

## Antibacterial and analgesic activity of leaves of *Lantana camara*

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### Abstract

The leaves of the plant *Lantana camara* were extracted with different solvents and screened for their antibacterial and analgesic activities. The chloroform and methanolic extract of the plant *Lantana camara* has showed the presence of four alkaloid compounds each. Antibacterial activity was evaluated using MIC method against bacteria. The analgesic activity of different extracts of *Lantana camara* leaves is evaluated by Eddy's hot plate method where the responses are jumping withdrawal of paws and licking of paws. This study demonstrates that leaf powder of *Lantana camara* has significant antibacterial and analgesic activities.

**Keywords:** *Lantana camara*, Antibacterial activity, Analgesic activity, MIC.

### Introduction

Plants have been one of the important sources of medicines even since the beginning of human civilization [1]. Today, nearly 88% of the global population turn to plant derived medicines as they are first line of defence for maintaining health and combating diseases. In the present study an attempt has been made to enrich the knowledge of antibacterial and analgesic activity of different extracts of leaves of *Lantana camara* (Family: Verbenaceae) is a common weed and a native of tropical America and completely naturalized in many parts of India [2]. In India it is mostly found in Andhra Pradesh, Kerala, Maharashtra and Odisha.

*Lantana camara* has several uses, mainly used as herbal medicine and in some areas as firewood and mulch [3]. In India many researchers found that leaf extracts of *Lantana camara* exhibit antimicrobial, fungicidal, insecticidal and nematocidal activity [4]. The leaves are used to

relieve itching. Other uses are against flu, colds, coughs, fevers, yellow fever, dysentery and jaundice. The roots are used for gonorrhoea. *Lantana* oil is sometimes used for the treatment of skin itches, as an antiseptic for wounds and externally for leprosy and scabies. *Lantana* repels other groups of organisms such as insects. Plant extracts are used as medicine for the treatment of cancers, chicken pox, measles, asthma, ulcers, swellings, eczema, tumors, high blood pressure, bilious fevers, catarrhal infections, tetanus, rheumatism, malaria and atony of abdominal viscera [5].

### Material and Methods

#### Collection and extraction:

*Lantana camara* leaves were collected from the outskirts of Berhampur, Ganjam District, Odisha, India, in the month of September. The plant was identified by the taxonomist, Department of

Botany, Andhra University, Visakhapatnam, by comparing it with the authentic specimen deposited at the Andhra University, Visakhapatnam.

The leaves of the plant were shade dried and powdered. The powdered leaves were extracted with solvents of increasing polarity such as petroleum ether (60-80°C), chloroform and methanol, by the hot soxhlet successive extraction method. The solvent was removed under reduced pressure and controlled temperature by using a rotary flash evaporator. Standard methods [6-7] were used for preliminary phytochemical screening of the various extracts to know the nature of phytochemicals present in it.

#### **Microorganisms used:**

The following standard strains were obtained from Institute of Microbial Technology, Chandigarh, India and were used for the study.

Bacteria: *Bacillus licheniformis* 429, *Escherichia coli* 40, *Proteus vulgaris* 426, *Pseudomonas aeruginosa* 424, *Shigella flexneri* 1457, *Bacillus subtilis* 441, *Staphylococcus aureus* 87, *Staphylococcus epidermidis* 2639.

The medium Mueller Hinton agar was obtained from Hi-media Laboratories Limited, Mumbai-400 086, India.

#### **Antibacterial activity:**

##### ***Determination of Minimum Inhibitory Concentration (MIC):***

Minimum Inhibitory Concentration (MIC) of the extracts was performed by Broth dilution method [8], with concentrations of the chloroform and methanolic extracts ranging from 50 µg/ml to 400 µg/ml in Dimethyl sulfoxide (DMSO) against all test microorganisms. The MIC data are showed in Table-1&2.

##### ***Determination of Zone of Inhibition (ZOI):***

For the determination of ZOI pure ciprofloxacin was taken as a standard antibiotic for comparison of the results. Two sets of two dilutions (100

µg/ml and 200 µg/ml) of chloroform extract and ciprofloxacin (100 µg/ml and 200 µg/ml) (solvent, DMSO) were prepared in Mc Cartney bottles. Sterile nutrient agar plates were prepared and incubated at 37°C for 24hrs to check any sort of contamination. Two sterile filter paper discs (Whatmann No.1) of 6mm diameter were soaked in two different dilutions of crude extract and placed in appropriate position on the surface of the flooded plate, marked as quadrants at the back of the petridishes. The petridishes were incubated at 37°C for 24hrs and the diameter of the ZOI were measured in mm. Similar procedure were adopted for the pure ciprofloxacin and the corresponding zone diameter were compared accordingly. The zone of inhibition data are showed in Table-3.

#### **Analgesic activity:**

The analgesic activity of different extracts of *Lantana camara* leaves is evaluated by Eddy's hot plate method [9-10] where the responses are jumping withdrawal of paws and licking of paws. Mice of either sex weighing 120-125 gm, six in each group are taken. The standard drug taken is aspirin (30 mg/kg, the stock solution prepared contain 3 mg/ml and inject 1 ml/100gm of bodyweight of mice). Control group received 5 ml/kg saline water, for test group 500 mg/kg body weight of chloroform and methanolic extracts of *Lantana camara* dissolved in water for oral administration. The analgesic activity of the chloroform and methanolic extract are showed in Table-4&5.

## **Results and Discussion**

The antibacterial activity of the two different extracts, that is, chloroform and methanol is shown in Table-1&2. Chloroform extract showed good antibacterial activity as compared with that of standard drug ciprofloxacin. Phytochemical studies revealed the presence of alkaloids in chloroform and methanol extracts.

The analgesic activity study revealed that chloroform and methanolic extracts showed good activity compared with that of standard drug

**Table-1: MIC value of methanolic extract of *Lantana camara* leaves.**

Name of the Bacteria	Concentration ( $\mu\text{g/ml}$ )				
	0	50	100	200	300
<i>Bacillus licheniformis</i> 429	+	+	+	-	-
<i>Escheriachia coli</i> 40	+	+	+	-	-
<i>Proteus vulgaris</i> 426	+	+	+	-	-
<i>Pseudomonas aeruginosa</i> 424	+	+	+	-	-
<i>Shigella flexneri</i> 1457	+	+	+	-	-
<i>Bacillus subtilis</i> 441	+	+	+	+	-
<i>Staphylococcus aureus</i> 87	+	+	-	-	-
<i>Staphylococcus epidermidis</i> 2639	+	+	+	-	-

“0” indicates without extract, “+” indicates presence of growth, “-“indicates absence of growth.

**Table-2: MIC value of chloroform extract of *Lantana camara* leaves.**

Name of the Bacteria	Concentration ( $\mu\text{g/ml}$ )				
	0	50	100	200	300
<i>Bacillus licheniformis</i> 429	+	+	-	-	-
<i>Escheriachia coli</i> 40	+	+	+	-	-
<i>Proteus vulgaris</i> 426	+	-	-	-	-
<i>Pseudomonas aeruginosa</i> 424	+	+	+	+	-
<i>Shigella flexneri</i> 1457	+	+	+	+	-
<i>Bacillus subtilis</i> 441	+	+	+	+	-
<i>Staphylococcus aureus</i> 87	+	-	-	-	-
<i>Staphylococcus epidermidis</i> 2639	+	+	+	+	-

“0” indicates without extract, “+” indicates presence of growth, “-“indicates absence of growth.

**Table-3: Zone of Inhibition of chloroform extracts of *Lantana camara* leaves.**

Name of the Bacteria	Extract conc. in (µg/ml)		Ciprofloxacin conc. (µg/ml)	
	100	200	100	200
<i>Bacillus licheniformis</i> 429	4	6	12	12
<i>Escheriachia coli</i> 40	2	3	12	13
<i>Proteus vulgaris</i> 426	5	7	13	14
<i>Pseudomonas aeruginosa</i> 424	3	3	13	15
<i>Staphylococcus aureus</i> 87	6	9	13	15

**Table-4: Analgesic activity of methanolic extract of *Lantana camara* leaves.**

Groups	Treatment	Dose	Basal reaction time	Reaction time in sec. after administration of drug in minute			
				30	60	120	180
i.	Control	5 ml/kg	4.0	4.3	4.4	4.3	4.5
		5 ml/kg	5.0	5.7	5.4	5.3	5.9
ii.	Standard	30 mg/kg	3.7	3.9	4.5	5.1	12.0
		30 mg/kg	3.7	4.4	4.6	5.0	5.6
iii.	Test	500 mg/kg	3.4	2.5	2.9	3.3	3.8
		500 mg/kg	4.3	3.5	4.3	4.5	4.6

**Table-5: Analgesic activity of chloroform extract of *Lantana camara* leaves.**

Groups	Treatment	Dose	Basal reaction time	Reaction time in sec. after administration of drug in minute			
				30	60	120	180
i.	Control	5 ml/kg	4.0	4.3	4.4	4.3	4.5
		5 ml/kg	5.0	5.7	5.4	5.3	5.9
ii.	Standard	30 mg/kg	3.7	3.9	4.5	5.1	12.0
		30 mg/kg	4.7	4.4	4.6	5.0	5.6
iii.	Test	500 mg/kg	4.4	4.0	4.2	4.4	4.7
		500 mg/kg	4.1	4.2	4.6	4.7	4.8

aspirin. We presume that the presence of alkaloids may be contributing the analgesic activity of chloroform and methanolic extracts. It is envisaged to inculcate the exact mechanism of analgesic activity of the chloroform and methanolic extracts. Further studies regarding the isolation and characterization of the active constituents responsible for such activity is currently under progress.

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