

ANTIBACTERIAL ACTIVITY OF SOME IMPORTANT MEDICINAL PLANTS

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ABSTRACT

Four different medicinal plant leaf extracts i.e. *Adhatoda vasica* Nees, *Eucalyptus globulus* Labill., *Ocimum sanctum* L. and *Cymbopogon marantii* (Roxb.) Wats. prepared in water and ethanol were examined for their antibacterial activity against four pathogenic bacteria such as *Bacillus subtilis*-2699, *Escherichia coli*-2803, *Staphylococcus aureus*-2602 and *Salmonella typhi*-2501. The results of agar well diffusion assay indicated that the ethanolic leaf extract was found good inhibitory than aqueous leaf extract. The ethanolic leaf extract prepared from *Eucalyptus globules*, was shown to have better efficacy.

Keywords: Antibacterial Activity, Medicinal Plants, Pathogenic Bacteria.

INTRODUCTION

Medicinal plants represent a rich source of antimicrobial agents. Plants are used medicinally in different countries and are a source of many potent and powerful drugs (Mahesh and Satish 2008). It has been established that up to 25% of the drugs prescribed in conventional medicines are allied directly or indirectly to natural substances mostly of plant origin. In recent years, pharmaceutical companies have spent a lot of time and money in developing natural products extracted from plants, to produce more cost effective remedies that are affordable to the population (Doughari, 2006). Traditionally used medicinal plants produce a variety of compounds of known therapeutic properties. In recent years, antimicrobial properties of medicinal plants are being increasingly reported from different parts of the world. It is expected that plant extracts showing target sites other than those used by antibiotics will be active against drug-resistant microbial pathogens. However, very little information is available on such activity of medicinal plants (Ahmad and Beg, 2001). Considering the vast potentiality of plants as sources for antimicrobial drugs with reference to antibacterial agents, an investigation was undertaken to screen the antibacterial activity from some important medicinal plants.

MATERIALS AND METHODS

Collection of Plant Material

Fresh leaves of four different medicinal plants such as *Adhatoda vasica* Nees, *Eucalyptus* sp., *Ocimum sanctum* L. and *Cymbopogon marantii* (Roxb.) Wats. was collected from Medicinal Plants Garden of N.E.S. Science College, Nanded (M.S.) and identified (Naik, 1998). The voucher specimens of all the species were deposited in the department of Botany, Science College, Nanded. The plant leaves after washing with sterile distilled water were dried in shade and powdered. This powder was used for the aqueous and ethanolic extractions

Preparation of Aqueous Extracts

10 g leaf powder of each plant was boiled in 100 ml of distilled water till one fourth of the extract left behind after evaporation. On filtration of extract with muslin cloth, filtrates were centrifuged at 5000 rpm for 15 min. and supernatant was again filtered by using Whitman's filter paper No. 1 under strictly aseptic condition. The filtrates were collected in fresh sterilized bottles and stored at 4° c until further use.

Preparation of Ethanolic Extracts

The ethanolic extraction was done by soxlet apparatus, 10 g of air dried powder of selected plant leaves were thoroughly mixed with 80% ethanol and extracted with the help of soxlet apparatus. After extraction the crude extracts were dissolved in dimethyl sulphoxide (DMSO) @ 500µg/ml and stored at 4°c until further use.

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The Pathogenic Bacteria Selected for the Study Were

Bacillus subtilis-2699, *Escherichia coli*-2803, *Staphylococcus aureus*-2602 and *Salmonella typhi*-2501. All the bacterial cultures were brought from National Collection of Industrial Microorganisms (NCIM), Pune and cultures were maintained on suitable nutrient medium.

Determination of Antibacterial Activity

In-vitro antibacterial activities of all aqueous and ethanolic leaf extracts were determined by agar well diffusion method (Parez *et al.*, 1990) on nutrient medium. Pre-prepared nutrient agar plates were inoculated with test bacteria by spreading loopful of bacterial inoculums (24 hr broth culture) on surface of the media. Five mm diameter wells were punched in the agar. Solvent extracts (10mg) were mixed with 1 ml of Dimethyl sulfoxide (DMSO) and 0.5 ml of this solution was added into the well. Well containing sterile distilled water and DMSO alone act as negative control for aqueous and solvent extracts respectively. Antibiotic streptomycin (100µg/ml) acts as positive control. The plates were incubated at 37±2C° in bacteriological incubator for 48 hr. The zone of inhibition was measured and recorded.

RESULTS AND DISCUSSION

Results presented in Table-1, 2 revealed that the ethanolic leaf extracts was found very good inhibitory than aqueous extracts. Antibacterial activity of aqueous leaf extracts of four different plants, extract prepared from *E. globulus* and *O. sanctum* was showed inhibitory activity against these pathogenic bacteria. Leaf extract prepared from *E. globulus* was found effective against *B. subtilis*, *E. coli* and *S. typhi*. Extract prepared from *O. sanctum* was showed good inhibitory activity against these bacteria.

Table 1: Antibacterial activity of some medicinal plants (Aqueous leaf extracts)

Bacteria	Zone of inhibition (mm)				Control (water)	Positive Control (Streptomycin)
	<i>Adhatoda vasica</i>	<i>Eucalyptus globulus</i>	<i>Ocimum sanctum</i>	<i>Cymbopogon martinii</i>		
<i>B. subtilis</i>	-	10	08	07	-	30
<i>E. coli</i>	7	12	08	07	-	40
<i>S. aureus</i>	-	-	-	-	-	34
<i>S. typhi</i>	-	07	06	-	-	32

Table 2: Antibacterial activity of some medicinal plants (Ethanolic extracts)

Bacteria	Zone of inhibition (mm)				Control (DMSO)	Positive Control (Streptomycin)
	<i>Adhatoda vasica</i>	<i>Eucalyptus globulus</i>	<i>Ocimum sanctum</i>	<i>Cymbopogon martinii</i>		
<i>B. subtilis</i>	-	17	15	07	-	30
<i>E. coli</i>	10	22	10	12	-	40
<i>S. aureus</i>	-	28	12	22	-	34
<i>S. typhi</i>	-	16	10	08	-	32

Antibacterial activity of ethanolic leaf extracts from different medicinal plants was depicted in Table-2. It is clear from table, that the four pathogenic bacteria were highly sensitive to the leaf extract prepared from *E. globules*. The bacterium *S. aureus* was highly sensitive to the ethanolic extract prepared from *E. globules* when compared with other bacterial species (Ayepola and Adeniyi, 2008). The ethanolic extract prepared from *O. sactum* and *C. martini*were also showed good inhibitory activity against pathogenic bacteria. Similar results were also observed by Rathod *et al.*, (2012) in case of four bacterial species i.e. *B.subtilis*, *S.aureus*, *Klebsiella pneumoniae*and *E.coli*. *O. sactum* leaves are reported to exhibit insecticidal and antibacterial activities (Nanasombat and Lohasupthawee, 2005). The crude plant and its extracts are used in various infections and as a cough remedy and expectorant based on the traditional

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experience (Pratibha *et al.*, 2005). The bacteria *E. coli* was sensitive to the ethanolic leaf extracts prepared from all the four plant.

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