Int. J. Mendel, Vol. 31 (3-4), 129-131, 2014 ANTIMICROBIAL PHYTOCHEMISTRY

ANTIBACTERIAL EVALUATION OF AQUEOUS EXTRACT OF AERIAL PARTS OF *Euphorbia hirta* L. AGAINST *Escherichia coli* AND *Staphylococcus aureus*

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Key words : Antibacterial, Test Bacteria, *Euphorbia hirta* L. *Escherichia coli* and *Staphylococcus aureus*.

Antibacterial activity of aqueous extract obtained from the aerial parts (leaf, bud and stem) of *Euphorbia hirta* L. were tested against both gram negative bacterium *Escherichia coli* and gram positive bacterium *Staphylococcus aureus* using the agar disc diffusion method. The susceptibility of the test bacteria varies with the different parts of plant used. The buds possess potent antibacterial activity with 20 mm of zone of inhibition against *E. coli* and 15 mm of zone of inhibition against *Staphylococcus aureus* in aqueous extract whereas the leaf and stem showed antibacterial activity. The stem exhibited moderate inhibitory effect on the test bacteria. The potentiality of the leaf against the test bacteria is evaluated by minimal inhibitory concentration (MIC). These results may suggest the distribution of antibacterial potential in different aerial parts of *Euphorbia hirta* L. that can be explored further for the isolation and characterization of the chemical constituent.

INTRODUCTION

The large number *of* synthetic drugs produced by pharmaceutical industries from time to time has led to develop resistant microorganisms that become major global issue in the treatment of infectious diseases (Schinor ., 2007). At present, there is an urgent need of continous exploration and development of cheaper and effective new plant based drugs with better bioactive potential and least side effects. Antimicrobials of plant origin have been proved to be efficacious in the treatment of infectious diseases simultaneously with lesser side effects, which are often associated with synthetic antibiotics (Iwu ., 1999).

o has been widely used by Tribals as traditional medicine in the treatment against infectious pathogens. *o* Linn. is a perennial herb belonging to the family Euphorbiaceae. It is a slender-stemmed, annual hairy plant with many branches. It is a potent medicinal plant and has established its sedative and anxiolytic activity including its analgesic, antipyretic, anti-inflammatory, antidepressant for blood pressure, antihypertensive and antioxidant properties. It is now more important in treating respiratory ailments, especially cough, coryza, bronchitis and asthma .There is evidence to show that it has been used as a medicinal herb for various ailments like diarrhoea, dysentery, warts, worm infestations, etc.

Both gram positive bacteria (*o o* and gram negative bacteria *o* have been proved to be major causal organisms of various human infections such as food poisoning, nosocomial infections, wound infections and urinary tract infections and have been selected for the present study. Therefore, in the present investigation *o* was selected to evaluate antibacterial potential of different plant parts against *o* and *o o* with a prospect for further exploration as a source of new antimicrobials.

Antibacterial activity of crude extracts of *o* against some bacteria associated with enteric infections was studied by some investigators (El-Mahmood ., 2009; Ibrahim .,2012; Shanmugapriya .,2012).Other workers have also shown that extracts of *o* inhibited the growth of various microorganisms (Sunil Kumar .,2010; Suresh ., 2008).

T RI ND T OD

The whole plant of *o* was collected locally from Doranda, Ranchi district of Jharkhand, India.

The aerial parts of the plant (leaf, bud and stem) were shade dried for fifteen days. The plant materials were finely ground and dried powder and used for extraction. Each 15 g of powder was transferred into conical flasks. Then 150 ml of water was added in the flasks, closed by foil paper and placed on a shaker at 37°C temperature for 72 h. The crude extracts were then filtered through Whatman No.1 filter paper and then concentrated. The concentrated extracts were subsequently dried aseptically at room temperature. After complete solvent evaporation, extract was weighed and stored in a refrigerator at 4°C for further use. 500 mg of solvent residue dissolved in 10ml of distilled water was used as the test extract for antibacterial activity assay.

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Human pathogenic bacteria such as *o* and *o o* were collected from Birsa Agriculture University, Kanke, Ranchi, Jharkhand, India. All the test bacterial species were maintained on nutrient agar media.

Antibacterial activity of aqueous extract of different parts of plant were determined by disc diffusion method on nutrient agar medium. The filter paper discs of 5 mm diameter were

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prepared using Whatman No.1 filter paper and soaked in extract. The discs dipped in respective solvent were used as negative controls. The petridishes were sterlized in hot air oven and nutrlent agar medium was sterlized by autoclaving. This media was poured in the sterile petri-dishes. After 24 h, test bacteria were spread on the solid plates with a sterile swab moistened with the bacterial suspension. The impregnated discs were aseptically placed on the solidified agar media. After 24 h of incubation at 37^{O}C temperature the culture plates were examined and the diameters of the inhibition zones were measured in mm unit.

R U T ND DI CU ION

In the present study, the antibacterial activity of the aqueous extracts obtained from different parts (leaf, bud and stem) of *o* were tested against *o o o* (Table - 1).

Figure 1 and 2 show the antibacterial effect of aqueous extract of leaf, bud and stem against *o* and respectively. All the tested bacteria responded differently against different extracts. Maximum zone of inhibition of 20 mm and Zone of Inhibition Area of 471.00 mm^2 was noticed with aqueous extract of bud of against *o* whereas leaf and stem extracts caused same inhibition zone of 15 mm and Zone of Inhibition Area of 294.38 mm^2 against *o*

The aqueous extracts of leaf, bud and stern showed antibacterial activity against (Figure 2). The stem and bud extracts exhibited same 15 mm inhibition zones and Zone of Inhibition Area of 294.38 mm^2. However, antibacterial activity was also detected with 13 mm inhibition zone and Zone of Inhibition Area of 234.72 mm^2 using leaf extract of *o* against .

From Table -1, it is seen that the aqueous extract of bud powder of showed maximum antibacterial activity against *o* but in case of S. bud and stem both have the same antibacterial manifestations.

o was found to contain many bioactive components with antibacterial activities. Further pharmacological studies are needed to separate active constituents and evaluate their anti-microbial efficacy towards broad range of microbial pathogens.

CONC U ION

Aqueous extracts of different parts of were found to be effective as a source of antibacterial agents against *o* and . . From the results obtained it was evident that this type of antibacterial evaluation has provided the accurate zone of inhibition of various bacteria. Thus the constituents of can be used for antibacterial purpose. It is used for various medical purposes. These primary extracts open the avenues for finding new clinically effective antibacterial compounds. Continued and intensive further exploration of plant-derived antimicrobials is needed today. However, the present study of *o* antibacterial evaluation of forms a primary platform for further phytochemical and pharmacological studies to discover new antibiotic drugs.

C NO D NT

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References

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.

Iwu M.W., Duncan., A.R. and Okunji C.O.,1999. New antimicrobials of plant origin. In: Janick J (editor), Perspectives on new crops and new uses. ASHS Press. Alexandria., pp. 457-462.

Schinor E.C., Salvador M.J., Ito I.Y. Dias D.A., 2007. *Brazilian J Microbiol.,* **38**

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.

Sunil Kumar, Rashmi Malhotra and Dinesh Kumar, 2010. *Euphorbia hirta:* Its chemistry, traditional and medicinal uses, and pharmacological activities. *Pharmacogn Rev.* Jan-Jul; **4** (7): 58-61.

Suresh K., Deepa P., Harisaranraj R. Vaira Achudhan V., 2008. Antimicrobial and phytochemical investigation of the leaves of *Carica papaya* L., *Cynodon dactylon* (L.) Pers., *Euphorbia hirta* L., *Melia azedarach* L. and *Psidium guajava* L. *Ethnobotanical Leaflets;***12**: 1184-9.

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Euphorbia hirta* ' *Escherichia coli* ! *Staphylococcus aureus.

Bacteria →	*Escherichia coli*		*Staphylococcus aureus*	
Parts of Plant ↓	DIZ(mm)	ZIA(mm²),	DIZ(mm)	ZIA(mm²)
Leaf (Lm)	15	294.38	13	234.72
Bud (Bm)	20	471.00	15	294.38
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.

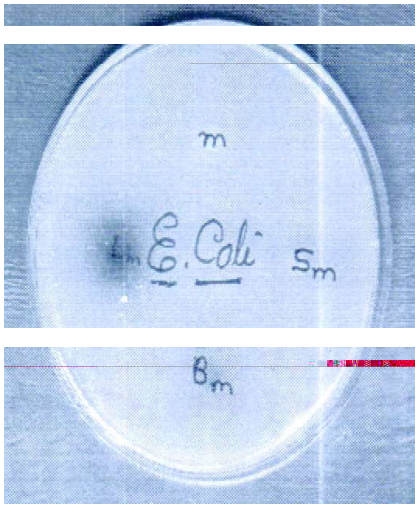

Fig. 1 : Effect of Aqueous Extract of Different Parts of *Euphorbia hirta* L. against *Escherichia coli*.

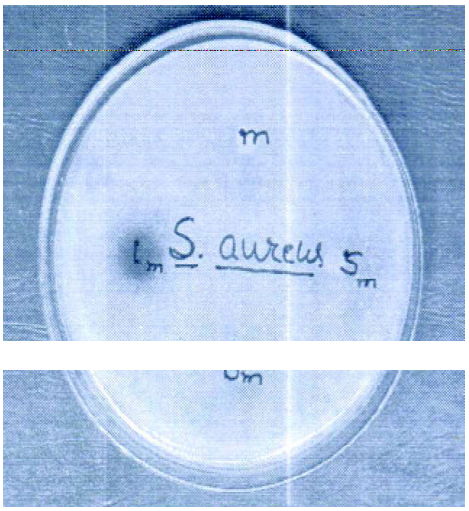

Fig. 2 : Effect of Aqueous Extract of Different Parts of *Euphorbia hirta* L. against *Staphylococcus aureus*.