

Evaluation of Antimicrobial Activity of Methanol and Aqueous Extracts of Euphorbia Hirta L. against Gram Positive Bacteria Staphylococcus Aureus

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Abstract

The antimicrobial activity of methanol and aqueous extracts of Euphorbia hirta L. was evaluated against resistant microorganisms Staphylococcus aureus. Crude extracts from following parts of plants were utilized : leaf, bud and stem. The highest antimicrobial potentials were observed in leaf and bud extracts of Euphorbia hirta L. in methanol which inhibited the tested microorganisms with zone of inhibition of 20 mm and zone of inhibition area of 471.00 mm². Bud or stem extracts in aqueous and stem extracts in methanol offered same inhibition zone of 15 mm and zone of inhibition area of 294.38 mm². Other extracts possessed moderate effect on the test bacteria. The results obtained was interesting, This inhibition was observed with the individual extracts and they were used in different solvents.

KEYWORDS: Methanol, aqueous, antimicrobial, Euphorbia hirta L., Staphylococcus aureus.

INTRODUCTION

In last three decades, a number of synthetic drugs produced from pharmaceutical industries, resistance to these drugs by microorganisms has increased. (Schinor et al., 2007). In general, bacteria have the genetic ability to transmit and acquire resistance to drugs, which are utilized as therapeutic agents (Cohen et al., 1992). A fact is cause for concern because the number of patients who have suppressed immunity due to new bacterial strains, which are multi-resistant. To control the use of antibiotic, develop research to understand the genetic mechanisms of resistance, and to continue studies to develop antimicrobials drugs of plant origin in the treatment of infectious diseases with lesser side effects (Iwu et al., 1999, Pretorius et al., 2003, Moreillion et al., 2005, Ibrahim et al., 2012; Shanmugapriya et al., 2012). The ultimate goal is to offer appropriate and efficient antimicrobial drugs to the patient.

The use of plant bio-active compounds for pharmaceutical purposes has gradually increased in India. According to World Health Organization, medicinal plants would be the best source to obtain a variety of drugs (Santos et al., 1995). About 80% of individuals from developed countries use traditional medicine, which has compounds derived from natural plants. Therefore, such plants should be investigated to better understand their properties, safety and efficiency (Ellof et al., 1998).

The different parts of Euphorbia hirta L. widely used as anti-inflammatory, antipyretic, analgesic, antidepressant for blood pressure, antihypertensive and antioxidant. It has been used as a medicinal herb for cough, bronchitis, asthma, diarrhea, dysentery, warts, worm infestations etc. However, little attention has been given to evaluate antimicrobial activity of extracts of aerial parts of the Euphorbia hirta L.

Gram positive bacteria *Staphylococcus aureus* has been proved to be major causal organisms of various human infections such as food poisoning, nosocomial infections, wound infections and urinary tract infections . It has been selected for the present study.

The use of plant extracts with known antimicrobial properties, can be of great significance in therapeutic treatments. A number of studies have been conducted in different countries to prove the efficiency of *Euphorbia hirta* ((EI Mahmood., 2009.,Sunil Kumar et al.,2010; Suresh et al.,2008). Many plants have been used because of their antimicrobial traits, which are due to compounds synthesized in the secondary metabolism of the plant. Therefore, in the present study, *Euphorbia hirta* L. was selected to evaluate antimicrobial activity against *Staphylococcus aureus* as a source of new antimicrobials.

MATERIALS AND METHODS

Plant material

Euphorbia hirta was collected from the different places of Doranda, Ranchi district of Jharkhand , India . The plant was identified and stored . Different parts of plant were separated.

Preparation of plant extracts

Leaf, bud and stem of *Euphorbia hirta* were shade dried . The plant material were finely ground and dried powder of each parts were extracted using methanol and aqueous solvents. Filtered crude extracts were subsequently dried aseptically at room temperature. After complete solvent evaporation, extract was weighed and stored in a refrigerator at 4 °C for use . Residue 500 mg was dissolved in 10 mL of solvent (methanol and aqueous) was used as the test extract for antimicrobial activity assay.

Microorganisms and Growth conditions

The test bacteria *Staphylococcus aureus* was collected from Birsa Agriculture University, Kanke , Ranchi, Jharkhand, India. Test bacterial was cultivated on nutrient agar media.

Antimicrobial Activity

Antimicrobial activity of crude extracts of aerial parts of *Euphorbia hirta* L. using methanol and aqueous solvents were determined by disc diffusion method . Test bacteria *Staphylococcus aureus* was swabbed over sterile plates containing nutrient agar medium . Filter paper discs (5 mm in diameter) impregnated with the extracts prepared in methanol and aqueous were placed on test organism-seeded plates. After 24 h of incubation at 37 °C temperature the culture plates were examined and the diameters of the inhibition zones were measured in mm unit.

RESULTS AND DISCUSSION

Crude extracts of different parts of *E.hirta* using methanol and aqueous solvents against gram positive bacteria *Staphylococcus aureus* showed antimicrobial activity . (Table -1 and Graph - 1).

The highest antimicrobial potentials were observed in leaf and bud extracts of *Euphorbia hirta* L. in methanol which inhibited the test microorganisms with zone of inhibition of 20 mm and zone of inhibition area of 471.00 mm². Further, Bud or stem extracts in aqueous and stem extracts in methanol was effective against test bacteria which recorded significant zone of inhibition 15 mm and zone of inhibition area 294.38 mm².

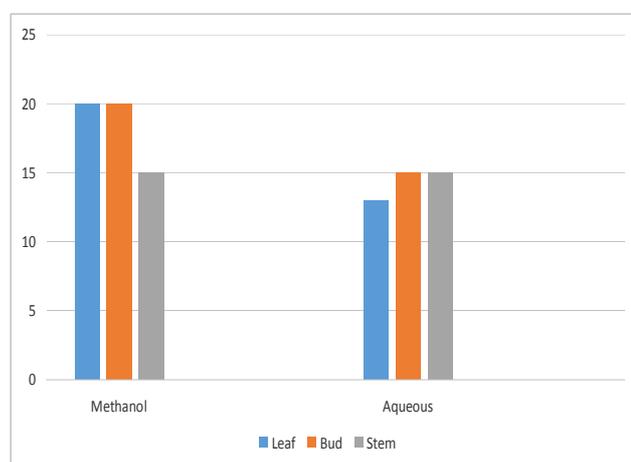
Other extracts possessed moderate effect on the test bacteria. A significant inhibition zone of *S. aureus* was found in leaf extract of *E.hirta* using aqueous showing zone of inhibition 13 mm and zone of inhibition area 234.72 mm². From Table 1, it is seen that extracts from methanol and aqueous of *E. hirta* showed antimicrobial activity against *S. aureus*. This may be due to the presence of secondary metabolites known to possess antimicrobial properties.

Table 1: Study of Diameter of Zone of Inhibition (DIZ) and Zone of Inhibition Area (ZIA) of Methanol and Aqueous extracts of different parts of *Euphorbia hirta* L. against *Staphylococcus aureus*.

Solvents→	Methanol		Aqueous	
Parts of Plant ↓	DIZ(mm)	ZIA(mm ²)	DIZ(mm)	ZIA(mm ²)
Leaf (Lm)	20	471.00	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 mil limeter scale.

ZIA = Zone of Inhibition Area in millimeter square.



Graph 1: Effect of extracts of different parts of *Euphorbia hirta* L. using Methanol and Aqueous solvents against *Staphylococcus aureus*.

CONCLUSIONS

Different aerial parts such as leaf, bud and stem extracts of *Euphorbia hirta* L. using methanol and aqueous solvents possess antimicrobial activity against *Staphylococcus aureus*. Hence, more studies pertaining to the use of plants as therapeutic agents

should be emphasized, especially those related to the control of antibiotic resistant microbes. The objective of this research was to evaluate the potential of *Euphorbia hirta* L. extracts on resistant bacteria. The potentiality of selected plant extracts varies with the types of solvents on test bacteria. Result revealed that plant extracts have great potential as antimicrobial against microorganisms. Thus, it can be used in the treatment of infectious diseases caused by resistant microbes. These primary extracts open the possibility of finding new clinically effective antibacterial compounds. *E.hirta* is used for various medical purposes. Continued further exploration of plant-derived antimicrobials is needed today. Further research is necessary to determine the identity of the antimicrobial compounds within this plant and also to determine their full spectrum of efficacy.

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