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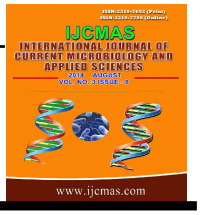

Original Research Article

Evaluation of the antimicrobial potential of various solvent extracts of *Murraya koenigii* (Linn.) Spreng leaves

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Keywords

Antimicrobial activity, *Murraya koenigii*, Solvent extraction

A B S T R A C T

In the present study, the antibacterial and antifungal investigations were carried out with the crude extracts obtained from the leaves of *Murraya koenigii* using different solvents like petroleum ether, chloroform, ethyl acetate, acetone, methanol and water. The effect of different extracts were tested on gram positive bacteria like *Bacillus subtilis* and Gram negative bacteria, *Salmonella typhi, E. coli* and the fungus, *Shigella sonnei* and C*andida utilis* by *in vitro* agar well diffusion method. This study scientifically supports the usage of leaves of *Muraya koenigii* as a remedy for various superficial bacterial and fungal infections.

Introduction

Medicinal plants are the nature's gift to human being to make disease free healthy life. Herbal medicine is still the mainstay of about 75–80% of the whole population, mainly in developing countries, for primary health care because, better compatibility with the human body and fewer side effects (Barmet, 1992). In India, thousands of species are known to have medicinal values and the use of different parts of several medicinal plants to cure specific ailments has been in vogue since ancient times (Parekh *et al.*, 2005). From over 3, 00,000 species of higher plants, only about 2 per cent have been screened so for. Extract of plants from 157 families have been reported to be active against microorganisms (Lakshmanan, 1990; Ravishankar, 1990).

Murraya koenigii (Linn.) Spreng., a member of the family Rutaceae, is a deciduous to semi-evergreen aromatic tree found throughout India. Traditionally, it is used as an analgesic, febrifuge, stomachic, carminative and for the treatment of dysentery and skin eruptions (The Wealth of India., 1962; Chakraborty *et al.*, 1965). Curry leaf tree is commonly used as spice due to the aromatic nature of leaves. Carbazole alkaloids (Ito *et al*., 1993), the major constituents of the plant are known to possess cytotoxic, antioxidative, antimutagenic and anti-inflammatory activities (Chakraborty *et al*., 1997; Arulselvan and Subramanian, 2007; Dutta, 1958).

The leaves are rich in mono-terpenoids and ses-quiterpenoids which exhibited antifungal activities (Goutam and Purohit, 1974). Minor furano-coumarins are also reported from seeds (Adebajo and Reisch, 2000). In the present investigation, an attempt was made to investigate the antimicrobial activities of leaf extracts of *M. koenigii* against pathogenic microorganisms. In recent years, a large number of plant products have been investigated for their antimicrobial properties against bacteria and fungi. The study will also confirm if there is a biological basis to the claim that the ethnomedicinal plant has useful medicinal purposes (Cowan, 1999). In the worldwide as well as in the developing countries, the most human death is due to infectious bacterial diseases (Nathan, 2004). The bacterial organisms including Gram positive and Gram negative viz. *Bacillus subtilis, Salmonella typhi* and *Echerichia coli* are the main source to cause severe infections in humans.

Materials and Methods

Collection of plant material

The leaves of *M. koenigii* were collected from the Botanical Garden, Department of Botany, Annamalai University, Annamalai nagar, Chidambaram, Tamilnadu, during the month of November, 2013. Leaves were separated and washed thoroughly with running tap water followed by rinsing with distilled water, were shade dried at room temperature then pulverized into powder and stored in an air tight container till further use. The plant material was identified and authenticated by Dr. V. Venkatesalu, Head of the Department of Botany (DDE), Annamalai University.

Preparation of extracts

The dried powdered sample was successively extracted with petroleum ether, chloroform, ethyl acetate, acetone, methanol and Water in soxhlet apparatus and stored at 4 ºC and used for further study.

Test organisms

Gram positive bacteria, *Bacillus subtilis*, gram negative bacteria, *Salmonella typhi*, *Escherichia coli* and fungus, *Shigella sonnei*, and *Candida utilis* were used as test organisms for this study. All these pathogenic strains were obtained from the Department of Medical Microbiology, Rajah Muthaiya Medical College & Hospital, Annamalai University, Annamalai nagar. The stock cultures were maintained on nutrient agar slants at 4^{o}C and then sub-cultured in nutrient broth at 37^{o}C prior to each antimicrobial test.

Antimicrobial assay

Antimicrobial susceptibility test was done using the agar well diffusion method to detect the presence of anti bacterial and anti-fungal activities of the plant samples (Perez, 1990). Nutrient Agar (Hi-media) for bacteria and Sabouraud's Agar (Hi-media) for fungus were prepared according to the manufacturer's instructions. The antibacterial activity of leaf extracts was determined by agar well diffusion method. Nutrient agar slants after solidification was inoculated with the test microorganisms, by spreading the bacterial inoculums under aseptic conditions. Wells of 5mm diameter were punched in the agar medium with sterile cork borer and filled with plant extract. Streptomycin for bacteria and fluconazole for fungus were used as positive controls. The plates were incubated at 37ºC for 24 hrs. The negative control was added without adding the cultures to know the sterile conditions. The antibacterial activity was assessed by measuring the diameter of the zone of inhibition for the respective plant extract and antibiotics.

Results and Discussion

The presence of antifungal and antimicrobial substances in the higher plants is well established as they have provided as a source of inspiration for novel drug compound as plant derived medicines have made significant contribution towards human for the treatment of diseases as done in the cases of Unani and Ayurvedic systems of medicines.

In the present study, we evaluated the antibacterial and antifungal activities of the crude extracts obtained from the leaves of *Murraya koenigii* using different solvents like petroleum ether, chloroform, ethyl acetate, acetone, methanol and water against *Bacillus subtilis, Salmonella typhi, E. coli, Shigella sonnei* and *Candida utilis*. The results of antimicrobial activities are presented in Table-1. In this study, different extracts of leaves have potent antimicrobial activity against gram positive and gram negative bacteria were equally affected by the leaf extract of *Murraya koenigii* indicating the presence of broad spectrum of antibacterial substance in the plant.

Table.1 Antimicrobial activity of leaves of *Murraya koenigii*

Organic Extracts	Concentration (μg/ml)	Zone of inhibition (mm)				
		Bacillus subtilis	*Salmonella typhi*	*Escherichia coli*	*Shigella sonnei*	*Candida utilis*
Petroleum ether	25	10	9	8	10	NA
	50	8	10	9	10	NA
	100	5	12	10	12	NA
	Control	0	0	0	0	NA
Chloroform	25	8	8	12	8	NA
	50	9	10	14	10	NA
	100	10	12	16	12	NA
	Control	0	0	0	0	NA
Ethyl acetate	25	9	10	8	9	NA
	50	8	11	9	10	NA
	100	8	13	9	11	NA
	Control	0	0	0	0	NA
Acetone	25	11	8	10	11	9
	50	10	12	13	12	10
	100	8	10	14	12	12
	Control	0	0	0	0	0
Methanol	25	10	10	13	13	NA
	50	12	11	14	15	NA
	100	13	13	16	16	NA
	Control	0	0	0	0	NA
Aqueous	25	9	8	9	8	8
	50	10	9	10	12	9
	100	9	10	10	8	9
	control	0	0	0	0	0
Standard Antibiotic		15	17	18	18	20

*Values are mean of three replicates.
*Standard Antibiotic Streptomycin 5 μg/ml for Bacterial Strain.
*Standard Antibiotic Fluconazole 5 μg/ml for Fungi.
*NA- No activity

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