

## **Antibacterial Activity of root of *Lantana camara* Linn.**

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### **Summary**

Crude ethanolic and aqueous extract from *Lantana camara* (L. camara) were evaluated for antibacterial activity by the agar-well diffusion method. Ten strains, including Gram-positive and Gram-negative bacteria were used in the bioassay. Amongst the evaluated extract ethanol extract presented the best results while aqueous extract showed moderate inhibition of the microbial growth.

**Key words:** *Lantana camara*, Antibacterial Activity, Agar well diffusion method

### **Introduction**

The emergence of human pathogenic microorganisms that are resistant to major classes of antibiotics have increased in recent years, due to the indiscriminate use of antimicrobial drugs (1). This has caused many clinical problems in the treatment of infectious diseases and the antibiotics commonly used are sometimes associated with adverse effects on the host, which include hypersensitivity, allergic reaction and immunosuppression (2). Therefore, research for development of new antimicrobial agents is an urgent need.

Plants are known to produce some chemicals, which are naturally toxic to bacteria (3). Traditionally, the dried herbs are used either as boiled in water to make a tea or as an infusion to treat systemic bacterial and fungal infections, as well applied directly on the skin or nails in a plaster form to treat local infections (4).

The present study was undertaken to investigate the antibacterial activity of *Lantana camara* (Verbanaceae) against some pathogens. The crude extracts of root were tested for their potential antibacterial property. The selection of this plant for evaluation was based on its traditional use. *Lantana camara* finds usage in the treatment of itches, ulcers, bilious fever, eczema, tetanus, malaria, tumours and rheumatism (5, 6).

### **Materials And Methods**

#### **Plant materials**

Fresh material of plant in the flowering stage were collected in Bangalore in May 2011. The taxonomic identification of the plant was confirmed by Dr. S. Sundara Rajan, Center for Vrikshayurveda a division of Center for Advance Studies in Bioscience (Voucher specimen number LC-201).

#### **Extraction**

Freshly collected roots of *Lantana camara* were shade-dried and then powdered using a mechanical grinder. One hundred gram of pulverized plant material were taken in five hundred capacity thimble of Soxhlet apparatus and refluxed with ethanol and water separately until all soluble compounds had been extracted. Extraction was considered to be complete when the filtrate had a faint colour. The extracts were evaporated to dryness under reduced pressure using a Rotavapor (Buchi Flawil, Switzerland). A portion of the residue was used for the antibacterial assay.

### **Bacterial culture**

The bacterial strains used in this study were clinical isolates. The isolates were identified by a standard method (7). The organisms were maintained on nutrient agar slope at 4°C and sub-cultured into nutrient broth by a picking-off technique (8) for 24 hrs before use.

### **Bacterial susceptibility testing**

*In vitro* antibacterial activity of the crude extracts was studied against Gram-negative and Gram-positive bacteria by the agar well diffusion method (9). Nutrient agar (Hi Media, India) was used as the bacteriological medium. The extracts were dissolved in 10% aqueous dimethylsulfoxide (DMSO) to a final concentration of 100 mg/ml. Pure DMSO was taken as the negative control and 50 mg/ml Ciprofloxacin as the positive control. 100 µl of inoculum was aseptically introduced on to the surface of sterile agar plates and sterilized cotton swabs were used for even distribution of the inoculum. Wells were prepared in the agar plates using a sterile cork borer of 6.0 mm diameter. 100 µl of test and control compound was introduced in the well. The same procedure was used for all the strains. The plates were incubated aerobically at 35°C and examined after 24 hours (10, 11). The diameter of the zone of inhibition produced by each agent were measured with a ruler and compared with those produced by the commercial antibiotic Ciprofloxacin.

## **Results And Discussion**

The antibacterial activity of the crude extracts of *Lantana camara* was determined against 10 strains which include Gram-negative and Gram-positive bacteria (Table 1). The plant extracts differ significantly in their activity. The antibacterial activity was observed to be in dependent on solvent i.e., the ethanol extracts showed more significant activity than aqueous extract. The ethanol extract was most active against the Gram-positive bacteria in comparison to Gram-negative bacteria, tested at the same concentration. This observation supports the earlier reports that plant extracts are more active against Gram-positive bacteria than Gram-negative bacteria (12, 13). These observations may be attributed to two reasons; firstly, due to the nature of biologically active components (alkaloids, flavonoids, sterols, quinine, tannins etc.) which might be enhanced in the presence of ethanol (14). It has been documented that alkaloids, flavonoids and tannins are plants metabolites well known for their antimicrobial activity (15). Secondly, the stronger extraction capacity of ethanol could have produced a greater number of active constituents responsible for antibacterial activity.

*Lantana camara* have demonstrated antibacterial activity against clinical strains of selected microorganisms. The crude extract shows activity profile. As the crude extract is mixture of several constituents, it exerts better activity profile. The basis of varying degree of sensitivity of test organism is due to the intrinsic tolerance of microorganism and the chemical nature and structure of the constituent for the mode of action on the control of growth of microorganism is beneficial. The plant has been used in curing various ailments in India; hence the phytoconstituents is useful to develop the molecules against infectious diseases. *Lantana camara* has shown the better activity profile against gram positive and gram negative bacteria and hence it is a best target for further research for the development of broad spectrum antibacterial agents.

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**Table 1** Antibacterial activity of *Lantana camera* root extract against bacterial strains.

	<i>Pseudomonas aeruginosa</i>	<i>Klebsiella pneumonia</i>	<i>Salmonella typhi</i>	<i>Escherichia coli</i>	<i>Serratia marcescens</i>	<i>Proteus mirabilis</i>	<i>Staphylococcus aureus</i>	<i>Staphylococcus citreus</i>	<i>Bacillus polymyxa</i>	<i>Bacillus cereus</i>
ETHANOL EXTRACT	9.00±0.58	9.67±0.33	8.67±0.33	11.67±0.33	5.60 ±0.35	7.67±0.33	18.73±0.37	11.93±0.18	13.67±0.33	12.27±0.18
AQUEOUS EXTRACT	6.40±0.23	6.93±0.18	5.60±0.35	9.00±0.58	4.33 ±0.33	4.00±0.58	13.00±0.12	9.47±0.64	10.67±0.67	9.67±0.33
STANDARD	13.33±0.67	14.67±0.67	12.00±0.58	15.33±0.67	11.33±0.33	11.67±0.33	24.00±0.12	20.67±0.18	21.87±0.47	21.33±0.18

The values are the mean of three experiments ± S.E.