

Evaluation of the Phytochemical and Antibacterial Properties of leaf extracts of *Murraya koenigii* L.(Spreng) against pathogenic bacteria.

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ABSTRACT: The aim of the present study was to investigate the phytochemical screening and antibacterial activity of methanol, petroleum ether, aqueous and chloroform extracts prepared from leaves of *Murraya koenigii* L. The antibacterial activity was assessed using the agar well diffusion assay against tested bacterial strain, *Escherichia coli*. The phytochemical analysis revealed that *Murraya koenigii* L. had most of the significant phco-constituents like alkaloids, terpenoids, flavonoids, saponins, tannins, phenol and carbohydrate. Zone of inhibition was measured and compared with standard antibiotic streptomycin. The outcome of the present work showed that the aqueous extracts presented higher zone of inhibition (6 mm) than petroleum ether extracts (5 mm), methanol extracts (3 mm) and chloroform extracts (2 mm). The result divulged the presence of antibacterial activity of different extracts of *Murraya koenigii* L. against human pathogenic bacteria. Thus, this plant has many active compounds which can be used for the development of various potent drugs.

Key Words: *Murraya koenigii* L, Phytochemical tests, *Escherichia coli*, Antibacterial activity, agar well diffusion

INTRODUCTION

Medicinal plants are naturally gifted with invaluable bioactive compounds which form the backbone of traditional medicine. Medicinal plants are the main source of traditional medicine and the materials used are easily available in rural areas as well as cheaper than modern medicine (Mann *et al.*, 2008). Traditional use of plants has led to investigate their bioactive compounds, which have resulted in the detection of a significant number of therapeutic properties (Sharma *et al.*, 2010). There has been gradual revival of interest in the use of medicinal plants in developed as well as developing countries. Plant derived drugs have been reported to be safe and without side effects while synthetic drugs can cause health problems in people who consume them (Ahmad and Beg, 2001). Many medicinal plants have been tested for their antioxidant potential (Chan *et al.*, 2007). Due to prolonged use of synthetic drugs, there is increase in resistance of pathogens present in the human body. Plant derived drugs are good source of antioxidants, antibiotics and anti-inflammatory agents (Mathur *et al.*, 2011).

Murraya koenigii L. is an aromatic shrub or small tree found throughout India and commonly known as curry leaf. The leaves are broad, pinnate and flowers are small, white in colour and fragrant. It has been investigated that leaves of this plant contains volatile oil, sesquiterpene, xanthoxine, glycozoline and alkaloids. It has important uses in traditional system of medicine, used as stimulant, anti dysenteric and for the management of diabetes mellitus. The root, bark and leaves are used in tonics; leaves are applied externally to bruises and eruption and also checks vomiting (Muthumani *et al.*, 2009). The leaves and roots are cooling, anti-helminthic, analgesic, hepatoprotective, cure piles, allays heat of body, inflammation & itching. Fruits are known to have high nutritional values with many medicinal properties and also considered as astringent. *Escherichia coli*, a Gram-negative, rod shaped and pathogenic bacteria which normally lives in the intestines of humans. *E. coli* causes intestinal diseases (gastroenteritis), neonatal meningitis and urinary tract infections in humans. With an increase in the antibiotic-resistant strains of microorganisms, there is need of new antimicrobial substances from different sources, including medicinal plants (Bauer *et al.*, 1996).

The aim of present study is to determine the phytochemical analysis and antibacterial activity of various extracts of *Murraya koenigii* leaves against pathogenic bacteria.

MATERIALS AND METHODS

Plant Materials

Murraya koenigii leaves were collected from Civil line, Raipur (C.G.). Healthy, fresh, disease-free and mature leaves were collected for extraction.

Preparation of Extracts

The leaves of *Murraya koenigii* were cleaned with sterile water to remove dust particle. They were shade dried and then ground into a fine powder. The dried powdered sample was successively extracted with chloroform, methanol, aqueous and petroleum ether in soxhlet apparatus. The solvent present in extract was evaporated at 50°C in water bath. The residual powder after solvent extraction was dissolved in DMSO and stored at 4°C.

Phytochemical analysis

Phytochemical tests were carried out on all extracts using standard methods for identification of alkaloids, flavonoids, carbohydrate, saponins, tannins, terpenoids and phenol by following the standard method of Harbone J. (1998).

Antibacterial Assay

The antibacterial activity of the leaf extracts was determined by using Agar well diffusion method. *Escherichia coli* were used as test microorganism and it was inoculated in nutrient broth for 24 hrs at 37°C. The petriplates were washed and sterilized in hot air oven. In laminar air flow chamber, nutrient agar medium was poured in each sterilize petriplates and after solidification of medium, fresh bacterial culture was spread over the plate by using sterile glass L-rod. Wells were prepared by sterile borer and 100 µl plant extracts pour in each well. Streptomycin was used as a positive control whereas DMSO was used as negative control. The plates were incubated at 37°C for 24 hrs and antimicrobial activity was observed and calculated.

Microbial Strain:

The microbial strain *E. coli* (ATCC 25922) was used. These strains were constantly sub-cultured and maintained in nutrient agar. The diameter of zone of inhibition (expressed in mm) was determined to test the sample of antibacterial activity.

RESULT AND DISCUSSION:

In the present study the four different crude extract of *Murraya koenigii* were investigated for phytochemical and antimicrobial activity.

Phytochemical analysis:

Phytochemical screening of leaf extracts of *Murraya koenigii* L. as shown in Table (1), revealed that alkaloids and saponins were present in all the extracts. In Aqueous extract, only tannin is absent while flavonoids, saponins, alkaloids, terpenoids, carbohydrate and phenols are present (Fig.1.a). In Methanolic extract, only terpenoids and carbohydrates are absent while tannins, saponins, alkaloids, flavonoids and phenols are present (Fig.1.b). In Petroleum ether extract, flavonoid, tannin and phenol are absent while saponins, alkaloids, terpenoids and carbohydrate are present (Fig.1.c). In Chloroform extract, only flavonoid is absent while tannins, saponins, alkaloids, terpenoids, carbohydrate and phenols are present (Fig.1.d).

Table 1: Phytochemical screening of *Murraya koenigii* L.

S. No.	Phytochemicals	Solvents			
		Methanol	Chloroform	Aqueous	Petroleum ether
1.	Terpenoids	-	+	+	+
2.	Carbohydrate	-	+	+	+
3.	Alkaloids	+	+	+	+
4.	Flavonoids	+	-	+	-
5.	Tannins	+	+	-	-
6.	Saponins	+	+	+	+
7.	Phenol	+	+	+	-

Antibacterial activity:

The results of antibacterial activity are shown in table (2). Based on the diameter of zone of inhibition, aqueous extract (6mm) (Fig. 2.a) exhibited highest inhibitory activity against *E. coli*. Petroleum ether extract (Fig.2.d) showed (5mm) and methanolic extract (Fig.2.b) (3mm) zone of inhibition. Chloroform extract (Fig.2.c) exhibited least (2mm) inhibitory zone among all the extracts. Antibiotic streptomycin was also active against tested bacteria. *Murraya koenigii* contains different chemical compounds which interact in a complex manner and gives pharmacodynamic response. The crude organic extracts and pure compounds of curry leaves have been screened and found to possess anti-diarrhoea, anti-diabetic, antiulcer activity, cholesterol reducing property and microbiological activity (Manfred *et al.*, 1985), cytotoxic and

antioxidative property (Shah and Juvekar, 2006), antimicrobial and many useful medicinal properties. The screening of literature available on this plant showed that it is a popular remedy among the different ethnic groups.

Table 2: Antibacterial test of *Murraya koenigii* against *E. coli*.

Sample (Test plant extract)	Concentration (mg/ml)	Organism (<i>E. coli</i>) Zone of Inhibition (Diameter in mm)	
		Extract	Positive control
Methanol	20 mg/ml	3 mm	6mm
Chloroform	20mg/ml	2 mm	6mm
Aqueous	20 mg/ml	6 mm	9mm
Petroleum ether	20mg/ml	5 mm	6mm

Figures

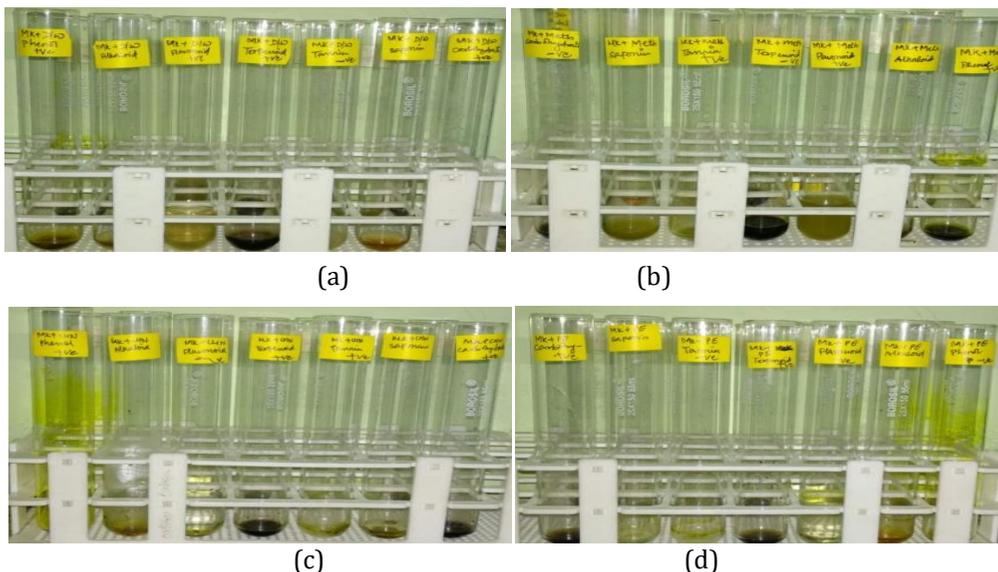


Fig (1): Phytochemical test of leaf extract of *Murraya koenigii* L. (a) aqueous extract, (b) methanolic extract, (c) petroleum ether extract, (d) chloroform extract

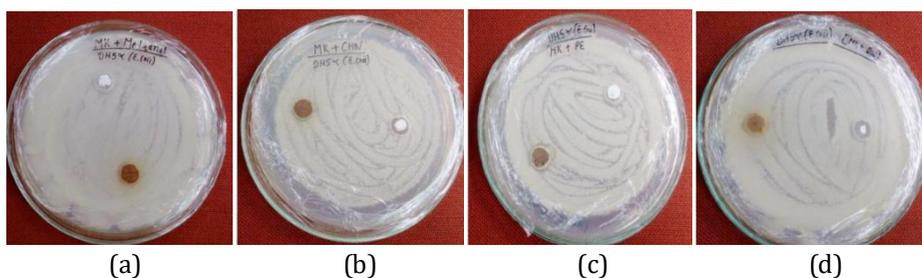


Fig (2): Antibacterial activity of leaf extract of *Murraya koenigii* L. (a) aqueous extract, (b) methanol extract, (c) chloroform extract, (d) petroleum ether

CONCLUSION

The present study demonstrates that *Murraya koenigii* L. showed the presence of bioactive compounds. This plant exhibited good antibacterial activity against pathogenic bacteria which indicates its potential as a source of functional ingredients, to develop new potent antimicrobial drug. Therefore, synergistic use of medicinal plant extract should be encouraged to prevent drug resistant bacteria and to treat the emerging and re-emerging diseases caused by the pathogenic microorganisms.

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