Research Article

IN VITRO ANTIBACTERIAL ACTIVITY OF STEM EXTRACTS OF *AERVA LANATA* LINN

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ABSTRACT

The study was carried out to ascertain the antibacterial properties present in different extracts of dried scale leaves of *Aerva Lanata*. The Antibacterial testing of stem extract *Aerva Lanata* was evaluated by Agar well diffusion method using gram positive bacteria like *Staphylococus aureus, Bacillus subtilius*, gram negative bacteria like *Escherichia coli, Klebseilia pneumoniae*. Amongst the test extracts, the results suggested that, Ethyl acetate, Ethanol extracts of stem showed significant antibacterial activity compared with standard drug.

Keywords: *Aerva Lanata*, Gentamycin, Flavonoids, Anthraquinons.

INTRODUCTION

Herb is an immeasurable wealth of nature not only from the global environmental perspective but also from the medicinal point of view. It plays a significant role ameliorating the disease resistant ability and combating against various unfavourable metabolic activities within the living system.[1] Herbal medicine is the mainstay of about 75–80% of the world population, mainly in the developing countries, for primary health care because of better cultural acceptability, better compatibility with the human body and lesser side effects. The chemical constituents present in them are a part of the physiological functions of living flora and hence they are believed to have better compatibility with the human body.[2] The clinical efficacy of many existing antibiotics is being threatened by the emergence of multidrug-resistant pathogens.[3] There is a continuous and urgent need to discover new antimicrobial compounds with diverse chemical structures and novel mechanisms of action for new and re-emerging infectious diseases.[4] Therefore, researchers are increasingly turning their attention to folk medicine, looking for new leads to develop better drugs against microbial infections.[5] *Aerva Lanata* linn. Belonging to the family Amaranthaceae. Herbs are perennial, 5–50 cm tall. Stem branched from base; branches ascending or stoloniferous, white lanose. Leaves opposite or nearly whorled, sessile, grayish green, subulate, linear, 1–2.5 cm × ca. 1 mm, abaxially white lanose, adaxially glabrous, base attenuate, sometimes vaginate. Spikes terminal, narrowly ovate or terete, 0.5–2.5 cm, 3–5 mm in diam., white lanose; rachis very short or absent. Bracts and bracteoles lanceolate, 1–2 mm, abaxially white lanose.[6,7] The phytoconstituents reported from stem are Flavanoids, Tannins, Anthra quinons.[8,9] However, from the above account, it is obvious that there is no information available about the antibacterial activity of stem *of Aerva Lanata*. The present investigation was to explore the antibacterial activity of *Aerva Lanata.*

MATERIALS AND METHODS

Collection of Plant material

The stems of *Aerva Lanata* were collected from surrounding places of Nalgonda Dist.

Procedure for Extraction

Dried stems of *Aerva Lanata* were ground to coarse powder. The powder was extracted with different solvents like Ethanol, Ethyl acetate by Soxhlation for 6 hours[10,11] for the preparation of different extracts and the obtained extracts were subjected to antibacterial screening[12].

Microorganisms

The test organisms included for study were gram positive bacteria like *Staphylococus aureus, Bacillus subtilius*, gram negative bacteria like *Escherichia coli, Klebseilia pneumoniae*. All the bacterial strains were procured from Osmania University, Hyderabad, Andhra Pradesh. The bacteria were grown in the nutrient broth at 37°C and maintained on nutrient agar slants at 4°C.

Bacterial Media

Muller Hinton Media was mixed with distilled water and then sterilized in autoclave at 15 lb pressure for 15 minutes. The sterilized media were poured into Petri dishes and allowed for solidification. The solidified plates were bored with 5mm diameter cork borer. The plates with wells were used for the antibacterial studies.

Antibacterial activity of the plant extracts

Different stem extracts of *Aerva Lanata* at a concentration of 500µg/ml, 750µg/ml, 1000µg/ml were tested against the gram positive bacteria like *Staphylococus aureus, Bacillus subtilius*, gram negative bacteria like *Escherichia coli, Klebseilia pneumoniae* by Well Diffusion Method.

Well Diffusion Method

Antibacterial activity of the plant extract was tested using Well diffusion method.[13] The prepared culture plates were inoculated with different selected strains of bacteria using streak plate method. Wells were made on the agar surface with 6mm cork borer. The dried extracts were dissolved in 95% of ethanol for preparation of different concentration ranges of extracts. The extracts were poured into the well using sterile syringe. The plates were incubated at37°C±2°C for 24 hours for bacterial activity. The plates were observed for the zone clearance around the wells. The extracts of the dried scale leaves were used for the study. The extracts were dissolved in sterile distilled water to form dilution such as 500µg/ml, 750µg/ml and 1000µg/ml. Each concentration of the extract was tested against different bacterial pathogens. Gentamycin[14] at a concentration of 5µg/ml and 10µg/ml was used as standard antibacterial drug. The zone of inhibition was calculated by measuring the diameter of the inhibition zone around the well (in mm) including the well diameter. The readings were taken in three different fixed directions in all three replicates[15] and the average values were tabulated.

RESULTS AND DISCUSSION

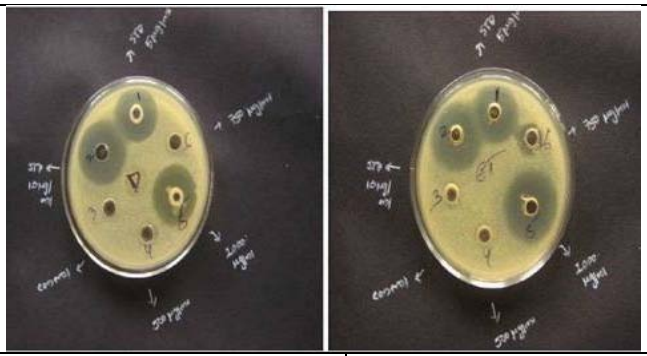
Antibacterial assay of the Ethanol, Ethyl acetate extracts of stem of *Aerva Lanata* exhibited dose dependent antibacterial activity against the tested microorganisms at three different concentrations of 500, 750 and 1000µg/ml. The potential sensitivity of the extracts was obtained against all the tested micro organisms and the zone of inhibition was recorded and presented in the table given below (Table 1). From the above study the zone of inhibition obtained was dose dependent and the activity shown by the Ethyl acetate, Ethanol extracts of stem of *Aerva Lanata* at a concentration of 1000µg/ml against gram positive bacteria like Staphylococcus aureus, Bacillus subtilius, and gram negative bacteria like *Escherichia coli, Klebseilia pneumonia* strains involved in present study was more in comparison to Gentamycin, at a concentration of 5µg/ml. The extracts prepared by solvents like water, isopropyl alcohol showed no zone of inhibition. The zone of inhibition shown by the water, isopropyl alcohol, were tabulated in the below given below (Table 2). The antibacterial potential exhibited by stem extracts may be contributed to the presence of tannins, flavonoids, anthraquinons in preliminary phytochemical investigations. Further study is needed to characterize the active principles.

Table 1: Zone of inhibition shown by the Gentamycin and the Ethanol, Ethyl alcohol extracts of dried stems of *Aerva Lanata*

Micro-organisms	Zone of inhibition (mm)			
	GENTAMYCIN		EXTRACTS (1000µg/ml)	
	5µg/ml	10µg/ml	Ethanol extract	Ethyl acetate extract
Bacillus subtilus	7.5 mm	9 mm	8 mm	7 mm
Escherichia Coli	7 mm	9 mm	6.5 mm	6 mm
Klebseilia Pneumoniae	7 mm	9 mm	8 mm	7 mm
Staphylococous aureus	7.5 mm	9 mm	8 mm	8 mm

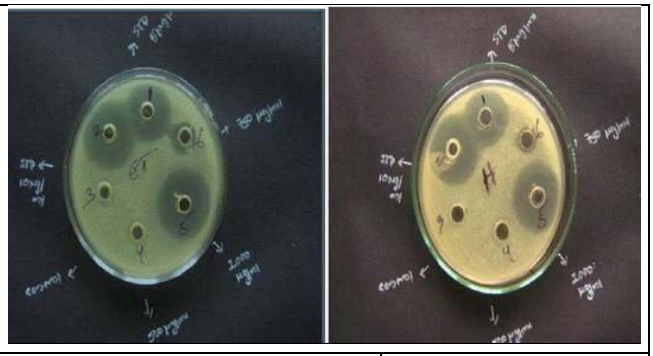
Table 2: Zone of inhibition shown by the Gentamycin and the Water, Isopropyl alcohol extracts of stem of *Areva Lanata.*

Micro-organisms	Zone of inhibition (mm)			
	GENTAMYCIN		EXTRACTS (1000µg/ml)	
	5µg/ml	10µg/ml	Water extract	Isopropyl alcohol extract
Bacillus subtilus	7.5 mm	9 mm	--	--
Escherichia Coli	7 mm	9 mm	--	--
Klebseilia Pneumoniae	7 mm	9 mm	--	--
Staphylococous aureus	7.5 mm	9 mm	--	--



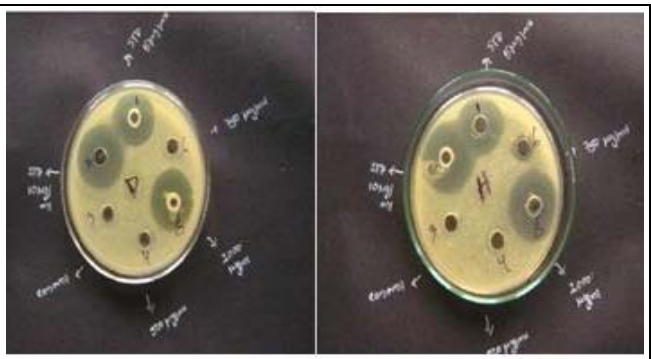
ETHANOL | ETHYL ACETATE

Figure 1: Zone of inhibition shown by the Ethanol and Ethyl acetate extracts of stem of *Areva Lanata.* on *Bacillus subtilis* bacteria.



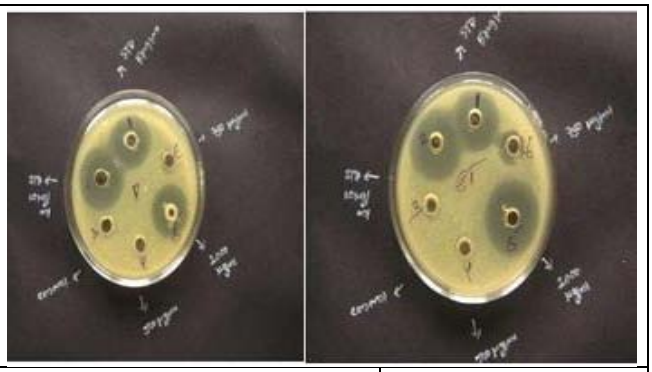
ETHANOL | ETHYL ACETATE

Figure 2: Zone of inhibition shown by the Ethanol and Ethyl acetate extracts of stem of *Areva Lanata* on *Klebsiella pneumoniae* bacteria.



ETHANOL | ETHYL ACETATE

Figure 3: Zone of inhibition shown by the Ethanol and Ethyl Acetate extracts of stem of *Areva Lanata* on *Staphylococcus bacteria*



ETHANOL | ETHYL ACETATE

Figure 4: Zone of inhibition shown by the Ethanol and Ethyl Acetate extracts of stem of *Areva Lanata* on *E. coli* bacteria

CONCLUSION

From the above study, it is concluded that the stems of *Areva Lanata* may represent a new source of anti-bacterial with stable, biologically active components that can establish a scientific base for the use of this in modern medicine. These local ethnomedical preparations of plant sources should be scientifically evaluated and then disseminated properly. This knowledge about the medicinal plants usage can also be extended to other fields like field of pharmacology.

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