Comparative study of antibacterial activity of leaf extracts from Mangifera indica L. and Psidium guajava L. against the urinary pathogens

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ABSTRACT

The ethanol and methanol extracts of Mangifera indica L. and Psidium guajava L. were evaluated for antibacterial activity by agar well diffusion method and broth dilution methods against urinary isolates viz., Gram positive organism: Staphylococcus aureus; Gram negative organisms: Escherichia coli and Klebsiella pneumoniae. Both the extracts of Psidium guajava L. showed the highest bactericidal activity when compared to the ethanol and methanol extracts of Mangifera indica L. against the Staphylococcus aureus and Escherichia coli but not against Klebsiella pneumoniae.

Key words: Antibacterial, Mangifera indica, Psidium guajava, urinary pathogens

INTRODUCTION

Since ancient times, plants have been a veritable source of drugs; man tends of ignore the importance of herbal medicine. Research work on medicinal plants is intensified and information on these plants be exchanged. This thought will go a long way in the scientific exploration of medicinal plants for the benefit of man and is likely to decrease the dependence or importance of drugs. Mangifera indica L. is one of the most important tropical plants marketed in the world. There are many traditional medicinal uses for the bark, roots and leaves of Mangifera indica throughout the globe. This plant was listed in TRAMIL (Program of Applied Research to Popular Medicine in the Caribbean) as an agent for the treatment of diarrhea, fever, gastritis and ulcers and possess numerous therapeutic uses including analgesic, anti-inflammatory, immunostimulant, antioxidant, spasmolytic, dyslipidemic, anti-diabetic, anti-amoebic, anti-helminthic, anti-allergic and antibacterial applications. The boiled water extract of guava plant leaves and bark are used in medicinal preparations which are utilized as remedies for dysentery, diarrhea and upper respiratory tract infections. In Malaysia, Psidium guajava L. is used for stomach ache and gastroenteritis. Leaf, root and bark extracts are used for treatment of diarrhea, leucorrhoea, cholera, external ulcers and skin diseases. In the present study, antimicrobial potentiality of the Mangifera indica and Psidium guajava was investigated against the organisms isolated from Urine specimen.

MATERIALS AND METHODS

Plant material
Mangifera indica L. and Psidium guajava L. leaves were collected from the Chennai city and the leaves were washed with distilled water followed by alcohol and it were air dried at room temperature.

Extraction
Leaves were powdered and stored in air tight bottles at 4°C. The powdered samples (20 g) were extracted using ethanol and methanol. The filtrates were then concentrated in vacuum at 40°C and stored at 4°C for the antimicrobial assay.

Microorganisms studied
Gram positive and Gram negative bacteria were isolated from urine specimens and the isolates were maintained in nutrient agar slant at 4°C.

Gram positive bacteria: Staphylococcus aureus
Gram negative bacteria: Escherichia coli, Klebsiella pneumoniae

Preparation of stock solution
The obtained extracts were reconstituted by dissolving 250 mg. of the respective leaf powder in 1ml. of dimethyl sulfoxide in screw capped tubes in case of primary screening of plant solvent extracts. For determining the MIC of plant extracts stock solution was prepared at a concentration of 800 mg. of the respective leaf powder in 1 ml. of dimethyl sulfoxide in screw capped tubes. It was then stored at 4°C.

Primary screening for antibacterial activity
The antibacterial assay of the leaf extracts was performed by agar well diffusion method. The media (Mueller Hinton Agar No.2), along with the inoculums (10⁴ cfu/ml), was poured into the petri plate (Hi Media). The cultures were grown for 24 hours, and the turbidity of the culture was maintained according to the 0.5 McFarland Standards. For the agar well diffusion method, 5 wells were prepared in the plates with a cup-borer (0,8 cm) and different quantity of the stock solution i.e. 250 mg/ml was pipette directly into each well (200µl, 150µl, 100µl, 50µl). Controls were maintained in the fifth well that comprised pure solvents instead of the extract. The plates were incubated overnight at 37°C. Antibacterial activity was determined by measuring the diameter of the zone of inhibition surrounding bacterial growth. Gentamycin, Erythromycin, Tetracyclin, Penicillin, Ceftriazone and Cefazimide (10-32 µg) were used as reference standards.

Determination of minimal inhibitory concentration (MIC) and minimal bactericidal concentration (MBC)
Broth dilution method was used to determine the MIC and MBC of both ethanolic and methanolic extracts of the plant leaves. 800mg/ml of the stock solution was taken and then serially diluted to get various concentrations viz., 400 mg/ml, 200 mg/ml, 100 mg/ml, 50 mg/ml, 25 mg/ml, 12.5 mg/ml. 10µl of test bacterial strain was inoculated in the tubes and incubated at 37°C for 18 hours. Observations were performed at least in duplicate and results were expressed as the lowest concentration of plant extracts that produced a complete suppression of colony growth, MIC. Minimal bactericidal concentration using agar dilution method in petri plates with Millipore filter was performed with the extracts that gave significant MIC values against each bacterial strain.

RESULTS
In the present study Mangifera indica L. and Psidium guajava L. leaf extracts extracted in ethanol (MEE, PEE) and methanol (MME, PME) were investigated at four different concentrations for their antimicrobial potentiality against three clinically important microbial strains isolated from urine specimen. The antibacterial assay of the leaf extracts was performed by agar well diffusion method in which different concentrations of the extracts were used. But in the present study different quantity of the stock solution was used (Table I & II). The ethanol extract and methanol extract of Mangifera indica L. (MEE, MME) and Psidium guajava (PEE, PME) exhibited antibacterial activity against S. aureus and E. coli, but not against K. pneumoniae. Among the extracts, MEE...
extract exerted highest activity on bacterial isolates tested compared to that of MME. Among the extract obtained from Psidium guajava L., the ethanol extract (PEE) exerted highest activity on bacterial isolates tested compared to that of the methanol (PME) extract. The inhibitory activity of the ethanol extract of the plant leaves is attributable to the ability of ethanol to extract essential oils which are inhibitory to the organism. The antibacterial activity of the standards were tested and reported. (Table III)

MIC and MBC was done by following the method Ajayiobu et al.36 In this case, different concentration of the extracts was prepared. The MBC values were in the range of 200mg/ml to 400mg/ml. The lowest MBC values of 400mg/ml. was recorded by the MEE extract against S. aureus. There was no bactericidal activity concerned with MME against E. coli. The lowest MBC values of 200mg/ml was recorded by the PPE extract against S. aureus and E. coli. The maximum values of 50mg/ml by the PEE extract against S. aureus (Table IV & V).

**CONCLUSION**

The present study has proven that the respective Mangifera indica L. and Psidium guajava L. leaf extract possessed antibacterial activity and thus provides the initial steps for further isolation and identification of antibacterial agents from these plants.

**REFERENCES**


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