

Short Communication

Biological characterisation of the rhizome of *Sansevieria roxburghiana* Schult. & Schult. f. (Agavaceae)

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Sansevieria roxburghiana Schult. & Schult. f. (Agavaceae), called *Murva* in Sanskrit and Hindi, Marul in Tamil, Indian bowstring hemp in English is a herbaceous perennial plant with short fleshy stem and stout rootstock, occurring in eastern coastal region of India. The stem part (rhizome) of this species is used to heal wounds in animals and also used to treat toothache. The rhizomes are mucilaginous and used in consumptive complaints, long lasting chronic persistent coughs, for quick relief of common cough and cold, in ear pain. Despite these uses, no published works are available for the antimicrobial property of stem part of this plant. Hence in the present study, an attempt has been made to access its therapeutic potential. The study was therefore aimed to investigate the antibacterial effects of ethanolic extracts of rhizome of *S. roxburghiana* against gram negative bacteria such as *Salmonella* Typhi, *Pseudomonas fluorescens*, *Pseudomonas aeruginosa* and *Escherichia coli*. The pathogens were tested by disc diffusion assay method and minimum inhibitory concentration was evaluated. An attempt has been made to compare the activity of extract with standard ciprofloxin.

Key words: *Salmonella*, *Escherichia coli*, gram negative, marul, *Sansevieria*, antibacterial.

INTRODUCTION

The plant kingdom has been the best source of remedies for curing a variety of disease and pain. This is why medicinal plants have played a key role in the worldwide remedies. Medicinal plants are of great importance to the health of individuals and communities. The medicinal value of these plants lies in some chemical substances that produce a definite physiological action on the human body. The most important of these bioactive constituents of plants are alkaloids, tannins, flavonoids and phenolic compounds. Many of these indigenous medicinal plants are used as spices and food plants. They are also sometimes added to foods as supplements. The herbal medicines are recognized as most reliable, and cost

effective than any other system of medicinal practice. In addition, the use of higher plants and their preparation to treat infectious and non-infectious diseases is an age old practices and are the only method available in the past. Plants which constitute an active part of the ecosystem have been found to be useful to man both as sources of foods and medicine (Evans et al., 2002). Hence in many parts of the world, medicinal plants have continued to be an integral part plant materials for curing diverse forms of ailments which leads to human civilization; the scientific analysis of different natural sources for their possible medicinal potency is of the health care system and the people's culture, though the use of natural sources like

Table 1. Antibacterial activity of ethanolic extract of rhizome of *Sansevieria*.

Bacteria	Bacteria zone of inhibition (mm)					Ciprofloxacin (50 µg/ml)
	100 µg/ml	150 µg/ml	200 µg/ml	250 µg/ml	300 µg/ml	
<i>S. Typhi</i>	8±0.1	11±0.1	12±0.2	13±0.1	18±0.1	38±0.1
<i>P. fluorescens</i>	10±0.2	17±0.1	21±0.1	28±0.2	32±0.1	46±0.1
<i>P. aeruginosa</i>	11±0.1	15±0.2	17±0.2	22±0.3	25±0.1	34±0.0
<i>E. coli</i>	7±0.1	13±0.1	18±0.1	20±0.2	22±0.2	33±0.0

microorganisms also triggered this type of plant investigations. Antibiotics are a class of antimicrobial agents. Antibiotics act by inhibition of cell wall synthesis, inhibition of folate metabolism and also binding to ribosomes to prevent translation and interference with nucleic acid synthesis (Reynolds, 1996). Higher plants can serve both as potential antimicrobial crude drugs as well as source of new anti-infective agents. In India, *Sansevieria* species include treatment for abdominal pains (Adeyemi et al., 2009), ear ache, diarrhoea and hemorrhoids. *Sansevieria* leaves are known for its anti-inflammatory activity, analgesic property (Sunilson and Jayaraj, 2009), antioxidant (Aliero et al., 2008) and antimicrobial activity.

MATERIALS AND METHODS

Collection and extraction of plant materials

Fresh stem parts were collected from Chennai and identified with the help of botanist of RRIUM, Chennai. 250 g air-dried stem powder was subjected to 250 ml of ethanol in Soxhlet extraction for 8 h (50 to 85°C). The extract was concentrated to dryness in a flask evaporator under reduced pressure and controlled temperature (50 to 60°C) to yield crude residue, which was then stored in refrigerator (Lin et al., 2008). The extracts were filtered through Whatman No. 1 filter paper and then concentrated in a vacuum at 40°C using a rotary evaporator. Each extract was transferred to glass vials and kept at 4°C before use.

Testing of antibacterial activity

Collection of microorganism

In vitro antimicrobial activity was examined for the ethanolic extracts of stem part against four bacterial species, the gram negative strains *Salmonella Typhi* (ATCC 00215), *Pseudomonas fluorescens* (ATCC 06341), *Pseudomonas aeruginosa* (ATCC 02150) and *Escherichia coli* (ATCC 10263).

Disc diffusion method

The testing of antibacterial activity of the plant extracts was carried out *in vitro* by Kirby-Bauer disc diffusion technique (Bauer et al., 1996). Culture of bacteria was made on Muller Hinton agar plates. Sterile paper discs 5 mm diameter (Himedia) were placed over the plate at an equidistant position.

The discs were loaded with 10 µl of the drug at the concentration of 100, 150, 200, 250 and 300 µg/ml. DMSO was used as solvent. Separate control disc was also included using the solvent.

Ciprofloxacin was used as standard for comparison. The plates were incubated at 37°C for 24 h. The microbial growth was determined by measuring the diameter of zone of inhibition.

Minimum inhibitory concentration (MIC)

Minimum inhibitory concentration (MIC) is the lowest of concentration of an antimicrobial that will inhibit the visible growth of the microorganism after overnight incubation. The MIC is determined by agar dilution method (Bennet et al., 1996). The tests were performed at five concentrations; 60, 70, 80, 90 and 100 µg/ml employing the ethanolic extract of the plant.

RESULTS AND DISCUSSION

The antibacterial activity of ethanolic extract of rhizome of *S. roxburghiana* against the four pathogenic bacteria, *S. Typhi*, *P. fluorescens*, *P. aeruginosa* and *E. coli* were assessed by zone of inhibition. The results are shown in Table 1. All the microbes used in the present study were sensitive to the ethanolic extract of the plant and showed a potential activity. Maximum activity was seen in the case of *P. fluorescens* where the zone diameter was 32 mm (300 µg/ml).

The minimum inhibitory concentration study revealed that the value for the *S. Typhi* and *E. coli* as 80 and 60 µg/ml for *P. fluorescens* and *P. aeruginosa*.

This *in vitro* study demonstrated that folk medicine can be as effective as modern medicine to combat pathogenic microorganism. The antibacterial activity of this plant would help for development of a new alternative medicine system which has no side effects. The antitumor activity of the experimental plant also opens doors for further research (Kar et al., 2010). This study serves as a baseline in identification of new medicinal plant and further investigation on the same may yield new compounds of medicinal importance for specific microbial disease.

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