



Original Research Article

Analysis of antimicrobial compounds in *Cyperus rotundus* and *Azadirachta indica* against human pathogens

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A B S T R A C T

Keywords

Cyperus rotundus;
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Phytochemical are extensively found at different levels in many medicinal plants. The aim of the present study was to evaluate the antimicrobial activity of *Azadirachta indica* and *Cyperus rotundus* against *Staphylococcus aureus*, *Streptococcus faecalis*, *Bacillus subtilis* and *Escherichia coli*. Plant samples were collected from Virudhunagar and Ramanathapuram Districts, Tamil Nadu. Crude extracts of the dried samples were made using solvents such as butanol, ethanol, methanol, chloroform, propanol, hexane, diethyl ether and aqueous. The antimicrobial activities of plant extracts were determined by agar well diffusion method and zone of inhibition was measured. Butanol extract of *Azadirachta indica* resulted maximum zone of inhibition against *E.coli*, *S.aureus*, and *S.faecalis*. In case of *Cyperus rotundus* ethanol extract against *E.coli*, butanol extract against *B.subtilis*, methanol extract against *S.aureus* and butanol extract against *Streptococcus* results maximum zone of inhibition. Further investigation with the pure compound is required to check the accuracy of the activity which is responsible for the inhibition.

Introduction

Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources, many based on their use in traditional medicines Nair et al., (2005). Plants have a great potential for producing new drugs of great benefit to mankind Jinga et al., (2005). Medicinal plants are gifts to nature to cure number of diseases among human beings. The abundance of plants on the earth's surfaces has led to an increasing interest in

the investigation of different extracts obtained from traditional plant as potential sources of new antimicrobial agents Bonjar et al., (2004). Many plants have therefore become sources of important drugs and the pharmaceutical industries have come to consider traditional medicine as a source of bioactive agents that can be used in the preparation of synthetic medicine Aboaba et al., (2006). Naturally derived antimicrobials from plants and mushrooms could serve as sources for new

antimicrobial drugs Gibbons. (2005). The systematic screening of antibacterial plant extracts represents a continuous effort to find new compounds with the potential to act against multi-resistant bacteria Suffredini et al., (2004). *Cyperus rotundus* is a well – known plant in Indian traditional medicine Puratchikody et al., (2006). The oils of *Mentha spicata*, *Azadirachta indica*, *Eugenia caryophyllata*, *Withania somnifera* and *Zingiber officinale* exhibited moderate activity Sunita and Mahendra, (2008). This work was therefore undertaken to authenticate the plant's antibacterial potentials.

Materials and Methods

Plant materials

The plants were obtained from Virudhunagar and Ramanathapuram Districts, Tamil Nadu, India. The plants were collected during the month of January.

Preparation of Extract

The plant samples were taken and dried under shade and the dried samples were weighed and made into powder. Solvents like butanol, ethanol, methanol, propanol, hexane, diethyl ether, aqueous and chloroform are used for *Cyperus rotundus*. Solvents used for *Azadirachta indica* includes butanol, methanol, propanol, hexane and ethanol. 50gms of the plant material was taken with 500ml of solvent and was put for soxlet extraction then filtered. The filtrate was evaporated to a thick residue based on the boiling point of the solvents.

Micro-organisms Tested

The test organisms were clinical isolates which were maintained in under

refrigeration conditions. The pathogenic bacteria were cultured on nutrient broth at 37°C for 24 hours, before inoculation on Muller Hinton agar plates for well diffusion assay.

Antibacterial Testing

Antibacterial activity test was then carried out using the agar well diffusion method. Muller- Hinton agar was prepared and poured into the sterile petri plate, allowed to solidify. Organisms was swabbed on the surface of the MH agar medium and wells were punched on the medium by using 6mm cork borer, Each well in the plate was filled with 50µl of plant extract. The inoculated agar plates were incubated at 37°C for 4 hours. After incubation period the diameter of inhibition zone to each well was measured in millimeter. The inhibition zone is the area surrounding the well and there is no growth of the inoculated microorganisms. Solvents were used as controls to check its inhibitory activity against the test organisms.

Results and Discussion

In the present investigation various extracts of *Cyperus rotundus* and *Azadirachta indica* were tested against the bacterial pathogens by agar well diffusion method. The result of preliminary screening test was summarized.

Antibacterial activities for *Azadirachta indica* and *Cyperus rotundus* using various solvents against human pathogens depicted in Figure (1 and 2).

Butanol extract of *Azadirachta indica* resulted maximum zone of inhibition against *E.coli*, *S.aureus*, and *S.faecalis*. In case of *Cyperus rotundus* ethanol extract against *E.coli*, butanol extract against

Figure.1 Antibacterial activity of *Azadirachta indica*

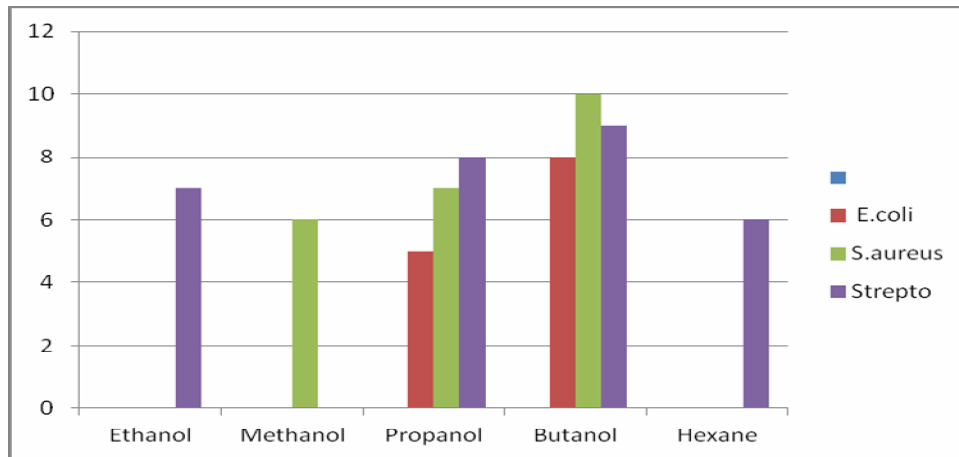
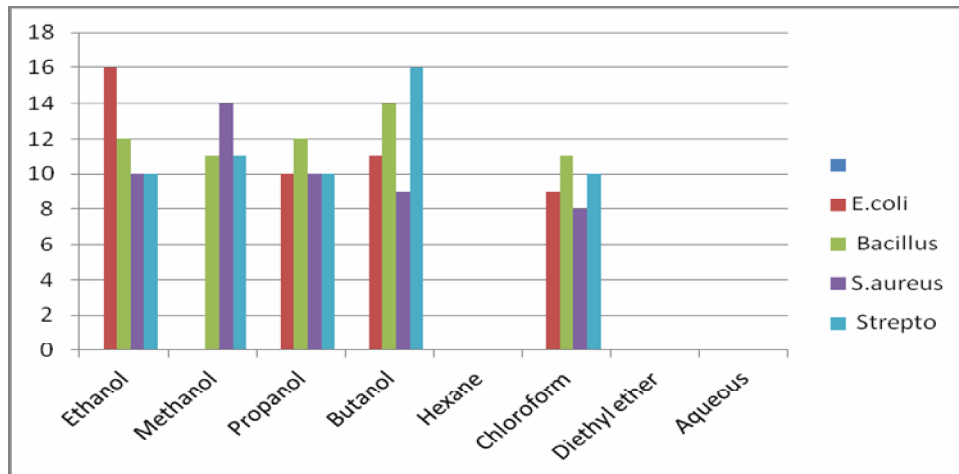


Figure.2 Antibacterial activity of *Cyperus rotundus*



B. subtilis, methanol extract against *S. aureus* and butanol extract against *S. faecalis* resulted in maximum zone of inhibition.

Several workers have reported that many plants possess antimicrobial properties including the parts which include; flower, bark, stem, leaf, etc. it has been shown that when solvents like ethanol, hexane and methanol are used to extract plant chemicals, most of them are able to exhibit inhibitory effect on both gram positive and gram negative bacteria Bushra and Ganga, (2003). In the present study butanol,

ethanol, methanol, propanol, hexane, diethyl ether, aqueous and chloroform extracts of the *A indica* and *C rotundus* were subjected to a preliminary screening for antimicrobial activity against four standard bacteria (*B. subtilis*, *E. coli*, *S. aureus* and *S. faecalis*). It is important to investigate scientifically those plants which have been used in traditional medicines as potential sources of novel antimicrobial compounds Mitscher et al., (1987).

Various workers have already shown that Gram positive bacteria are more susceptible towards plants extracts as

compared to Gram negative bacteria Lin et al., (1999) Parekh and Chanda, (2006). These differences may be attributed to fact that the cell wall in Gram positive bacteria is of a single layer, whereas the Gram negative cell wall is multilayered structure Yao et al., (1995). As mentioned above it was clear from the present study the zone of inhibition was high in gram positive bacteria than the gram negative bacteria. Butanol extract of *A.indica* resulted in maximum zone of inhibition against *E.coli*, *S.aureus* and *S.faecalis*.

The aqueous and ethanolic extracts of *Launaea procumbens* Roxb. (Labiatae), *Vitis vinifera* L. Vitaceae and *Cyperus rotundus* L. (Cyperaceae) were evaluated for antimicrobial activity against clinically important bacteria. Both, ethanolic and aqueous extracts of *Cyperus rotundus* L. showed similar activity as that of *Launaea procumbens* Roxb Jigna and Sumitra (2006). Ethanol extract of *C.rotundus* against *E.coli*, methanol extract against *S.aureus* and butanol extract against *B.subtilis* and *S.faecalis* showed maximum zone of inhibition compared to other extracts. Aqueous extract of *Cyperus rotundus* resulted in no inhibition.

It is not surprisingly that there are differences in the antibacterial activities of the extracts of the tested plants. This could be due to the phytochemical differences between plants. Further studies are needed to identify the pure component and establish the exact mechanism for antibacterial action of the plant extract.

References

Aboaba, O.O., Smith, S.I and Olude, F.O 2006. Antibacterial Effect of Edible Plant Extract on Escherichia coli

- 0157:H7, Pakistan Journal of Nutrition, 5 4: 325-327.
- Bonjar, glls and Farrokhi, P.R 2004. Antibacillus activity of some plants used in traditional medicine of Iran. Niger. J. Nat. Prod. Med, 8: 34-39.
- Bushra Beegum, N.R. and T. Ganga Devi, 2003. Antibacterial activity of selected Seaweeds from Kovalam south West coast of India. Asian Jr. of Microbiol. Biotech. Env. Sc., 53: 319-322.
- Gibbons, S 2005 . Plants as a source of bacterial resistance modulators and anti-infectious agents. Phyto. Rev, 4: 63-78.
- Jigna parekh and Sumitra Chanda 2006. In-vitro Antimicrobial Activities of Extracts of Launaea procumbens Roxb. Labiateae, Vitis vinifera L. Vitaceae and Cyperus rotundus L. Cyperaceae. African journal of Biomedical Research, 9: 89-93.
- Jigna parekh., Sumitra, V and Chanda 2008. Antibacterial Activity of Aqueous and Alcoholic Extracts of 34 Indian Medicinal Plants against some Staphylococcus species, Turk J. Biol, 32: 63-71.
- Lin,J., Opoku, A.R., Geheeb-Keller, M., Hutchings, A.D., Terblanche, S.E., Jager, A.K., van staden, J. 1999: Preliminary screening of some traditional zulu medicinal plants for anti-inflammatory and antimicrobial activities. JEthnopharmacol. 68: 267-274.
- Mitscher, L.A., S.Drake, S.R. Gollapudi and S.K. Okwute, 1987. A modern look at folkloric use of anti-infective agents. J.Natural Products, 50: 1025-1040.
- Nair,R., Kalariya, T and Chanda, S 2005. Antibacterial activity of some selected indian medicinal flora. Turk J Biol, 29: 41-47.
- Parekh, J., Chanda, S. 2006: In vitro

antimicrobial activities of extract of *Launaea procumbens* Roxb. Labiateae, *Vitis vinifera* Vitaceae and *Cyperus rotundus* Cyperaceae. *Afr. J. Biomed. Res.* 9: 89-93.

Puratchikody, A., Devi, C.N and Nagalakshmi, G 2006. Wound healing activity of *Cyperus rotundus* Linn. *Indian Journal of Pharmaceutical Sciences*, 68: 97-101.

Suffredini, I.B., Sader, H.S., Goncalves, A.G., Reis, A.O., Gales, A.C., Varella, A.D and Younes, R.N 2004. Screening of antibacterial extracts from plants native to the Brazilian Amazon Rain Forest and Atlantic Forest. *Brazilian journal of medical and biological research*, 37: 379-384.

Sunita Bansod and Mahendra Rai 2008. Antifungal Activity of Essential Oils from Indian Medicinal plants against Human Pathogenic *Aspergillus fumigatus* and *A.niger*. *World Journal of Medical Sciences*, 32: 81-88.

Yao, J., Moellering, R.1995: Antibacterial agents in *Manual of Clinical Microbiology*, Murray P, Baron E, Tenover F, Tenover F, Tenover F, Tenover F, Tenover F Eds, ASM, Washington DC, pp. 1281-1290.