Int. J. Mendel, Vol. 31 (1-2), 45-46, 2014 ANTIMICROBIAL PHYTOCHEMISTRY ISSN 0970-9649

EFFECT OF METHANOL EXTRACT OF DIFFERENT PARTS OF Euphorbia hirta L. AGAINST Escherichia coli AND Staphylococcus aureus.

Indu Kumari

Key words : Solvent, Extracts, *Escherichia coli*, *Staphylococcus aureus*.

Effect of Methanol Extract of different parts of *Euphorbia hirta* L. were examined using agar disc diffusion method against *Escherichia coli* and *Staphylococcus aureus*. Leaves, buds and stems were extracted using methanol as solvent. In case of *E.coli*, maximum *in vitro* inhibition was scored in leaves extracts which offered inhibition zone of 25 mm. And in case of *S. aureus*, both leaves and buds extracts offered same inhibition zone of 20 mm. A significant inhibition was also found in stem extracts of *Euphorbia hirta* against *E. coli* and *S. aureus*.

INTRODUCTION

E. hirta (Family Euphorbiaceae) is very popular herb amongst practitioners of traditional medicine. It is widely used as a decoction or infusion to treat various ailments including intestinal parasites, diarrhoea, peptic ulcers, heartburn, vomiting, amoebic dysentery, asthma, bronchitis, hay fever, laryngeal spams, emphysema, cough, cold, kidney stones, menstrual problems, sterility and venereal diseases.

Several workers throughout the world have carried out antimicrobial studies on various medicinal plants including *Betula pendula* (Mukhtar *et al*., 2002) and *Ageratum houstonianum* (Bowers, 1976). According to World Health Organization (Santos *et al*., 1995) medicinal plants would be the best source to obtain a variety of drugs. Antibacterial activity of crude extracts of *Euphorbia hirta* against some bacteria associated with enteric infections was studied by some workers (El-Mahmood *et al*., 2009; Ibrahim *et al*., 2012; Shanmugapriya *et al*., 2012). The compounds present in *E. hirta* have potenially significant application against human pathogens, including those that cause enteric infections (El-Mahmood *et al*., 2009).

The present study was undertaken to explore the antibacterial activities of crude *E. hirta* extract against important human pathogenic bacteria.

MATERIAL AND METHODS

Plant material : The fresh plant of *Euphorbia hirta* was collected from the campus of Nirmala College, Doranda and also from different locations of Ranchi district of Jharkhand, India.

Preparation of Extract : After collection of plant, leaves, buds and stems were initially separated and washed thoroughly 2-3 times with running tap water and then with sterile water which were then shade-dried, powdered and used for extraction. 15 g of each powder was taken and soaked in 150 ml of methanol in conical flasks, closed by foil paper and placed on a shaker at 37^{0}C temperature for 72 hr. The crude extracts were then filtered through Whatman No. 1 filter paper and then concentrated. After complete solvent evaporation, extract was weighed and stored in a refrigerator at 4^{0}C for further use. 500 mg of solvent residues dissolved in 10 ml of methanol were used as the test extracts for antibacterial activity assay.

Test Bacteria : Human pathogenic bacteria such as *Escherichia coli* and *Staphylococcus aureus* were collected from Birsa Agriculture University, Kanke, Ranchi, Jharkhand (India). All the test bacterial species were maintained on nutrient agar media.

Antibacterial Activity : Antibacterial activity of methanol extract of different parts of plant were determined by disc diffusion method on nutrient agar medium, Extracts were loaded onto the sterile disc of Whatman No. 1 filter paper of 5 mm diameter and dried aseptically. The discs dipped in respective solvent were used as negative controls. The impregnated discs were aseptically placed on the solidified agar media containing test bacteria. After 24 h of incubation at 37^{0}C the culture plates were examined and diameters of the inhibition zones were measured in mm unit.

RESULTS AND DISCUSSION

The antibacterial activity of methanol extracts of leaves, buds and stems of *E. hirta* against human pathogenic bacteria showed varied levels of inhibition (Table-1). Among treatments, maximum *in vitro* inhibition of tested bacteria *E. coli* was scored in methanol extract of leaf of *E. hirta* which offered Zone of Inhibition of 25 mm and Zone of Inhibition Area of 686.88 mm^2. Further, buds and stem extract of *E. hirta* were effective against *E. coli* which recorded significant zone of Inhibition of 20 and 15 mm respectively and Zone of Inhibition Area of 471.00 and 294.38 mm^2 respectively (Figure-1).

In case of human pathogenic bacteria *S. aureus*, significant Zone of Inhibition of 20 mm of Zone of Inhibition Area of 471 mm^2 was obtained in leaf and bud powder but stem extract shows 15 mm and 294.38 mm^2 respectively (Figure-2).

From Table -1, it is evident that the leaf powder extract from methanol of *E. hirta* showed maximum antibacterial activity against *E-coli*. But in case of *S. aureus*, both leaf and bud extracts have same antibacterial activity properties. The crude methanol extract of *E. hirta* leaf powder produced the highest 25 mm Zone of Inhibition against *E-coli* and 20 mm Zone of Inhibition against *S. aureus*. This may be due to the presence of alkaloids, tannins, saponins and flavonoids which are secondary plant metabolites known to possess antibacterial properties.

Department of Botany, Nirmala College, Doranda, Ranchi, Jharkhand (India)
Email : induraj15@yahoo.com

CONCLUSIONS

Methanol extract of different parts of *E. hirta* were found to be effective antibacterial agents against *E.coli* and *S. aureus*. These primary extracts offer the possibility of finding new clinically effective antibacterial compounds. It is used for various medical purposes. Sustained exploration of plant-derived antimicrobials is needed and further research is desirable to establish the identity of the antibacterial compounds obtained from this plant and to determine their complete spectrum of efficacy.

ACKNOWLEDGEMENTS

This research work was partly funded by **UGC**-PSJ-007/12-13 (ERO). The author wishes to extend her heartfelt thanks to Prof. Ramesh Kumar Pandey, Head and Dean, University Department of Botany, Faculty of Science, Ranchi University, Ranchi for providing required laboratory facilities.

References

Bowers, W.S., 1976. Discovery of insect juvenile hormone in plants (Agretochrome I, II). Sci. **195** : 542-547.

El-Mahmood Muhammad Abubakar, 2009. Antibacterial activity of crude extracts of *Euphorbia hirta* against some bacteria associated with enteric infections. *Journal of Medicinal Plants Research* Vol. **3** (7), pp. 498-505, ISSN 1996-0875.

Ibrahim T.A., Adetuyi F.O. and Ajala Lola, 2012. Phytochemical screening and antibacterial activity of *Sida acuta* and *Euphorbia hirta*. Journal of Applied Phytotechnology in Environmental Sanitation **1**(3) :113- 119; ISSN 2088-6586.

Mukhtar M.H., Ansari S.H., Ali, M., Wani, F.A., 2002. Antimicrobial activity of *Betula pendula*. Hamdard Medicus. **45** : 41-43.

Santos P.R.V., Oliveira A.C.X., Tomassini T.C.B., 1995. Control microbiogicode productos. Fitoterapicos. *Rev. Farm. Bioquim.* **31** : 35-38.

Shanmugapriya Perumal, Suthagar Pillai, Lee Wei Cai, Roziahanim Mahmud, Surash Ramanathan, 2012. Determination of Minimum Inhibitory Concentration of *Euphorbia hirta* (L.) Extracts by Tetrazolium Microplate Assay, Journal of Natural Products Volume **5**, 68-76; ISSN 0974 - 5211.

TABLE-1: Study of Diameter of Zone of Inhibition (DIZ) and Zone of Inhibition Area (ZIA) of Extract of *E.hirta* leaf in Methanol Solvent against *Escherichia coli* and *Staphylococcus aureus*

Bacteria →	*Escherichia coli*		*Staphylococcus aureus*	
Parts of Plant ↓	DIZ(mm)	ZIA(mm^2),	DIZ(mm)	ZIA(mm^2)
Leaf (Lm)	25	686.88	20	471.00
Bud (Bm)	20	471.00	20	471.00
Stem (Sm)	15	294.38	15	294.38

DIZ = Diameter of zone of inhibition in millimeter scale.

ZIA = Zone of Inhibition Area in millimeter square.

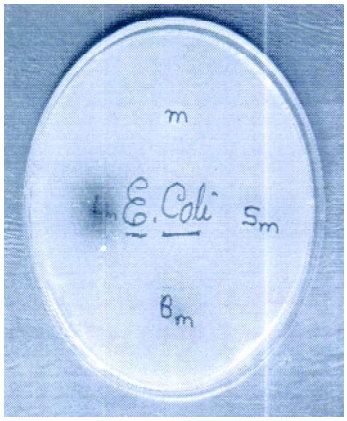

Fig. 1 : Effect of methanol extract of different parts of *Euphorbia hirta* L. against *Escherichia coli*.

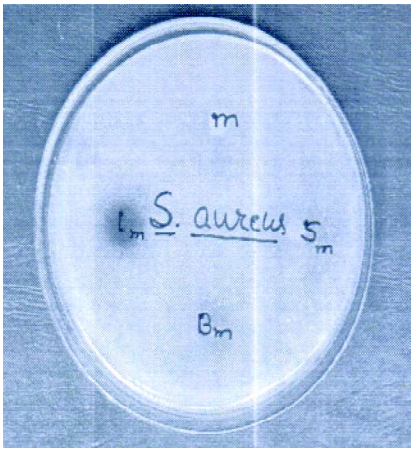

Fig. : 2 : Effect of methanol extract of different parts of *Euphorbia hirta* L. against *Staphylococcus aureus*.