Ethnobotanical Leaflets 12: 227-230. 2008.

Antibacterial Activity of Some Indian Medicinal Plants

Prusti, A.,* Mishra, S.R.,** Sahoo, S.** and Mishra, S.K.**

* Department of Botany, P.N. College, Khurda-752057, Orissa
** University Department of Pharmaceutical Sciences
Utkal University, Bhubaneswar-751 004, Orissa

*Corresponding author: aratibala_prusti@hotmail.com

Issued 18 April 2008

ABSTRACT

The preliminary phytochemical study and *in vitro* antibacterial activity of the ethanolic extracts of three plants having ethnomedicinal uses collected from tribal belt of Orissa, India, viz. *Litsea glutinosa* L.: Lauraceae (LG), *Vitex peduncularis* W.: Verbenaceae (VP), *Elephantopus scaber* L.: Asteraceae (ES) were investigated. The preliminary phytochemical analysis of the extracts revealed the presence of carbohydrate, tannin, alkaloid in LG, tannin, flavonoid, saponin, alkaloid in VP and flavonoid, saponin, steroid, alkaloid, glycoside in ES. The extracts were subjected for screening of *in vitro* antibacterial activity against selected major urinary tract infection (UTI) causing pathogens viz. *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Proteus mirabilis*, *Enterococcus faecalis* and *Escherichia coli* at the concentrations of 500 and 250 µg/ml by disc diffusion assay method. The results of antibacterial activity revealed that all the extract showed good inhibitory activity against all the tested pathogens and the ES extract showed comparative by better activity than the other extracts. The activity of the extract were compared with standard antibiotics.

INTRODUCTION

According to World Health Organization, medicinal plants are the best source to obtain a variety of newer herbal drugs. About 80% of individuals from developed countries use traditional medicine, which has compounds derived from medicinal plants. Therefore, such plants should be investigated to better understand their properties, safety and efficacy.

The use of plant extracts and phytochemicals, both with known antimicrobial properties, can be of great significance in therapeutic treatments. In the last few years, a number of studies have been conducted in different countries to prove such efficiency. Many plants have been used because of their antimicrobial traits, which are chiefly due to synthesized during secondary metabolism of the plant.

Litsea glutinosa L. (LG) belonging to the family Lauraceae commonly known as *Jaisanda* having many ethnomedicinal uses in diarrhoea, dysentery, rheumatism and has antispasmodic, wound healing properties (Ambasta, 1986). *Vitex peduncularis* W. (VP) belonging to the family Verbenaceae (*Madochulia*), used as antiinflammatory, analgesic, antimalarial, antispasmodic and also used in diarrhoea and dysentery (Ambasta, 1986). *Elephantopus scaber* L. (ES) belongs to family Asteraceae

(*Tatmuli*), given in dysuria, urethral discharges, diarrhoea, snake bite and dysentery (Ambasta, 1986). The present study is aimed to carry out the preliminary phytochemical analysis and to screen *in vitro* antibacterial activity against some major urinary tract infection (UTI) causing pathogens.

MATERIALS AND METHOD

The plants were collected from the tribal belts of Bolangir District of Orissa, India on the basis of their ethnomedicinal uses. The plants were identified, confirmed and authenticated by the taxonomist of Department of Botany, P.N. College, Khurda, Orissa. After authentification leaves were collected in bulk, washed, shade dried and extracted with ethanol for 48 hrs in a Soxhlet assembly (Pulok, 2002). The extracts were concentrated, percentage yield calculated and then subjected to preliminary phytochemical analysis. The *in vitro* screening for antimicrobial study was carried out using selected urinary tract infection (UTI) causing pathogens which includes two gram positive bacteria *(Staphylococcus aureus and Enterococcus faecalis)* and three gram negative bacteria *(Escherichia coli, Pseudomonas aeruginosa* and *Proteus mirabilis)*. Five strains each of 5 UTI causing bacterial species were used in this study which was procured from Post Graduate Department of Microbiology, Orissa University of Agriculture and Technology, Bhubaneswar, Orissa. These organisms were identified by following the standard microbiological methods (Collins and Lyne, 1995). The antibacterial screening of the extracts were carried out by determining the zone of inhibition using disc diffusion method (Sahoo et al, 2006; Rath et al, 1999). The strains of microorganisms obtained were inoculated in conical flask containing 100 ml of nutrient broth. These conical flasks were incubated at 37^0 for 24 h and were referred to as seeded broth. The density of the bacterial suspension was standardized by standard McFarland method (Mc Farland et al, 1987). The extracts were dissolved in dimethyl formamide which was previously tested for antibacterial activity against all test bacteria and found to have no antibacterial activity. The extracts were made solution at a concentration of 50 mg/ml and finally sterilized by filtration using 0.45 µm Millipore filters. The sterile discs (6 mm in diameter) were impregnated with 20 and 2.5 µl of above extract solution to achieve desired concentration of 500 and 250 µg/disc and placed in inoculated agar. Gentamicin (G) (10 µg/disc) and Ciprofloxacin (CF) (25 µg/disc) were used as standards. The controls were prepared using the same solvents employed to dissolve the extracts. The inoculated plates with the test and standard discs on them were incubated at 37^0 for 24 h.

RESULTS

The leaves of LG, VP and ES were extracted with ethanol in Soxhlet assembly for 48 hrs and the percentage yield of each extract is presented in Table 1. The extracts were subjected to preliminary phytochemical analysis, the result of which revealed the presence of the zone of inhibition is given in Table 1. The antimicrobial activity in terms of zone of inhibition was shown in Table 2.

DISCUSSION & CONCLUSION

The antibacterial activity of the ethanolic extracts has been shown. Among the extracts, ES exhibited highest activity against all the tested strains. It showed highest activity against *P. mirabilis* (19.8±0.7 µg/disc) and the lowest activity against *E. coli* (11.5±0.3 µg/disc) at 500 and 250 µg/disc respectively. VP extracts also exhibited good inhibitory activity against all the tested microorganisms and the highest activity was found against *P. mirabilis* (17.8±0.52 µg/disc) and lowest against *S. aureus*

(9.7±0.5 µg/disc) at 500 and 250 µg/disc respectively. LG showed highest and lowest activity against *S. aureus* (15.1±0.6 µg/disc) and *P. aeruginosa* (8.1±0.56 µg/disc) at 500 and 250 µg/disc respectively. The observed activity may be due to the presence of potent phytoconstituents in the extracts.

ACKNOWLEDGEMENT

The authors are thankful to the H.O.D., U.D.P.S., Utkal University for providing the laboratory facilities.

REFERENCES

Ambasta, S.P. (1986). The useful plants of India. Publication and Information Directorate, CSIR, New Delhi, India.

Collins CH, Lyne PM. In: Microbiological Methods. 7th ed. London: Butterworths; 1995.

Mc Farland, J. (1987). Standardization of bacterial Culture for disc diffision assay. *Journal of American Medical Association* 49: 1176-1178.

Mishra, S.K., Sahu, S.K., Pattanayak, S.P., Duraiswami, B., Panda., C.S. (2007) Phytochemical and pharmacological studies on *Bryonopsis laciniosa* Naud, roots. *Hamdard Medicus* 50(1): 127-132.

Pulok, K.M. (2002) Quality control of herbal drugs. Bussiness Horizons. New Delhi, India, pp. 398.

Rath, C.C., Dash. S.K., Mishra, R.K., Charyulu, J.K. (1999). *In vitro* evaluation of antimycotic activity of turmeric (*Curcuma longa* L.) essential oils against *Candida albicans* and *Cryptococcus neoformans*. *Journal of Essential Oil Bearing Plants* 43(4): 172-178.

Sahoo, S., Kar, D.M., Mohapatra, S., Rout, S.P., Dash, S.K. (2006). Antibacterial activity of *Hybanthus enneaspermus* against selected UTI pathogens. *Indian Journal of Pharmaceutical Sciences* 68(5): 653-655.

Table-1: The phytochemical analysis of the extracts.

Phytoconstituents	LG	VP	ES
Carbohydrate	+	-	-
Tannin	+	+	-
Alkaloid	+	+	+
Flavonoids	-	+	+
Saponin	-	+	+
Steroid	-	-	+
Glycoside	-	-	+

LG, VP and ES stand for *Litsea glutinosa* L.; *Vitex peduncularis* W.; *Elephantopus scaber* L., respectively.

Table-2: The antibacterial activity of the plant extracts.

Organisms	Conc.	Zone of inhibition (in mm)

(µg/ml)		Extracts			Standards	
		LG	VP	ES	CF	G
1	a	12.1±0.23	15.7±0.5	15.9±0.61	28.0±0.41	10.8±0.8
	b	9.2±0.38	10.1±0.65	11.5±0.3		
2	a	13.2±0.51	17.5±0.13	17.7±0.5	26.4±0.23	25.8±0.55
	b	8.7±0.4	12.6±0.3	13.5±0.5		
3	a	10.6±0.8	16.3±0.15	17.0±0.7	25.6±0.18	26.6±0.6
	b	8.1±0.56	11.4±0.6	12.4±0.43		
4	a	14.9±0.34	17.8±0.52	19.8±0.7	24.5±0.71	25.4±0.45
	b	11.8±0.27	13.4±0.2	14.5±0.4		
5	a	15.1±0.6	15.0±0.31	17.3±0.9	25.3±0.52	24.5±0.7
	b	10.2±0.15	9.7±0.5	12.4±0.67		

The letters a and b indicates the concentrations of the extracts at 500 and 250 µg/disc, respectively.
Org-Organisms 1. *Escherichia coli*; 2. *Enterococcus faecalis*; 3. *Pseudomonas aeruginosa; 4. Proteus mirabilis; 5. Staphylococcus aureus*. CF and G stands for Ciprofloxacin 25 µg/disc and Gentamicin 10 µg/disc, respectively.
LG, VP and ES stands for *Litsea glutinosa* L.; *Vitex peduncularis* W.; *Elephantopus scaber* L., respectively.
*****All the values are mean ± standard deviation of three determinations.