



ANTIBACTERIAL ACTIVITY OF SELECTED MEDICINAL PLANTS AGAINST BACTERIAL PATHOGENS

Vijaya Chitra A*

Associate Professor, Department of Microbiology, Sri Ramakrishna College of Arts and Science for Women, Coimbatore. *Corresponding Author

Shakitha K

Department of Microbiology, Sree Narayana Guru College, Coimbatore

ABSTRACT

Medicinal plants have been used for centuries in traditional medicine systems to treat various ailments, including bacterial infections. The use of medicinal plants against bacteria is a practice that is still relevant today. Many plants contain bioactive compounds that exhibit antibacterial properties. These compounds can inhibit the growth of bacteria, prevent their reproduction, and even disrupt their cell membranes making them potential sources for developing new antibiotics or complementary treatments for bacterial infections. Research into the antimicrobial properties of plants is on progress as repeated and improper use of antibiotics has resulted in drug resistance. Most of the drugs available in the market today have been derived from the natural products. Additional information and knowledge aid in expanding our understanding of potential therapeutic applications of medicinal plants.

KEYWORDS : Medicinal Plant, Antibacterial, Bacteria, Pathogens

INTRODUCTION

Medicinal plants have been used for centuries by various cultures around the world for their therapeutic properties. These plants contain natural compounds that can have positive effects on human health. Many medicinal plants have been traditionally used for their antimicrobial properties to combat various types of microbes, including bacteria, viruses, fungi, and parasites. Ayurveda known as the 'science of life' is a system of traditional medicine native to the Indian subcontinent and a form of alternative medicine which is more than 5000 years old. Medicinal plants are an essential natural resource for the treatment of more persistent diseases. Various medicinal plants can be used to treat similar diseases, depending on the country in which the disease occurs. In some localities, medicinal plants are perceived according to their traditional uses and represent a low-cost alternative to treat various diseases.

The medicinal plants are explored and used for their anti-inflammatory, anti-diabetic properties, digestive, aid digestion, soothe upset stomachs, and alleviate symptoms of colds and respiratory issues, stress and anxiety relief, immune system support, skin health, pain relief, cognitive function, anti-bacterial, anti-viral properties. Knowledge on the use of medicinal plants against bacterial pathogens could help in the development of new ayurvedic formulations and help to reduce antibiotics usage. In the past two decades, antibacterial properties of various plants and plant parts like root, stem, leaves, seeds, and flowers have been well documented for some of the medicinal plants. (Vaghasiya *et al.*, 2007)

MATERIALS AND METHODS

The medicinal plants used in this study include *Plectranthus amboinicus*, *Justicia adhatoda*, *Tinospora cordifolia*, *Eryngium foetidum*, *Mentha longifolia*, *Murraya koenigii*, *Passiflora edulis*.

Plectranthus amboinicus, commonly known as, Indian borage, Mexican mint, or Spanish thyme, is a perennial herb that belongs to the mint family. *Justicia adhatoda*, commonly known as Vasaka or Adhatoda, is a medicinal plant belonging to the Acanthaceae family. It is native to the Indian subcontinent and is widely used in traditional Ayurvedic and Unani medicine for its therapeutic properties. *Tinospora cordifolia*, commonly known as Guduchi or Giloy, is a medicinal plant that has been used for centuries in traditional Ayurvedic medicine for its wide range of health benefits. *Eryngium foetidum*, commonly known as culantro, long coriander, or recaon, is an herbaceous plant that is popular in

Asian cuisines. *Mentha longifolia*, commonly known as horse mint or wild mint, is a perennial herb belonging to the family Lamiaceae. *Murraya koenigii*, commonly known as curry leaf or curry tree that belongs to the Rutaceae family. *Passiflora edulis*, commonly known as passion fruit, is a tropical fruit-bearing plant and a member of the Passifloraceae family.

Preparation of plant extracts

The collected plants were washed cleanly with sterile distilled water. 50 gm of the leaves of the respective plants *Plectranthus amboinicus*, *Justicia adhatoda*, *Tinospora cordifolia*, *Eryngium foetidum*, *Mentha longifolia*, *Murraya koenigii*, *Passiflora edulis* were weighed. The leaf extracts were prepared using aqueous extraction process and were filtered using Whatmann.No.1 filter paper. The prepared juices were used for further processing.

Test microorganisms

Clinical microorganisms used in this study include *E.coli*, *Bacillus sp.*, *Klebsiella sp.*, *Pseudomonas sp.*, *Staphylococcus sp.*, and *Salmonella sp.*,

Preparation of test inoculums

Each of the bacterial culture was inoculated into separate tubes containing nutrient broth and incubated for 24 hours at 37°C

Screening of Antimicrobial Activity

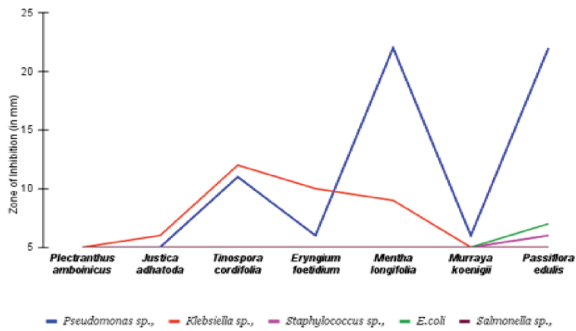
The antimicrobial activity of the test organisms to the prepared plant extracts was screened by using the agar-well diffusion method (Perez *et al.*, 1990). An inoculum suspension was swabbed uniformly to solidified 20 ml Mueller-Hinton Agar (MHA) plates for bacteria and well of 6 mm in diameter were made in the seeded agar using sterile cork borer. Aliquot of 50 µL of each plant juice extract was added into each well on the seeded medium and allowed to stand on the bench for 1 hr for proper diffusion and thereafter incubated at 37°C for 24 hrs. The resulting inhibition zones were measured in millimeters (mm).

RESULTS

Antibacterial Activity

The plant extracts showed different degree of antibacterial activity against the tested organisms. The plant extracts of *Mentha longifolia* and *Passiflora edulis* formed 22mm of zone of inhibition and *Tinospora cordifolia* formed 20 mm zone of inhibition against *Pseudomonas sp.*, (Fig 1) whereas the other plant extracts showed no activity against the *Pseudomonas sp.* The gram negative organism *Klebsiella sp.*, sensitive to *Tinospora cordifolia* plant extract with a zone of inhibition of

12 mm. followed by *Eryngium foetidum* with a zone of inhibition of 10 mm. The other plant extracts did not show considerable activity against *Klebsiella* sp. The inhibition effect of all the plant extracts against *Staphylococcus* sp., and *Salmonella* sp is very minimal and did not show zone of inhibition.



CONCLUSION

The results prove that the plants possess anti bacterial activity against the tested pathogens *Pseudomonas* and *Klebsiella* sp. The antibacterial activity of medicinal plants represents a fascinating and time-honored approach to combat bacterial infections. Though the effect of inhibition is minimal for all the other organisms the plant extracts have shown an inhibitory effect. The emergence of antibiotic-resistant bacteria underscores the need for responsible and evidence-based use of both pharmaceutical antibiotics and herbal remedies. The therapeutic potential of plant based antimicrobials have enormous potential as they have lesser side effects that are often associated with synthetic antimicrobials (Iwu et al., 1999). While the antimicrobial potential of these plants is evident from laboratory studies, further studies may be done at clinical level and with a combination of the plant extracts to check out the effectiveness and its utilization as antimicrobial drug.

REFERENCES:

[1] Iwu MW, Duncan AR, Okunji CO. (1999). New antimicrobials of plant origin. In: Janick J, ed. Perspectives on New Crops and New Uses. Alexandria, VA: ASHS Press; 1999: pp. 457-462.

[2] Jigna Parekh, Sumitra V. Chanda (2007). In vitro Antimicrobial Activity and Phytochemical Analysis of Some Indian Medicinal Plants, 2007. Turk J Biol., 31:53-58

[3] Vaghasiya, Yogeshkumar And Chanda, Sumitra, (2007). Screening of Methanol and Acetone Extracts of Fourteen Indian Medicinal Plants for Antimicrobial Activity." Turkish Journal of Biology. Vol. 31(4):7