



E-ISSN: 2278-4136
P-ISSN: 2349-8234
JPP 2016; 5(3): 101-105
Received: 16-03-2016
Accepted: 18-04-2016

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Evaluation of anti-microbial activity of leaf and bark extracts of *Murraya koenigii* (curry leaves)

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Abstract

Aim of the study is to evaluate the Anti-Microbial activity of *Murraya Koenigii*. It is an aromatic more or less deciduous shrub or a small tree. It shares the aromatic nature. It is a plant which has important uses in traditional system of medicine. Leaves are used internally in dysentery also checking vomiting. Steam distillate of the leaves can be used as stomachic & purgative and bark powder is used as tonic, stomachic, & carminative.

In the present study preliminary phytochemical screening was performed for Ethanolic leaf and bark extracts and results showed the presence of carbohydrates, alkaloids, tannins & saponins. These extracts were screened for their anti-microbial activity against the pathogens namely *Staphylococcus aureus*, *Proteus vulgaris*, *Enterobacter aerogenes* & *Lactobacillus* by agar cup-plate method. The pattern of inhibition varied with both the extracts and the microorganism tested. Among these extracts, Ethanolic bark extract showed the significant anti-bacterial activity against most tested microbes. The most susceptible micro-organism was *Staphylococcus aureus* followed by *Proteus vulgaris* and *Enterobacter aerogenes*.

Keywords: Anti-microbial activity, *Murraya Koenigii*, Phytochemical, Streptomycin, Zone of inhibition.

Introduction

Murraya koenigii is an aromatic more or less deciduous shrub or a small tree up to 6m in height and 15-40cm in diameter. It commonly called as 'curry leaf plant' in English and locally known as "karivepaku" belongs to the family Rutaceae^[1].

It is a tree growing throughout India up to an altitude of 1500m commonly in forests often as gregarious under growths^[2]. It also grows in Srilanka & other south Asian countries. It is found almost everywhere in the Indian subcontinent. It shares the aromatic nature^[3]. It is a plant with short trunk, thin smooth grey or brown bark and dense shady crown. Most part of plant is covered with fine down and has a strong peculiar smell. *Murraya koenigii* is having grey colour back, longitudinal striations on it and beneath it white back is present. Leaves are bipinnately compound, 15-30cm long each bearing 11-25 leaflets alternate on rachis, 2.5-3.5cm long ovate lanceolate with an oblique base. Margins irregularly create, petioles 2-3mm long, flowers are bisexual, white, funnel shaped, sweetly scented, stalked, complete, ebracteate, regular with average diameter of fully opened flower being in average 1.12cm inflorescence terminal lymes each bearing 60-90 flowers. Fruits are ovoid to subglobose, wrinkled or rough with glands. It is having the size of 2.5cm long & 0.3cm in diameter and gets purplish black when ripen. Fruits are generally bi seeded seeds occur in spinach green colour, 11cm long, 8mm in diameter & weighs up to 445mg^[2].

Natural Habitat

The plant is distributed and cultivated throughout India. It is found wild from Sikkim to Garhwali, Bengal, Assam, Western Ghats and Travancore-cochin. Propagation is done by seeds, which germinate freely under partial shade^[3].

Medicinal Uses

Murraya koenigii is a plant which has important uses in traditional system of medicine in eastern Asia^[4]. Based on ethano medicine, *M. koenigii* is used as stimulant, anti dysentric and for the management of diabetes mellitus. The leaves, root, & bark are tonic, stomachic, & carminative. Leaves are used internally in dysentery also checking vomiting^[5]. Leaves are applied externally to bruises and eruption.

The leaves & roots are bitter, acrid, cooling, anti-helminthic, analgesic. It cures piles, allays heat of body, thirst, inflammation & itching. An infusion of the toasted leaves is used to stop vomiting. Fruits are also considered as astringent in indo-china. Crushed leaves are applied externally to cure skin eruptions and to relieve burns. The fruits are known to have high nutritional values with many medicinal properties. Branches of *M. koenigii* are used to strengthen gums & teeth's. It has also been used as an anti- periodic and many a time the powdered dry leaf, mixed with honey and juice of betel nut, is recommended in the ayurvedic system of medicine [1].

Plant Profile

Plant Taxonomy

Kingdom – Plantae

Sub-kingdom – Tracheobionta

Super division – Spermatophyte

Division – Magnoliophyta

Class – Magnoliopsida

Subclass – Rosidae

Order – Sapindales

Family – Rutaceae

Genus – *Murraya J. Koenig ex L*

Species – *Murraya koenigii L.*, Spreng [1]



(A)



(B)



(C)

Fig 1: Morphology of *Murraya koenigii* plant along with A) flowers B) fruits & C) bark

Methodology

Materials

Collection of plant materials: Leaves and bark of *Murraya koenigii* were collected from Sircilla, karimnagar district. The identity of the plant was confirmed by M. Ahmedullah Scientist incharge (BSI/DRC/16-17/Tech./06)

Selection of bacterial strains

Medically important bacterial strains used in this study were staphylococcus aureus, lacto bacillus, proteus vulgaris, & Enterobacter aerogenes which were procured from MTCC [IMTECH], Chandigarh, India.

Standard reference antibiotic

The reference antibiotic used is streptomycin.

Drugs and chemicals

Streptomycin (Piramal healthcare limited), Di methyl sulfoxide (Merck life sciences [p] Ltd), Ethanol (Merck life sciences [p] Ltd), Agar medium (Himedia laboratories Pvt Ltd), Broth (Central drug house Pvt. Ltd) was used during the experiment.

Equipments

Hotairoven (Teknik), Autoclave (Teknik), Laminar air flow chamber (ROLEX), Incubator (Teknik), Desiccator (ROLEX), Rotary shaker (REMI).

Methods

Preparation of extracts

The plant material (leaves and bark) were shade dried and powdered by a mechanical grinder. The dried powders were then extracted with ethanol to give their extracts respectively. The plant material (leaf and bark) about 10gms each was sequentially extracted with ethanol (150ml) by maceration process for 5 days at room temperature. The obtained extracts were filtered by using whatmann no.1 filter paper. The extracts were evaporated to obtain syrupy solution. The extraction values of the extracts were calculated.

Results

Extractive values

Table 1: Ethanolic extract percentage yield values of Leaf and Bark of *Murraya Koenigii*.

Plant extract	% yield of leaf (w/v)	% yield of bark (w/v)
Ethanol	70%	45%

Organoleptic properties

The colour, texture and odour of the leaf and bark extracts in ethanol solvent were characterised.

Table 2: Organoleptic properties of leaf

Plant extract	Colour	Odour	Texture
Ethanol	Blackish green	Characteristic	Sticky

Table 3: Organoleptic properties of bark

Plant extract	Colour	Odour	Texture
Ethanol	Brown	Characteristic	Sticky

Table 4: Results of phytochemical screening

Name of phyto constituent	Ethanol	
	Leaf	Bark
Alkaloids	+	+
Glycosides	-	+
carbohydrates	+	+
Amino acids	-	-
Tannins	+	+
Steroids	-	+
Flavonoids	+	+
Saponins	-	-
Mucilage	-	-

Table 5: Antibacterial activity of leaf extract of *Murraya koenigii*

Name of organism	Conc. mg/ml	Zone of inhibition	Streptomycin(std) DIZ(mm)
		Ethanol DIZ(mm)	
Staphylococcus aureus	10	11	22
	20	13	24
Proteus vulgaris	10	11	22
	20	14	23
Enterobacter aerogenes	10	11	24
	20	12	23
Lacto bacillus	10	10	22
	20	13	23

Table 6: Antibacterial activity of bark extract of *Murraya koenigii*

Name of Organism	Conc. mg/ml	Zone of inhibition	Streptomycin(std)
		Ethanol DIZ(mm)	
Staphylococcus aureus	10	11	24
	20	15	22
Proteus vulgaris	10	12	22
	20	14	23
Enterobacter aerogenes	10	12	23
	20	14	24
Lacto bacillus	10	11	22
	20	14	23

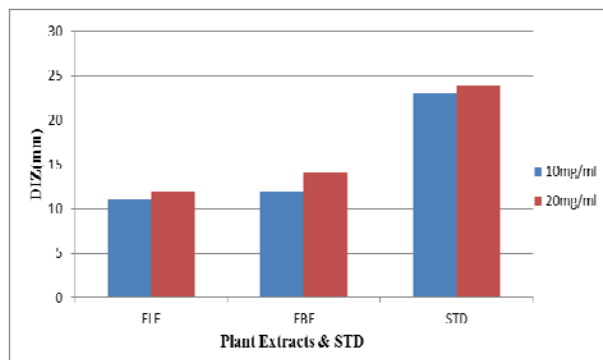


Fig 1: Antibacterial activity of leaf and bark extracts on staphylococcus aureus

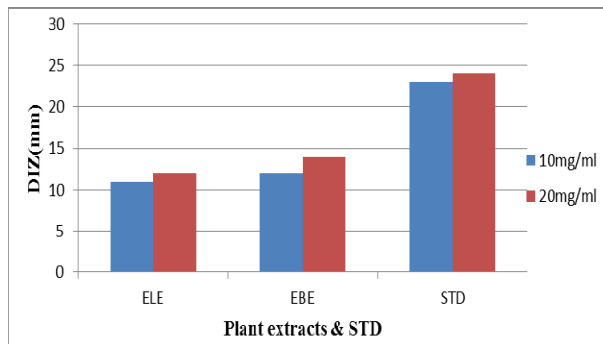


Fig 2: Antibacterial activity of leaf and bark extracts on proteus vulgaris

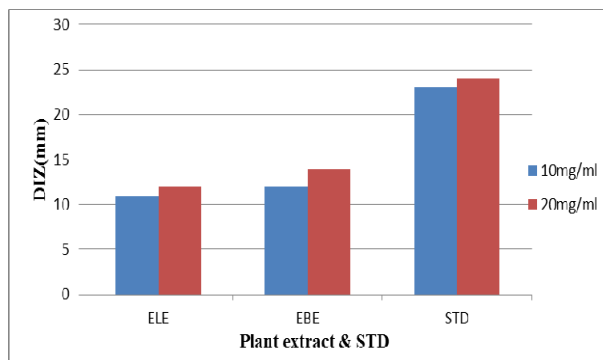


Fig 3: Antibacterial activity of leaf and bark extracts on Enterobacter aerogenes

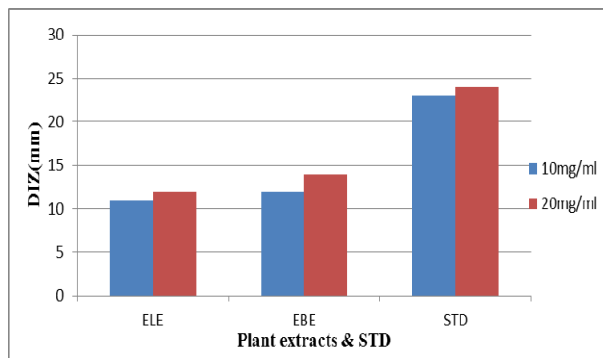
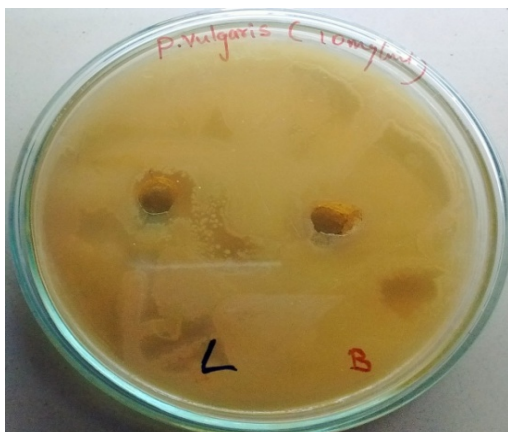


Fig 4: Antibacterial activity of leaf and bark extracts on Lactobacillus



Discussion

The different extracts of leaf and bark powders were subjected for phytochemical analysis and anti-bacterial activity and the results were investigated. Phytochemical screening of crude extracts of leaf and bark revealed the presence of alkaloids, carbohydrates, glycosides, tannins, saponins, flavonoids, & steroids.

The results of antibacterial screening by agar cup plate method indicates the highest antibacterial activity was shown by Ethanolic bark extract against staphylococcus aureus. Ethanolic bark extract showed the antibacterial activity against all the organisms except the lactobacillus, that which exhibited the greater microbial activity.

Ethanolic leaf extracts showed good antibacterial activity against the proteus vulgaris. Leaf extract showed the antibacterial activity against all the organisms except the lactobacillus, that which exhibited the greater microbial activity.

Standard antibiotic streptomycin was effective against all the organisms and showed a zone of inhibition of 22-25 mm.

The results of the investigation showed that the bark extract of *Murraya koenigii* have good antibacterial activity against staphylococcus aureus, proteus vulgaris, enterobacter aerogenes, & lactobacillus due to the presence of alkaloids, carbohydrates, flavonoids & tannins.

Summary & Conclusion

The plant *Murraya koenigii* was collected from the area of karimnagar district, Telangana. The dried aerial parts of the plant was cut into small pieces and powdered by a mechanical grinder and subjected to the maceration process by using ethanol as the solvent. Then it is distilled to get a concentrated mass. Phytochemical investigation was done.

The work states the presence of alkaloids, carbohydrates, tannins & saponins in the extracts of *Murraya koenigii* which were responsible for its antimicrobial activity. These extracts exhibit the maximum zone of inhibition against staphylococcus aureus, proteus vulgaris and enterobacter aerogenes. It is interesting to observe the result of high antibacterial effects of Ethanolic leaf and bark extracts.

This study gives the way for the further attention and research to identify the active compounds responsible for the plant biological activity. Further research needs in the angle whether the phytochemical could be useful to treat other diseases

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