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Assessing Bacterial Inhibition by Selected Medicinal Plants of India

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ABSTRACT

Crude extracts of eight medicinal plants were screened for their antibacterial activity against four possible pathogenic strains. *Murraya* extract shows maximum antibacterial activity against *Staphylococcus aureus*. *Bacillus subtilis* is highly sensitive towards plant extract Tulsi. The plants like Pudina, Brahmi is said to have highest antibacterial activity against *Staphylococcus aureus.* The most sensitive organism towards the crude extracts of medicinal plants is *Staphylococcus aureus.*

Keywords: Plant extract, antibacterial activity, medicinal plants

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1. Introduction

An antimicrobial is a substance that kills or inhibits the growth of microorganisms such as bacteria, fungi or protozoans. Antimicrobial drugs either kill microbes (microbicidal) or prevent the growth of microbes (micro biostatic) [1-2]. Medicinal plants represent a rich source of antimicrobial agents. Plants are a source of many potent and powerful drugs [3-5]. India is one of the richest countries in the world as regarded to genetic resources of medicinal Plants. India is standing among the world's top twelve mega diversity nations. Two out of the eighteen `hot spots' of biodiversity in the world are in India such as Eastern Himalayas and Western Ghats. India has remarkably diverse agro- ecological conditions facilitating immense possibilities or introducing and domesticating new exotic plant species [6].

The different parts of plants which is used to extract as raw drugs include root, stem, flower, fruit, twigs exudates and modified plant organs. While some of these raw drugs are collected in larger quantities and traded in the market as the raw material for many herbal industries [7]. The potential of higher plants as source for new drugs is still largely unexplored. Among the estimated 250,000 - 500,000 plant species, only a small percentage has been investigated phytochemically and the fraction submitted to biological or pharmacological screening is even smaller. Thus, any phytochemical investigation of a given plant will reveal only a very narrow spectrum of its constituents [8-9]. Although hundreds of plant species have been tested for antimicrobial properties, the vast majority of have not been adequately evaluated [10].

Considering the vast potentiality of plants as sources for antimicrobial drugs, the present study focused to evaluate the antibacterial activity of various medicinal plants using its crude extracts and to compare their inhibitory activity.

2. Materials and methods

2.1. Collection of medicinal plants

For the determination of antimicrobial activity eight medicinal plants such as *Murraya koenigii* (Murraya), *Ocimmum sanctum* (Tulsi), *Aloe barbadensis*, *Azadiractita indica* (Neem), *Mentha arvensis* (Pudina), *Chromolaena odorata* (Commun ist green), *Centella Asiatic* (Bhrami) *Costur igneur* (insulin) were collected from Varkala, Parippally and Kollam.

2.2. Extract preparation

The leaves were washed with tap water and then with distilled water to remove any sand particles. The leaves were then allowed to dry. Around (200 g) of leaves were taken and ground with methanol using a mortar and pestle. The extract was filtered after 24 hours, and

it was concentrated by keeping in water bath at 45 °C for eliminating methanol. The extracts were kept in sterile Eppendorf tubes under refrigerated condition until use.

2.3. Test bacteria and bioassay

Microbial susceptibility assay was carried by agar well diffusion method. The test was carried out against *E. coli, Staphylococcus aureus, Pseudomonas flourescence, Bacillus subtilis.* Over night cultures in Nutrient broth were inoculated on to Muller Hinton Agar (MHA) plates by swabbing. Wells of 15 mm in diameter were cut into these agar plates. To these wells, 70 μl each of the plants extracts was added and kept for incubation at 37 °C for 24 hours and plates were subsequently examined for zones of inhibition. The diameters of inhibition zones were measured in mm.

3. Results and discussion

The result obtained in the present study revealed that seven out of eight medicinal plant extracts possess potential antibacterial activity against *E. coli, Staphylococcus aureus, Pseudomonas fluorescence, Bacillus subtilis* and the result are represented in **Table 1**.

Table 1. Antibacterial activity of crude extracts of medicinal plants against tested bacteria

Bacterial Sp.	**Zone of inhibition (mm)**							
	Neem	Tulsi	Brahmi	Murraya	Pudina	Communist green	Aloe vera	Insulin
B. subtilis	14	20	15	20	15	15	-	-
E. coli	14	10	12	17	16	-	-	-
P. fluorescence	12	10	14	14	16	-	-	-
S. aureus	16	20	19	27	19	13	10	-

When tested by agar well diffusion method, the methanol leaf extracts of *Murraya Koenigii* showed significant activity against *Staphylococcus aureus* around 27 mm. The least activity recorded in *Pseudomonas fluorescence* around 14 mm. *Ocimum sanctum* leaf extract posses' maximum activity against *S. aureus* and *P. fluorescence* around 20 mm and least activity was recorded against *E. coli* and *P. fluorescence* around 10 mm. *Chromolaena odorata* showed highest activity against *B subtilis* around 15 mm and no zone of inhibition was found against *E. coli* and *P fluorescence.*

Mentha arvensis showed highest inhibitory activity against *S aureus* around 19 mm and the least activity against *B. su*btilis around 15 mm. The leaf extracts of *Bacopa monnieri* showed potential antibacterial activity against *S. aureus* around 19mm and the least activity against *E.*

coli around 12 mm. Neem leaf extracts possess maximum activity against *S. aureus* around 16 mm. The least activity was recorded against *P. fluorescence* around 12 mm. The leaf extract of *Aloe barbadensis* showed antibacterial activity against *S. aureus* only around 10 mm and the extract of *Costus igneus* were insensitive to the respective bacterial species.

Plants are important sources of potentially useful structures for the development of new chemotherapeutic agents. The first step towards this goal is the in-vitro anti-bacterial activity assay [11]. Many reports are available on the antiviral, antibacterial, antifungal, anti-helminthic, anti-mollusca and anti-inflammatory properties of plants [12-17].

In the present study, it was observed that *Murraya* extract shows maximum anti-bacterial activity against *Staphylococcus aureus*. *Bacillus subtilis* is highly sensitive towards plant extract Tulsi. The plants like Pudina, Brahmi is said to have highest antibacterial activity against *Staphylococcus aureus*. So, the most sensitive organism towards the respective medicinal plants is *Staphylococcus aureus*. Also, the plant extracts of Aloe vera and insulin does not show antibacterial activity against any selected organisms.

4. Conclusions

Our choice of medicinal plants as the research topic was particularly due to the importance in the subcontinent especially its importance in Kerala in the field of Ayurveda. The medicinal plant is a house hold remedy for so many ailments like stomach pain, fever, cough, etc. Even though hundreds of plant species have been tested for antimicrobial properties, the potential of higher plants as a source of medicines is still highly unexplored. The result of present study clearly indicates that the antibacterial activity varies with the species of the plants and plant material used. Thus, the study of the medicinal plants which is used traditionally in Ayurveda could be considerable interest to the development of new drugs.

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