



Antibacterial Activity of Bud Extract of *Euphorbia Hirta* L. Against Gram - Positive Bacteria *Staphylococcus Aureus*

KEYWORDS

Antibacterial activity, solvents, extracts, and *Staphylococcus aureus*.

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ABSTRACT *Euphorbia hirta* Linn. is a perennial herb belonging to the family Euphorbiaceae. It is medicinal plant and has established its sedative and anxiolytic activity, analgesic, antipyretic, anti-inflammatory, antidepressant for blood pressure, antihypertensive and antioxidant. It has been widely used by Tribal as traditional medicine in a treatment against infectious pathogens. Dimethyl sulfoxide, Methanol, Ethanol and Aqueous extracts of buds of *Euphorbia hirta* L. have been evaluated for antibacterial effect against *Staphylococcus aureus* using agar disc diffusion method. Methanol extract was more effective in comparison to dimethyl sulfoxide, ethanol and aqueous extract. Maximum in vitro inhibition was scored in methanol extract of bud of *Euphorbia hirta* L. which offered inhibition zone of 20 mm and Zone of Inhibition Area of 471.00 mm² against *Staphylococcus aureus*. A significant inhibition of *S. aureus* was found in dimethyl sulfoxide, ethanol or aqueous extract of *Euphorbia hirta* with same inhibition zone of 15 mm and Zone of Inhibition Area of 294.38 mm².

Introduction

Despite the existence of potent antibacterial agents, resistant or multi-resistant strains are continuously emerging, imposing the need for a continuous search and development of new drugs (Barbour et al., 2004; Machado et al., 2003; Rojas et al., 2003). The demand is increasing in plant derived drugs in recent years due to the fact that natural drugs is safe and ecofriendly than the synthetic drugs which are known to possess adverse side effects (Nair and Chanda, 2007). Current research mainly focuses on natural molecules and products from plants and can be selected based on their ethno medicinal use (Arora and Kaur, 2007). Consequently, this has led to the search for more effective antimicrobial agents among materials of plant origin, with the aim of discovering potentially useful active ingredients that can serve as source and template for the synthesis of new antimicrobial drugs (Pretorius et al., 2003, Moreillon et al., 2005).

Euphorbia hirta has been widely used by Tribal as traditional medicine in a treatment against infectious pathogens. *Euphorbia hirta* Linn. is a perennial herb belonging to the family Euphorbiaceae. It is a common weed referred to as 'garden spurge'. It is a slender-stemmed, annual hairy plant with many branches. It is widely found in India. It bears buds, flowers and fruits in all seasons. It grows heavily during rainy season. Flowers are small, crowded and numerous seen together in thick cymes about 1cm in diameter. The fruits are yellow in colour, three celled, hairy and have keeled capsules which are around 1-2 mm in diameter. They contain three four sided, brown, wrinkled and angular seeds. It has established its sedative and anxiolytic activity, analgesic, antipyretic, anti-inflammatory, antidepressant for blood pressure, antihypertensive and antioxidant. It is important in treating respiratory ailments, especially cough, coryza, bronchitis and asthma.

Gram positive bacteria - *Staphylococcus aureus* can cause a range of illnesses, skin infections, pneumonia, meningitis, osteomyelitis, endocarditis, toxic shock syndrome (TSS), bacteremia, and sepsis. Its incidence ranges from skin, soft tissue, respiratory, bone, joint, endovascular to wound infections. So to explore antibacterial activity of this herb, the research work has been carried out.

Antibacterial activity of *Euphorbia hirta* against some few bacteria associated with enteric infections was evaluated by some scientist. (El-Mahmood et al., 2009; Shanmugapriya et al., 2012; Ibrahim et al., 2012).

The purpose of the present study was to investigate the antibacterial activity of bud of *E. hirta* using different solvents against disease causing bacteria - *Staphylococcus aureus*.

Materials and Methods

Plant material

Euphorbia hirta was collected as whole plant from different locations of Ranchi district of Jharkhand, India.

Preparation of the Extract

Collected Fresh buds were cleaned for 2-3 times with tap water and distilled water followed by shade-dried, powdered and used for extraction. Each 15 g of powder was mixed to 150 mL of methanol in the flasks, closed by foil paper and placed on a shaker at 37 °C temperature for 72 hr. The crude extract was then filtered by passing the extract through Whatman No. 1 filter paper and then concentrated. After complete solvent evaporation, extracts were weighed and stored in a refrigerator at 4 °C for further use. 500 mg of solvent residue was dissolved in 10 mL of solvents were used as the test extracts for antibacterial activity assay.

Test Bacteria

Pathogenic bacteria such as *Staphylococcus aureus* was collected from Birsra Agriculture University, Kanke, Ranchi, Jharkhand, India. The test bacterial species was maintained on nutrient agar media.

Antibacterial Activity

Antibacterial activity of bud extracts using different solvent were determined by disc diffusion method on nutrient agar medium. The filter paper discs of 5 mm diameter were prepared using Whatman No. 1 filter paper, soaked in extract. The discs dipped in respective solvent were used as negative controls. The petri-dishes and nutrient agar medium was sterilized. Test bacteria was spread on the solid plates with a sterile swab moistened with the bacte-

rial suspension. Plates were incubated at 37°C for 24hrs depending upon the growth rate of the test pathogens. Antibacterial activities were determined by measuring zone of inhibition by using Himedia zone scale in mm unit.

Results and Discussion

Effect of Different Solvent Extract of bud of *Euphorbia hirta* L. against *Staphylococcus aureus* has been presented in Table-1. Different type of solvents were used such as Methanol, Ethanol, Dimethyl sulfoxide and Aqueous for studies of antibacterial activity of *E. hirta* against human pathogenic gram positive bacteria *S. aureus*. Among treatments, methanol extract showed maximum antibacterial activity with zone of inhibition of 20 mm and Zone of Inhibition Area of 471.00 mm². Further, bud extracts of *E. hirta* using dimethyl sulfoxide ,ethanol or aqueous solvent were effective against *S. aureus* which recorded same significant zone of inhibition of 15 mm and Zone of Inhibition Area of 294.38 mm² (Graph -1).

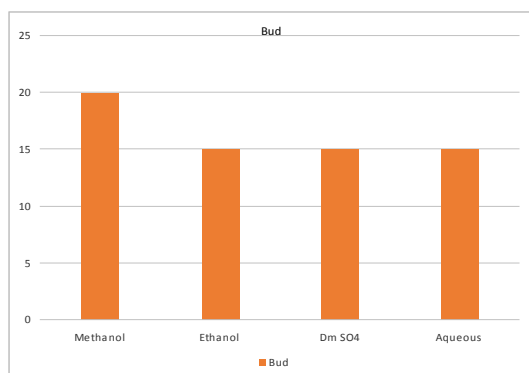
From Table -1, it is seen that the extract from bud of *E. hirta* in different solvents such as methanol ,ethanol, Dimethyl sulfoxide or aqueous, showed antibacterial activity against *S. aureus* . Methanol extract of *E. hirta* bud showed the maximum degree of antibacterial activity properties.

Table 1: Study of Diameter of Zone of Inhibition (DIZ) and Zone of Inhibition Area (ZIA) of Extracts of *E. hirta* Bud in Different Solvent against *Staphylococcus aureus* .

| Solvent | Diameter of Disc (mm) | Diameter of Inhibition including disc (mm) | DIZ (mm) | ZIA(mm ²) |
|--------------------|-----------------------|--|----------|-----------------------|
| Methanol | 5 | 25 | 20 | 471.00 |
| Ethanol | 5 | 20 | 15 | 294.38 |
| Dimethyl sulfoxide | 5 | 20 | 15 | 294.38 |
| Aqueous | 5 | 20 | 15 | 294.38 |

DIZ = Diameter of zone of inhibition in millimeter scale.

ZIA = Zone of Inhibition Area in millimeter square.



Graph 1: Antibacterial activity of Extracts of *Euphorbia hirta* Bud in Different Solvent against *Staphylococcus aureus* .

Conclusions

The result of this study showed *E. hirta* bud extracts was most effective against *Staphylococcus aureus* . The result confirms its use traditionally in treating antibacterial infections like dysentery, wound infection. These primary extracts open the possibility of finding new clinically effective

antibacterial compounds. Out of all the extracts from *E. hirta* , the methanol extract was the most active. It showed marked antibacterial activities against *Staphylococcus aureus* . This may be due to the presence of alkaloids, tannins, saponins and flavonoids , which are secondary metabolites of plants. These secondary metabolites are actually the defensive mechanisms of the plants against pathogens. However the present study of *in vitro* antibacterial evaluation of *E. hirta* forms a platform for further phytochemical and pharmacological studies to discover new antibiotic drugs.

References

- Arora,D.S and Kaur,G.J. 2007. Antimicrobial activity of some Indian medicinal plants. *Journal of Natural Medicine*.61:313-317.
- Barbour, E.K., Al Sharif, M., Sagherian, V.K., Habre, A.N., Talhouk, R.S. and Talhouk, S.N., 2004. Screening of selected indigenous plants of Lebanon for antimicrobial activity. *J. Ethnopharmacol.*, 93(1): 1-7.
- 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.
- Machado T B, Pinto A V, Pinto M C F R, Leal I C R, Silva M G, Amaral A C F, Kuster R M, Netto – dosSantos K R, 2003. *In-vitro* activity of Brazilian medicinal plants, naturally occurring naphthoquinones and their analogues, against methicillin-resistant *Staphylococcus aureus*. *Int. J. of Antimicrobial Agents* 21:279-284.
- Moreillon,P., Que,Y.A., and Glauser,M.P, 2005. *Staphylococcus aureus* (Including Staphylococcal Toxic shock). In 'Principles and Practice of Infectious diseases.' (Ed.) Mandell G.L, Bennett J.E, Dolin R. Published by Churchill livingstone Pennsylvania 6th ed. 2: 2333- 2339.
- Nair,R. and Chanda,S.V.2007.Antibacterial activities of some medicinal plants of the Western Region of India. *Turk.J.Biol.* 31:231-236.
- Pretorius, J.C., Magama S., and Zietsman P.C.,2003. Growth inhibition of plant pathogenic bacteria and fungi by extracts from selected South African plant species *South African Journal of Botany* 20: 188-192.
- Rojas R, Bustamante B, Bauer J, 2003. Antimicrobial activity of selected Peruvian medicinal plants. *J. Ethanopharm.* 88: 199-204.
- 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.