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**Sensitivity Pattern of Bacterial Pathogens on the Medicinal Weed
Lantana camara (Linn.)**

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Abstract: *Lantana camara* (Linn.) is widely used as a traditional medicine for the treatment of infectious diseases. *In vitro* antibacterial activity of aqueous and organic extracts of *Lantana camara* leaves were investigated against various clinical pathogens. The disc diffusion method showed significant zones of inhibition against the test bacteria. Among the solvents tested ethanolic and ethyl acetate extracts were found to possess better antibacterial activity. While aqueous extracts exhibited no inhibition. The activity was greater against *Staphylococcus aureus* (19.0 mm), *Klebsiella pneumoniae* (18.6 mm) and *Proteus vulgaris* (14.2 mm). These results support the ethnomedicinal uses of *Lantana camara* for the starting treatment of various elements.

Key words: *Lantana camara*, drug resistance, antibacterial activity, infectious diseases, clinical problems

INTRODUCTION

During the last few decades infectious diseases have threaten the life of millions of people in developing as well as developed countries (Ashbo, 2004). This situation has been compounded by the increase in the development of antibacterial resistance by different bacterial species and the high cost of current antibacterial drugs (Samie *et al.*, 2005). This has increased the development of novel, efficient and inexpensive drug is of great importance. Medicinal plants have been used all over the world for the treatment and prevention of various elements, particularly in developing countries where the infectious diseases are endemic and modern health facility and services are inadequate (Kamanzy *et al.*, 2002; Samie *et al.*, 2005). In India traditional medicine is of great value and is well recognized by different communities to treat various disorders. Plants particularly have been used to treat infectious diseases due to its anti microbial properties. This is due to the presence of various kinds of phytochemicals including alkaloids, flavanoids, terpenoids, Phenolic compounds and essential oils (Lewis and Elvin-Lewis, 1995; Cowan, 1999). Hence plant products are anticipated to be an alternative source of novel antibacterial agent findings.

Lantana camara is a most common weed belonging to the family verbenaceae. It is widely distributed in tropical and subtropical region has a good position in traditional medicinal system in wayanadu district of Kerala (India). The leaf extract of the plant have been used against ulcer, dysentery and other skin diseases. To validate this observations the present study was under taken to evaluate the antibacterial potentiality of the leaf extracts of *Lantana camara* (Linn.) against the growth of some pathogenic bacteria.

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MATERIALS AND METHODS

Plant Collection

The present study plant materials used by tribal communities (Paniyar, Kurichyar, Kattunaykkan, Ooralikuruman) of Wayanadu district-Kerala, were collected during November 2006-February 2007 with the help of local tribal peoples. Dr. S. Soosai authenticated the plant samples, the botanist of St. Joseph College, Rapinat Herbarium, Trichirappalli, India.

Extraction of Plant Material

The plant materials (leaves) were shade dried at 31°C for 10 days. Fifty grams of the dried powdered materials were soaked separately with 300 mL of the solvents (1:6 w/v) viz., water, ethanol, ethyl acetate, chloroform and benzene, in a soxhlet apparatus for 48 h at 310°C until complete extraction of the plant materials. At the end of 48 h each extract was filtered through whatman No. 1 filter paper and filtrates were concentrated at room temperature in order to reduce the volume. The paste like extracts were stored in pre-weighed screw capped bottles and the yield of extracts have been weighed and the extract was individually reconstituted using minimal amounts of extracting solvents prior to use.

Microorganisms

The microorganisms used for the anti bacterial screening were collected from clinical laboratory of Microbiology department, Sea horse hospital, Trichirappalli, India. The bacteria includes *Staphylococcus aureus*, *Staphylococcus epidermitis*, *Enterococcus faecalis*, *Pseudomonas aeruginosa*, *Salmonella typhimurium*, *Vibrio cholerae*, *Proteus mirabilis*, *Proteus vulgaris*, *Salmonella typhi*, *E. coli*, *Klebsiella pneumoniae*, *Enterobacter aerogens*.

E. coli mutants strains viz., K₁₂, DH5 α , KL₉₆, DH₁₉, C₂H₅7 were collected from Microbiology Division, Madurai Kamaraj Univeristy, Madurai, India.

Antibacterial Assay

Antibacterial activity of the above mentioned four different solvents and aqueous extracts were assayed separately using disc diffusion method (Bauer *et al.*, 1996). Petriplates containing 10 mL of Muller Hinton Agar Medium, were seeded with 100 μ L of suspension containing 10⁸ CFU mL⁻¹ of each test bacterial sterile filter paper discs (6 mm in diameter) were impregnated with 10 μ L of the 3 mg mL⁻¹ plant extracts (30 μ g/disc) placed on the surface of the medium. Negative controls are prepared using the same solvents employed to dissolve the plant extracts. A standard disc containing chloramphenicol antibiotic drug (30 μ g/disc) was used as a positive control. Incubation was done for 24 h at 37°C. The assessment of antibacterial activity was based on the measurement of diameter of inhibition zones formed around the disc. Three independent trials were conducted for each concentration.

RESULTS AND DISCUSSION

The antibacterial activity of aqueous and various organic solvent extracts of *Lantana camara* leaf on clinical pathogens are depicted in Table 1. The ethanolic leaf extracts exhibited greater inhibition against the test bacteria. The zone of inhibition was higher in *Staphylococcus aureus* (19.0 mm), *Klebsiella pneumoniae* (18.6 mm) and *Proteus vulgaris* (14.2 mm). Moderate inhibition was associated with DH5 α (11 mm), K₁₂ (11.0 mm), *Vibrio cholerae* (10.3 mm), *Salmonella typhi* (19.3 mm), *E. coli* (8.6 mm), *Enterobacter aerogens* (8.6 mm). DH₁₉ (8.3 mm) and KL₉₆ (8.6 mm) where as the same extract showed feable inhibition on *Enterococcus faecalis* (6.3 mm) and very poor inhibition was

Table 1: Sensitivity profile of bacterial pathogens on *Lantana camara* leaf extracts (Disc diffusion method)

Test bacteria	Zones of inhibition (mm)					Positive control (chloramphenicol) (30 µg/disc)
	Aqueous	Ethanol	Ethylacetate	Chloroform	Benzene	
Gram positive						
<i>Staphylococcus aureus</i>	-	19.0±2.9	14.0±4.50	11.0±1.00	12.5±2.50	6.0±0.00
<i>Staphylococcus epidermitis</i>	-	2.6±3.7	6.0±4.30	2.6±3.70	-	6.0±0.00
<i>Enterococcus faecalis</i>	-	6.3±4.4	-	-	7.0±0.00	9.0±0.00
Gram negative						
<i>Pseudomonas aeruginosa</i>	-	-	4.6±3.20	7.0±4.90	-	9.0±0.00
<i>Salmonella typhimurium</i>	-	7.3±0.4	8.6±0.90	7.6±0.40	7.3±0.40	9.0±0.00
<i>Vibrio cholerae</i>	-	10.3±1.6	10.3±1.20	7.3±0.40	7.3±5.10	7.0±0.00
<i>Proteus mirabilis</i>	-	-	-	-	-	9.0±0.00
<i>Proteus vulgaris</i>	-	14.0±4.3	15.6±2.60	14.0±4.00	11.3±2.00	9.0±0.00
<i>Salmonella typhi</i>	-	9.3±1.2	10.0±0.80	8.6±0.40	4.0±2.80	9.0±0.00
<i>E. coli</i>	-	8.6±1.2	17.3±2.00	12.3±4.10	13.3±5.30	10.0±0.00
<i>Klebsiella pneumoniae</i>	-	18.6±1.6	17.0±1.60	9.3±1.20	7.6±1.20	8.0±0.00
<i>Enterobacter aerogens</i>	-	8.6±1.2	-	-	-	9.0±0.00
C ₂ H ₅ 7	-	-	11.0±0.00	11.0±0.00	6.3±4.60	9.0±0.00
DH ₁₉	-	8.3±1.2	7.6±0.40	8.3±0.40	3.3±4.70	7.0±0.00
KL ₉₆	-	8.3±0.4	7.6±0.40	9.3±0.90	7.0±4.90	14.0±0.00
DH5 α	-	11.0±0.8	10.0±0.80	10.0±0.80	10.0±0.80	7.0±0.00
K ₁₂	-	11.0±1.6	2.6±3.70	8.0±0.00	9.6±0.40	7.0±0.00

-: Nil activity

observed against *Staphylococcus epidermitis* (2.6 mm). There was no inhibition associated with *Pseudomonas auriginosa*, *Proteus mirabilis* and C₂H₅7. The results of antibacterial screening of other solvent extracts of *Lantana camara*, Leaf extracts were also depicted in Table 1. The zones of inhibition against the pathogenic bacteria were higher than or equal to standard antibiotic. chloramphenicol (30 µg/disc). Some of the extracts showed less inhibition or complete absence of inhibition zones (Benzene) against *Salmonella typhi*, C₂H₅7 and DH₁₉, where as the aqueous extracts did not show any activity against the test bacteria, against *Staphylococcus epidermitis*, *Pseudomonas auriginosa*, *Proteus mirabilis* and *Enterobacter aerogens*.

The ethanol and ethylacetate extract of *Lantana camara* leaf effectively inhibited the growth of both gram negative and positive bacteria. These results are consistent with previous reports given by Raghavendra *et al.* (2006) where the ethanol and methanol extracts showed significant activity against human pathogenic bacteria viz., *Klebsiella pneumoniae*, *Pseudomonas aeruginosa*, *Staphylococcus aureus*, *Salmonella typhi* and *Salmonella typhimurium*. Similar results were also drawn by many researchers (Rabe and Vanstaden, 2000; Ates and Erdogru, 2003; Subramanian *et al.*, 2006; Manikandar *et al.*, 2006), were by majority of the significant activity was associated with ethanol and ethyl acetate extracts. This is due to most of the antibacterial principles are extracted much through alcoholic solvents (Chakrabarty and Brantner, 1999; Aburjai *et al.*, 2001). This finding is quiet interest because in the traditional methods of treatment, plant part decoction has been prepared using water as a solvent where as according to the present investigation, plantextract preparation with the organic solvents shown greater antibacterial activity in accordance with the findings reported by Subramanian *et al.* (2006) and Bhattacharjee *et al.* (2006). Antibiotics provide the main basis for the therapy of bacterial infection. However, the high genetic variability of bacteria enables them to rapidly evade the action of antibiotics by developing antibiotic resistance. Thus there has been a continuing search for new and potent antibiotics (Raghavendra *et al.*, 2006). The last decade researches witnessed an increase in the investigation on plants as a source of human diseases management (Mouniswamy *et al.*, 2002; Woldemichael *et al.*, 2003; Raghavendra *et al.*, 2006) and not many reports are available on the exploitation of weeds for antibacterial screening. Therefore in the present study

Lantana camara an important weed in the list of most hundreds invaders of the world, was evaluated for its antibacterial potential for the first time against important pathogens of humans and plants. The present investigation clearly reveals the antibacterial nature of this plant and suggest that this weed could be exploited in the alternate antibiotic source, which may provide leads in the ongoing research on novel antibiotics.

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