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Research Article

ANTIBACTERIAL ACTIVITY IN DIFFERENT EXTRACTS OF *LANTANA CAMARA* AGAINST ENTEROPATHOGENS

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ABSTRACT

Medicinal use of plants is the oldest form of healthcare known to mankind. India has a rich profusion of medicinal plants and 75% of its folk population is still using herbal preparations. Present study reports about antimicrobial potentiality of *Lantana camara* as its leaf extracts exhibit good antimicrobial, fungicidal, insecticidal and nematicidal properties and the plant might be a novel source of antimicrobial drug. Two enteropathogens as (A) - *B. subtilis* (positive, obligate aerobic) and (B) - *E. coli* (Gram-negative, facultative anaerobic) were used for the present study. Four solvent phases viz, methanol, ethanol, acetone and aqueous were used for extraction of antimicrobial agent. The screening of antimicrobial property was done by well diffusion method. Leaves of *Lantana camara* showed excellent antibacterial activity in all the solvent phases used against both *E. coli* as well as *B. subtilis*. *Lantana* is effective against both the bacteria.The aqueous extract showed minimum ineffective antimicrobial activity against *E. coli and B. subtilis, where as* acetone phase showed maximum activity against *B. subtilis* and ethanol against *E. coli* as shown in the terms of maximum zone of inhibition.

Keywords: Antibacterial, solvent phase, microbial strains, zone of inhibition

INTRODUCTION

Long before mankind discovered the existence of microbes, the idea that certain plants had healing potential, indeed, that they contained what we would currently characterize as antimicrobial principles, was well accepted. Since time immemorial, plants are used as a source of medicines; Traditional medicine is the most ancient art of medical practice (Soforowa, 1986). According to an all India ethnobiological survey carried out by the Ministry of Environment & Forests, Government of India, there are over 8000 species of plants being used by the people of India, while the biological diversity potential of plant metabolites is evident from the fact that 47-marketed drugs have been derived from 39 tropical forest plants. *Lantan camara* (an invasive shrub species of family Verbenaceae) plant introduced in India as an ornamental plant but entirely naturalized and found throughout India (Ross, 1999). The leaf oil is used as an antiseptic for wounds and the roots are used for the treatment of tooth ache and the flowers for chest complaints in children (Kirtika and Basu, 1981),while extracts from the leaves exhibit strong antimicrobial, anti proliferative, fungicidal, insecticidal and nematicidal activity (Day, 2003). All few types' yellow, lavender, red and white *Lantana camara*, flowers displayed almost similar antibacterial activities against *E. coli, P. aeruginosa, S. aureus*, and *S. saprohiticus* (Kensa, 2011).

Material and methods

Plant sample and preparation of extracts

All plant materials were collected from local area of Rajasthan and M. P. and identified taxonomically. The leaves of the plants were air dried at room temperature before grinding them to powdered form. Different solvents i.e. Methanol, Ethanol, Distilled water and Acetone were used respectively to find extracts of the earlier dried leaves. The powdered leaves were extracted by putting in incubator shaker for 48 days at 25°C temperature. Each extract was first filtered through Whatman No. 1 filter paper to clarify and then through a 0.45 µm membrane filter. The residual extracts were evaporated at 35-40°C in oven. The dried crude extracts were stored at 4°C for antibacterial testing. All the extracts were diluted in specific solvent prior to use in mg/ml concentration.

Test bacterial strain

To determine the antimicrobial activity of different plants two categories of microbes were selected as: (A) -*Bacillus subtilis* (strain no.441) and (B) -*Escherichia coli* (strain no. 45).

Screening of extracts for antibacterial activity

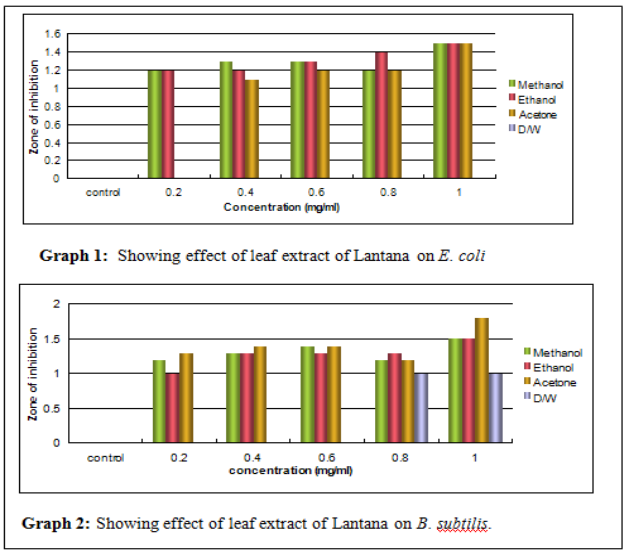
Activation of bacterial culture was carried out by inoculation of culture from the slants on to nutrient broth and then incubating them overnight at 37^0 C. few colonies was pulled out from the slants and transferred to respective broths and incubated for 16-18 hours at 37^0 C prior to test.

The antibacterial effect was analyzed by well diffusion (Mahalngam et al., 2011). Five wells of about 5mm diameter were punctured in each Petri plate of nutrient agar. Different concentrations (0.2, 0.4, 0.6, 0.8 and 1 mg/ml) of plant extracts were inoculated in each well and incubated the petri plates for 24 hrs at 37^0 C the diameter of zones of inhibition were measured.

RESULTS

Pictures and graph are showing comparative antimicrobial activity of different extracts of *L. camara.* In *Lantana camera* leaves, distilled water extract showed no inhibitory effect on *E. coli* (figure 2D) (graph 1), while showed some inhibition of *Bacillus subtilis* (Figure 2C) (graph 2). Ethanolic extract showed marked inhibition of *Bacillus subtilis* (figure 1C), while comparatively less inhibition of both the test micro-organisms. The acetone extract also showed marked inhibition of *B. sutbilis* (figure 2A). In *B. subtitlis* the maximum zone of inhibition was observed with crude ethanolic extract with zone of diameter 1.8cm at concentration 1 ml (figure 2B) and minimum zone of inhibition in methanolic extracts at zone 1 ml and 0.2ml with zone of diameter 1cm each (figure 1B). Against *E. coli* maximum zone of inhibition was observed in Acetone extract with zone of diameter upto1.5 cm (figure 2B) (graph 1) and

minimum zone of inhibition was with Ethanol and Acetone at concentration 0.4 ml with zone of diameter 1.2 cm (figure 1D) and 1.1 cm (figure 2B) .



Graph 1: Showing effect of leaf extract of Lantana on *E. coli*

Graph 2: Showing effect of leaf extract of Lantana on *B. subtilis*.

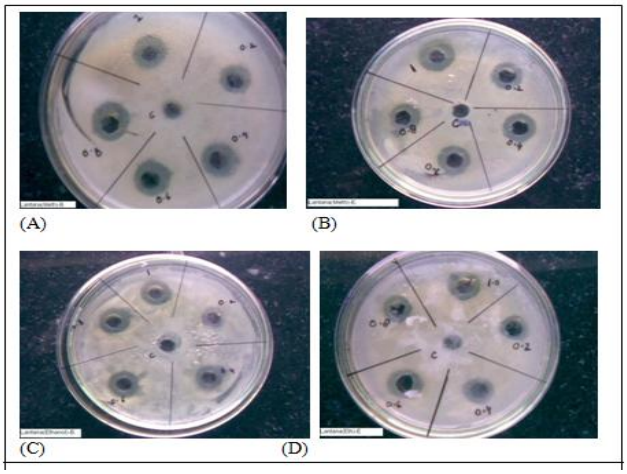
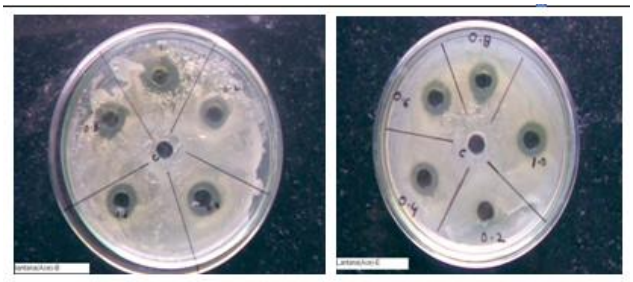
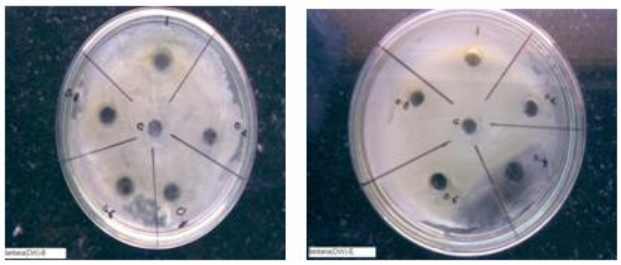


Fig.1: A: Methanolic extract of *L. camara* against *B. subtilis* and **B:** Methanolic extract of *L. camara* against *E. coli* **C:** Ethanolic extract of *L. camara* against *B. subtilis* and **D:** Ethanolic extract of *L. camara* against *E. coli*



(A) *(B)*



(C) *(D)*

Fig. 2: A: Acetone extract of *L. camara* against *B. subtilis* **B:** Acetone extract of *L. camara* against *E. coli* **C:** D.W extract of *L. camara* against *B. subtilis* **D:** D.W extract of *L. camara* against *E. coli*

DISCUSSION AND CONCLUSION

Lantana camara is most effective against *E.coli* and *Bacillus subtillius* among solvents used it is most effective in Ethanol, Methanol and Acetone. Distilled water is almost ineffective against the two microbial strains. The order of effectiveness of solvent phase for extraction of effective antimicrobial on the basis of zone of inhibition is; *E.coli*- Ethanol>Methanol>acetone>distilled water and for *B. subtilis*- Acetone>methanol>ethanol>distilled water. Therefore, present work highlights the use of solvent extracted leaves extracts of *L. camara* containing a highly potential antimicrobial property. The leaves of Lantana too proved to be good antibacterial agent as they show antagonistic effect on the growth of both tested microbes in all the solvent phases used.

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