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Antimicrobial activity and phytochemical analysis of *Sanseiveria roxburghiana* leaf

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ABSTRACT

Medicinal plants play an important role in the discovery of novel drugs used in modern medicine. The medicinal plant Sanseiveria roxburghiana leaf possesses the wide range of medicinal properties which were confirmed through literature reviews. The present study was to determine it's leaves have any antimicrobial activity and also to check whether their phyto chemical constituents responsible for said activities. The Sanseiveria roxburghiana leaf extract was obtained by mixing the pulverized leaf materials with various solvent such as diethyl ether, ethanol and acetone, filtered with What man No.1 filter paper and concentrated to dryness. The collected extracts were tested for antimicrobial activities and the presence of chemical constituents by preliminary phytochemical analysis according to the literature. The antimicrobial susceptibility studies were conducted against gram (-) bacteria such as Escherichia coli, Pseudomonas aeruginosa and Klebsiella pneumoniae and gram (+) such as Staphylococcus aureus. The current result supports the medicinal use of the leaf which acts as an antimicrobial agent. However further studies need to isolate the active constituents from the leaf and to study the antimicrobial activity in cellular level.

Keywords: *Sanseiveria roxburghiana*, phytochemical, antimicrobial activity, diethyl ether, ethanol, acetone.

INTRODUCTION

Medicinal plants continue to be an important therapeutic aid for alleviating the ailments of humankind. Natural products are known to play an important role in both drug discovery and chemical biology. Although some therapeutic benefits can be traced to specific plant compounds, many herbs contain dozens of active constituents that, together, combine to give the plant its therapeutic value. Any part of the plant may contain active components [4, 5, 12, 13]. Over the past few decades there has been much interest in natural materials as sources of new antibacterial agents. The acceptance of traditional medicine as an alternative form of health care and the development of microbial resistance to the available antibiotics has led researches to investigate the antimicrobial activity of medicinal plants [1,9,10,6]. India is rich in medicinal plant diversity. All known types of agro-climatic, ecologic and adaphic conditions are met within India.

Sanseiveria roxburghiana plant is widely distributed in ornamental coast. Root and leaves of plants are pharmacologically used by the tribal as medicines (nutrient). It has been used in traditional medicine for the treatment of asthma, abdominal pains, colic, diarrhea, hemorrhoids, hypertension, monorrhagia, pilies, sexual weakness, wounds of the foot, cough, leprosy, rheumatism, glandular enlargement; nutritional deficiencies and treatment of snake bite [17]. Thus, the present study was done to evaluate the antimicrobial potential of the leaves of

Sanseiveria roxburghiana against gram (-) bacteria such as *Escherichia coli, Pseudomonas aeruginosa,* and *Klebsiella pneumoniae* and gram (+) such as *Staphylococcus aureus*.

MATERIALS AND METHODS

Collection of plants samples

Fresh plant materials were collected from Thovalai village, Kanyakumari district, washed and air dried. Fresh leaves were subjected to diethyl ether, alcohol and acetone extract preparation.

Collection of pathogens

Pathogens were collected from Vivek laboratory in Nagercoil. Pathogens were gram (-) bacteria such as *Escherichia coli, Pseudomonas aeruginosa,* and *Klebsiella pneumoniae* and gram (+) such as *Staphylococcus aureus.*

Preparation of leaf extracts

10g of pulverized leaf material was mixed with 50ml of solvents such as diethyl ether, alcohol and acetone and kept in rotary shaker at 100rpm overnight and filtered with Whatman No.1 filter paper and concentrated to dryness at 40^0C, lyophilized and stored at 4^0C until further use.

Antimicrobial susceptibility testing

Antibacterial activity was determined using agar diffusion method of Kirby and Bauer procedure. In this technique, Muller Hinton Agar was used and the medium was prepared according to the formulation, sterilized and poured into a sterile plate to a depth of 4mm. The antibacterial activities of leaves of Sanseiveria roxburghiana were t**e**sted against the organisms such as *Escherichia coli, Pseudomonas aeruginosa,* and *Klebsiella pneumoniae* and gram (+) such as *Staphylococcus aureus.* Discs containing 100g, 200g, 300g, 400g and 500g/ml of sap were placed on cultured pathogenic bacteria on Muller Hinton Agar plates and incubated at 37^0C for 24 hours [2, 3, 14, 15]. The diameter of the zone of inhibition was measured, commercial discs of Streptomycin, Co-Trinoxazole and Optochin were used as positive control and experiments were done thrice.

Determination of the phytochemicals

The phytochemical screening of the sample was carried out as described by Herbune [7] and Sofowora [16]. The sample was screened for alkaloids, flavonoids, saponins, carotinoids, phytates and tannins.

RESULTS AND DISCUSSION

Plants have been a source of medicine in pharmacopoeia. The disc diffusion method is used to detect the antimicrobial activity of leaf extract. Diethyl ether, alcohol, and acetone extracts showed antibacterial activity against *Escherichia coli, Pseudomonas aeruginosa,* and *Klebsiella pneumoniae,* and *Staphylococcus aureus.* The antimicrobial activity of the *Sanseiveria roxburghiana* leaves were determined against four bacterial pathogens and recorded in Table 1.

The result of antimicrobial activity was showed in table 1. All the extracts showed high activity on 500 µg/disc concentrations. Among the three extracts of *Sanseiveria roxburghiana* leaves, extract of Diethyl ether showed maximum inhibitory activity against *Klebsiella pneumoniae* (13.67±1.15mm) followed by *Pseudomonas aeruginosa* (11.67±1.15 mm), *Escherichia coli* (11.0±1.0mm) and *Staphylococcus aureus* (9.33±0.58mm). Extract of ethanol showed maximum activity against *Klebsiella pneumoniae* (12.67±1.53mm) followed by *Pseudomonas aeruginosa* (12.0±1.0mm). *Escherichia coli* (9.67±1.53mm) and *Staphylococcus aureus* (8.67±1.15mm) were also inhibited. The antimicrobial activity of acetone extract showed the maximum zone of inhibition (11.67±1.53mm) against *Klebsiella pneumoniae* followed by *Escherichia coli* (10.67±1.53mm), *Staphylococcus aureus* (10.0±1.0mm) and *Pseudomonas aeruginosa* (9.33±0.58mm). All the three extracts effectively inhibit all the pathogens. The commercial antibiotic streptomycin was used as reference drug. Streptomycin was sensitive to all pathogen.

The phytochemical screening of the sample was carried out as described by Herbune [7] and Sofowora [16]. The sample was screened for alkaloids, flavonoids, saponins, and tannins were carried out in triplicated and results has shown in Table 2.

Table 1: Antimicrobial activity of different plant extracts against bacterial pathogens

Organism	Concentration of the extract (µg/disc)	Zone of inhibition (mm) Mean±SD			
		diethyl ether	ethanol	acetone	Streptomycin (10mcg/disc)
Escherichia coli	100	7.0±1.0	7.0±1.0	7.67±1.55	20±0.58
	200	7.33±0.58	8.0±1.0	8.33±0.58	
	300	9.33±0.58	7.67±1.15	9.0±1.0	
	400	10.0±1.0	9.33±0.58	10.33±1.55	
	500	11.0±1.0	9.67±1.53	10.67±1.53	
Pseudomonas aeruginosa	100	8.33±0.58	9.0±1.0	6.33±0.58	10±1.15
	200	8.33±0.58	9.33±0.58	6.33±0.58	
	300	9.33±0.58	9.67±1.53	8.33±0.58	
	400	10.33±1.55	10.67±1.15	8.33±0.58	
	500	11.67±1.15	12.0±1.0	9.33±0.58	
Staphylococcus aureus	100	6.0±1.0	6.33±0.58	7.0±1.0	09±1.15
	200	6.33±0.58	7.0±1.0	7.0±1.0	
	300	7.33±0.58	8.0±1.0	8.33±0.58	
	400	8.0±1.0	8.33±0.58	9.33±0.58	
	500	9.33±0.58	8.67±1.15	10.0±1.0	
Klebsiella pneumoniae	100	9.67±1.15	8.67±0.58	9.67±1.15	10±0.58
	200	10.67±1.15	8.33±0.58	9.67±1.15	
	300	9.33±0.58	9.67±0.58	8.33±0.58	
	400	11.67±1.52	11.67±1.53	10.67±1.53	
	500	13.67±1.15	12.67±1.53	11.67±1.53	

Table 2: Phytochemical analysis of *Sanseiveria roxburghiana* leaf extract

Phytochemicals	Status
Alkaloids	Present
Flavonoids	Present
Saponins	Present
Tannins	Present
carotinoids	Present
Phytates	Present

Antimcrobial activity against *Escherichia coli, Pseudomonas aeruginosa,* and *Klebsiella pneumoniae* and gram (+) such as *Staphylococcus aureus* showed that the plant can be used in the treatment of gastrointestinal infection and diarrhea in human [11]. This may be due to its variation in phytochemical constituents like alkaloids, flavonoids, saponins, tannins, aminoacids and carbohydrates, which were also reported by Ikewuchi *et al.* [8], and these results were compared with the standard antibiotic streptomycin.

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