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Research Article

ANTIMICROBIAL ACTIVITY OF MEDICINAL PLANTS ON URINARY TRACT PATHOGENS

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ABSTRACT

Anti microbial activity of three medicinal plants (*Murraya*, *Azadirachta*, and *Ocimum)* on Urinary tract pathogens were investigated. The methanolic extracts of leaf of all three medicinal plants were the potent antimicrobial agent than ethanolic extract. Methanolic extract of all the three plants inhibited the growth of *Kliebsiella, Escherichia and Serratia* while the ethanolic extract inhibited less. The highest antibacterial activity was found against *Escherichia* with methanolic extract of Leaf and Bark of *Murraya* and Leaf extract of *Azadirachta.* Bark extract of *Azadirachta Azadirachta* showed highest inhibitory activity against *Serratia* with methanolic extract and least with *Escherichia. Ocimum* leaf extract possess maximum antibacterial activity against *Serratia* with methanolic extract and least with *Kleibsiella*. *Escherichia* was found to be most sensitive than *Kleibsiella* and *Serratia.* The highest antibacterial activity was found against all the Urinary tract pathogens with methanolic extract of Leaf and Bark of *Murraya*.

Keywords: Medicinal Plants, Antibacterial activity, Methanolic extract, Ethanolic extract.

INTRODUCTION

Medicinal plants are part and parcel of human society to combat diseases, from the dawn of civilization. Medicinal plants are considerably useful and economically essential. They contain active constituents that are used in the treatment of many human diseases [1]. The plant extracts have been developed and proposed for use as antimicrobial substances [2]. Plants used in traditional medicine contain a vast array of substances that can be used to treat chronic and infectious diseases.

The use of plant extracts and photochemical, both with known antimicrobial properties can be of great significance in therapeutic treatments. In the last few years, a number of studies have been conducted in different countries to prove such efficiency. Many plants have been used because of their antimicrobial traits, which are chiefly due to synthesized during secondary metabolism of the plant [3].

In modern days, the antioxidants and antimicrobial activities of plant extract have formed the basis of many applications in pharmaceuticals, alternative medicines and natural therapy. Recently extracts of plant have provoked interest as sources for their potential uses as alternative medicines for the treatment of many infectious diseases[4].

Bacterial resistance to antibiotics represents a serious problem for clinicians and the pharmaceutical industry and great efforts are being made to reverse this trend, and one of them is the widespread screening of medicinal plants from the traditional system of medicine hoping to get some newer, safer, and more effective agents that can be used to fight infectious diseases [5].

Azadirachta indica A. Juss (syn. *Melia azadirachta*) is well known in India and its neighbouring countries for more than 2000 years as one of the most versatile medicinal plants having a wide spectrum of biological activity. Every part of the tree has been used as traditional medicine for household remedy against various human ailments from antiquity [6, 7].

Murraya koenigii L. (curry leaf) belonging to family Rutaceae is used as a spice for its characteristic flavour and aroma. It is reported to have anti-oxidant, anti-diabetic, anti-carcinogenic, anti-dysenteric, stimulant, hypoglycaemic and antimicrobial activities [8]. Biologically active carbazole alkaloids are reported to have antimicrobial properties [9].

Ocimum sanctum commonly known as holy basil or Tulsi a herbaceous sacred plant found throughout India. Essential oils of tulsi have antibacterial [10, 11] with emphasis on anti tuberculosis [12], antifungal[13] and antiviral properties[14].

MATERIALS AND METHODS

Plant material

The plants of *M.koenigii (MK)*, *Azadirachta indica(AI) and Ocimum sanctum*(OS)were collected from the Local Nursery of Jaipur. Different parts including Leaf, Bark and Roots were separated, washed thoroughly with distilled water, shade dried, powdered using blender and stored.

Solvent Extraction

After authentification the powdered parts were extracted with methanol, ethanol, petroleum ether and acetone using Soxhlet's apparatus for 12-14 h. The extracts were concentrated, percentage yield calculated and then subjected to preliminary phytochemical analysis.

Antimicrobial Activity

The *in vitro* screening for antimicrobial study was carried out using selected urinary tract infection (UTI) causing pathogens which includes three gram negative bacteria *(Escherichia coli, Kliebsiella pneumoniae* and *Serratia marscens)*

These organisms were identified by following the standard microbiological methods. The antibacterial screening of the extracts were carried out by determining the zone of inhibition using well diffusion method. The strains of microorganisms obtained were inoculated in conical flask containing 100 ml of nutrient broth. These conical flasks were incubated at 37^0 C for 24 h and were referred to as seeded broth.

Different concentrations of the extracts were prepared by reconstituting with methanol and ethanol. The test microorganisms were seeded into respective medium by spread plate method 10 µl (10 cells/ml) with the 24h cultures of bacteria growth in nutrient broth. One ml of this was used in flooding over nutrient agar plates in the well diffusion method of the *in vitro* antimicrobial sensitivity test.

The plates were left for 5mins after which they were dried at 37^0 C for 1hour. Four wells, equally distant, were bored round the plate using a sterile cork borer. Various concentrations of the diluted extracts were put inside the wells. Solvents such as Methanol and ethanol were put inside the well in separate petriplates to serve as negative control while Chloramphenicol (1mg\ml) was used as positive control in the separate petriplates. The plates were left free for 1 hour after which there were incubated at 37^0 C for 24 hours and were examined for zones of inhibition

Phytochemical Screening

The methanolic extracts of different plants were used as samples for qualitative phytochemical screening for tannins, alkaloids, glycosides, terpenoid, steroid and flavonoids following the standard procedures of Trease and Evans[15], 1989.

Table 1: The phytochemical screening of the Plant extracts.

Phytoconstituents	OS	AI	MK
Carbohydrate	-	-	+
Tannin	+	+	-
Alkaloid	+	-	+
Flavonoids	-	+	-
Steroid	+	-	-
Glycoside	+	-	-

(+): Present; (-): Absent

Table 2: Antimicrobial activity of methanol and ethanol extracts of plants against UTI Pathogens

Bacteria	Organic solvent	Leaf MK (mm)	Bark MK (mm)	Leaf AI (mm)	Bark AI (mm)	Leaf OS (mm)	Chloramphenicol
Klebsiella	Methanol	27	24	26	25	21	29
	Ethanol	19	15	13	14	13	
Escherichia	Methanol	29	29	18	12	20	25
	Ethanol	23	20	21	10	18	
Serratia	Methanol	22	24	22	20	18	23
	Ethanol	16	12	12	17	16	

Values are statistically significant at ($p<.05$)

RESULTS AND DISCUSSION

The phytochemical analysis of the leaf powder and various extracts gave the results as depicted in Table-1.

Results obtained from the susceptibility testing of the organisms revealed that the tested three medicinal plants extracts possess potential antibacterial activity against *Kliebsiella, Escherichia and Serratia.* When tested by agar diffusion method the methanolic extract was the potent antimicrobial agent than ethanolic extract. Methanolic extract inhibited *Kliebsiella, E.coli and Serratia* while the ethanolic extract inhibited less (Table-2).

The highest antibacterial activity was found against *Escherichia* (29mm) with methanolic extract of Leaf and Bark of *Murraya* (Table-2).

Azadirachta leaf extract possess maximum antibacterial activity against *Kliebsiella* (26mm) with methanolic extract (Table 2). Bark extract of this plant showed highest inhibitory activity against *Kliebsiella* (25mm) with methanolic extract and least with *Escherichia* (12mm) (Table 2).

Ocimum leaf extract possess maximum antibacterial activity against *Kliebsiella* (22mm) with methanolic extract and least with *Serratia* (Table 2).

Kleibsiella was found to be most sensitive than *Escherichia* and *Serratia.* The highest antibacterial activity was found against all the Urinary tract pathogens with methanolic extract of Leaf and Bark of *Murraya*.

Plants are important source of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the *in vitro* antibacterial activity assay [16]. Many reports are available on the antiviral, antibacterial, antifungal, anthelmintic, antimolluscal and anti-inflammatory properties of plants [17, 18]. Some of these observations have helped in identifying the active principle responsible for such activities and in the developing drugs for the therapeutic use in human beings.

However, not many reports are available on the exploitation of antifungal or antibacterial property of plants for developing commercial formulations for applications in crop protection. The phytochemical research based on ethno-pharmacological information is generally considered an effective approach in the discovery of new anti-infective agents from higher plants [19].

Knowledge of the chemical constituents of plants is desirable, not only for the discovery of therapeutic agents, but also because such information may be of value in disclosing new sources of such economic materials as tannins, oils, gums, precursors for the synthesis of complex chemical substances.

In addition, the knowledge of the chemical constituents of plants would further be valuable in discovering the actual value of folkloric remedies [15]. Chemically constituents may be therapeutically active or inactive. The ones which are active are called active constituents and the inactive ones are called inert chemical constituents [20].

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