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ASSESSMENT OF ANTIBACTERIAL ACTIVITY OF PAVONIA ZEYLONICA ROOT EXTRACTS

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ABSTRACTS

In the current environment, increasing resistance to existing antibacterial agents and herbal drugs is being investigated as important sources for new agents for testing various diseases related to bacterial infections. The present study was subjected to evaluating the antibacterial activity of petroleum ether, ethanol, and aqueous root extract of the medicinal plant *Pavonia zeylonica* L. using the standard disc diffusion method. Susceptibility of some Gram-positive organisms (*Staphylococcus pneumonia*, *Staphylococcus aureus*, and *Enterococcus faecium*) and Gram-negative organisms (*Escherichia coli*, *Klebsiella pneumoniae*, and *Pseudomonas aeruginosa*) was tested against various root extracts. The antibacterial activity results of the present study showed a variety of extracts; ethanol root extract was more effective, and aqueous root extract was found to be less effective against all the bacteria. It is concluded that the plant extract showed antimicrobial activity in the presence of these phytochemicals. Additional research is recommended for drug development to treat various infectious disorders.

KEYWORDS: *Pavonia zeylonica*, Malvaceae, Antibacterial activity, Root extracts.

INTRODUCTION

India has a variety of plants that is spread throughout the country. Herbal treatments have been the basis of treatment and cure for different diseases and physiological indicates in traditional processes performed such as Ayurveda, Unani, and Siddha. Medicinal components from plants suffer from a necessary a part in conventional as well as western medicine. Plant-

derived pharmaceuticals have been a part of the evolution of human healthcare for thousands of years. At the same time, indigenous people of the rest of the earth were also utilizing plants for repairing diseases. Today, approximately 88% of the global populations turn to plant-derived medicinal products as their first line of defense for protecting health and diseases.

Pavonia zeylonica root is used in the treatment of dysentery, anti-inflammation, intestinal problems, and ulcers (K. Kalaichelvi *et al.*, 2017) and paste intestinal ulcers, acne, and skin diseases (Mounika, S *et al.*, (2022), Yogeesha and Kumar (2022)). and antibacterial activities (H.B. Joga Rao *et al.*, 2020), The roots of Pavonia zeylonica are used for scabies and other human diseases. Several chemical and biological investigations have been carried out on these plants. In the present research study, the experiment was carried out on the antimicrobial activities of *Pavonia zeylonica* root extracts of various solvents. An attempt has been made to enrich the knowledge of the antibacterial activity of *Pavonia zeylonica* plant root extract against Gram-positive and Gram-negative bacteria.

MATERIALS AND METHODS

Plant materials

The fresh plant roots of *Pavonia zeylonica* were collected from the area of Thirumalayam Palayam of the Coimbatore city and authenticated by Dr. M.U. Sharief, Scientist 'F' & Head of Office, from the Government of India, Ministry of Environment, Forest & Climatic Change, Botanical Survey of India, Southern Regional Centre, T.N.A.U Campus, Tamil Nadu, India.

Preparation of plant extract

The shade-dried coarsely powdered roots were subjected to Soxhlet extraction using petroleum ether, ethanol, and aqueous. The solvent was removed in vacuo, and the extract was used for an antibacterial assay.

Bacterial strains

The test organisms were supplied by the Department of Biotechnology, Bharathiyar University, Coimbatore, Tamil Nadu, India. Three Gram-positive (S*taphylococcus pneumonia, Staphylococcus aureus, Enterococcus faecium*) and Gram-negative (*Escherichia coli, Klebsiella pneumoniae, Pseudomonas aeruginosa*) bacterial strains were used in the study.

Antibacterial assay

Disk diffusion method

The disk diffusion method is employed to appraise the antimicrobial activity of plant root extract. The root extract residues (10 mg) were dissolved in 1 ml of DMSO. Muller-Hinton agar was then prepared under sterile conditions. The organisms that were isolated were inoculated in the nutrient broth and incubated overnight. Then, swabs were used to lawn the organisms to the Muller-Hinton agar plates, and then sterile discs were placed. The root extract solution of 30 µL was poured into the sterile discs. The plates are incubated at 37°C overnight (Tendencia, 2004).

RESULT AND DISCUSSION

The result of Antibacterial activities of petroleum ether, Ethanol and Aqueous and extract of root from *Pavonia zeylonica* was assayed against various bacterial pathogens shown in (Table-1).

Table 1: Antibacterial activities of different solvents of *Pavonia zeylonica* L. Root against the pathogenic organisms.

Bacterial strains		Concentration	Root Extracts		
			Petroleum ether	Ethanol	Aqueous
Gram + ve	*Staphylococcus pneumonia*	(10 mg/ml)	4 mm	14 mm	13 mm
	Staphylococcus aureus	(10 mg/ml)	7 mm	13 mm	13 mm
	Enterococcus faecium	(10 mg/ml)	6 mm	14 mm	10 mm
Gram - ve	*Escherichia coli*	(10 mg/ml)	4 mm	14 mm	11 mm
	Klebsiella pneumoniae	(10 mg/ml)	3 mm	13 mm	10 mm
	Pseudomonas aeruginosa	(10 mg/ml)	6 mm	14 mm	12 mm

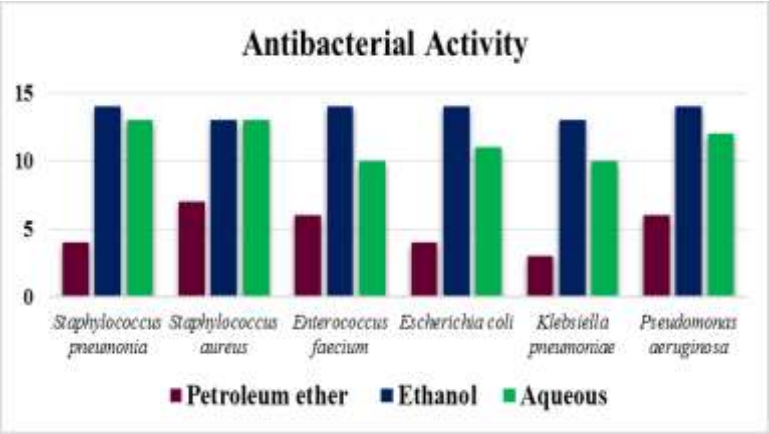

Figure 1: Antibacterial activities of different solvents of *Pavonia zeylonica* L. Root against the pathogenic organisms.

The antibacterial activity of *Pavonia zeylonica* root was carried out by disk diffusion method against six bacterial strains, viz., *S. pneumonia*, *S. aureus*, and *E. faecium*, which were gram-positive, *E. coli*, *K. pneumoniae* and *P. aeruginosa* gram-negative bacteria.

Antibacterial activity against all the bacteria was conducted using three different solvents: petroleum ether, ethanol, and aqueous root extracts. The inhibition zone of three different extracts of Pavonia zeylonica was observed at concentration after 24 hours of incubation. No inhibition zone was noted in blank solvents, i.e., negative control. An antibiotic, *streptomycin*, was used as a positive control; 1 mg was dissolved in mL of sterile distilled water.

Antimicrobial studies of each extract (petroleum ether, ethanol, and aqueous) are performed, which include various disease-causing gram-positive and gram-negative bacteria. (Fig No. 1; Table 1) The ethanolic root extracts show strong antibacterial activity against gram-positive bacteria *Staphylococcus pneumonia* (14 mm) and *Enterococcus faecium* (14 mm). While root extract shows positive response against *Staphylococcus aureus* (13 mm) and ethanolic root extract shows strong antibacterial activity against gram-negative bacteria, viz., *E. coli* (14 mm) and *P. aeruginosa* (14 mm), while extract shows positive response against *K. pneumoniae* (13 mm).

Aqueous root extract also (Table 1) shows antibacterial activity against gram-positive and gram-negative bacteria. Aqueous root extract shows strong antibacterial activity against gram-positive bacteria, viz., *S. pneumonia* and *S. aureus* (13 mm), while it shows a positive response against *E. faecium* (10 mm). In the case of gram-negative bacteria, extract shows strong antibacterial activity against *P. aeruginosa* (12 mm) and *E. coli* (11 mm), while extract shows a positive response against *K. pneumoniae* (10 mm).

Antibacterial testing of petroleum ether root extract was also performed, but there was no zone of inhibition found.

CONCLUSION

In conclusion, this study showed that the ethanolic root extracts of *P. zeylonica* inhibited the growth of various tested species of Gram-positive and Gram-negative bacteria. Generally, we can conclude that *P. zeylonica* ethanolic root extracts have antimicrobial activity. The results indicated that the presence of phytocompounds including phenols, tannins, and flavonoids

constituents may be responsible for these antibacterial activities. Further studies are needed to investigate individual phytochemical compounds of the root of *P. zeylonica*.

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