		Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water
1	*K pneumonicae*	15	19	18	9	14	13	40.00	26.32	27.78
2	*S typhi*	14	18	17	10	13	10	28.57	27.78	41.18
3	*S aureus*	14	18	20	10	13	12	28.57	27.78	40.00
4	*E coli*	14	19	20	11	11	12	21.43	42.11	40.00

Table 4: The percentage of potency of plant *Vernonia cineria* whole plant extract and antibiotic (ampicil lin) against pathogens

S.No.	Human Pathogens	Zone of Inhibition (Antibiotic 100 mg/ml)			Zone of Inhibition (Extract 100 mg/ml)			% of Potency	
		Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water	Pt. Ether	Methanol	Water
1	*K pneumonicae*	15	19	18	9	15	13	40.00	21.05	27.78
2	*S typhi*	14	18	17	8	14	10	35.71	22.22	41.18
3	*S aureus*	14	18	20	10	12	14	28.57	27.78	30.00
4	*E coli*	14	19	20	11	13	13	21.42	31.58	35.00

References

Ahmad I., Mehmood, Z. and Mohammad F., 1998. Screening of some Indian medicinal plants for their antimicrobial properties. ***Journal of Ethnopharmacology***, 62: 183-193.

Ahmad I., Beg, A.Z. and Mehmood, Z., 1999. Antimicrobial potency of selected medicinal plants with special interest in activity against phyto pathogenic fungi. ***Indian veterinary medical Journal***, 23: 299-306.

Kapoor,L.D., Singh, A., Kapoor, S.L. and Srivastava, S.N., 1989. Survey of Indian medicinal plants for saponins, alkaloids and flavonoids. ***Llodia***, 32: 297-302.

Prabhat, Navneet and Shrikrishna., 2005. Antimicrobial activity of apamarga (*A. aspera*). ***Indian Academy of Science Letters***, 28(11-12): 379-381.

Prabhat, Navneet and Shri Krishna., 2005. Antibacterial activity of *Mimusops elengi* (Bakul). ***Environmental Conservation Journal***, 6(2): 59-61

Prabhat and Navneet., 2007. *Antibacterial activity of medicinal plants against dental infections*. Medicinal plants: Conservation, Cultivation and Utilization (ed. Book). Daya publishing house, New Delhi. pp: 139-146.