Research Article

# Comparatitive Study of of Root Bark and Flower of *Lantana camara* for Evaluation of Antibacterial Activities

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**ABSTRACT**

Comparative antibacterial study of various extract of root bark and flower of *Lantana camara* was performed by disc diffusion method. Four extract (petroleum ether, ethyl acetate, ethanol, and aqueous) of 50 mg/ml concentration was prepared and tested against *Escherichia coli, Salmonella typhi, Pseudomonas, Staphylococcus aureus,* and *Bacillus subtilis.* Ethyl acetate extract from both root bark and flower showed effect but difference in their activity to the test organism was found. Highest activity was shown by root bark in ethyl acetate extract against all bacteria. However ethyl acetate extract of flower has shown more significant activity against *Bacillus subtilis and Salmonella typhi only.*

**Keywords:** *Lantana camara,* Root bark, Flower, Antibacterial activity, disc diffusion method, ethyl acetate extract.

## INTRODUCTION

Medicinal plants are the important source of medically important compounds. Recently, an increasing number of infections agents are becoming more resistant to available compounds[1].

The use of various plant extracts and phytochemicals, both with various pharmacological properties, are of great significance to therapeutic purposes[2].

The medicinal properties of plants are based on the presence of phytochemicals in them which possesses various effects such as antioxidant, antimicrobial, antipyretic etc[3].

Medicinal plants would be the best source to obtain a variety of drugs for treating various diseases therefore; such plants should be investigated to better understand their properties, safety and efficacy.

*Lantana camara* belongs to family Verbenaceae which is a flowering ornamental plant. It shows many traditional uses. Leaves are used for cuts, rheumatism, ulcers, and as a vermifuge. Decoction is applied externally against leprosy and scabies[4].

The essential oil obtained from this plant containing β-Caryophyllene, Geranyl acetate, Terpinyl acetate, Bornyl acetate and Lomonene remarkably inhibited the growth of many tested bacteria and fungi among them P. Aeruginosa, A. Niger, F. Solani, C. Albicans are the most sensitive ones[5].

Various parts of *Lantana camara* possess various pharmacological activities such as antifungal, antiproliferative antibacterial nematicidal termicidal anthelmintic and anticancer activities[6-9].

In the present work, a comparative antibacterial study of various extract of root bark and flower was carried out against gram positive and gram negative bacteria and Chloramphenicol was used as a positive control.

## MATERIALS AND METHODS

### Collection of Plant Material

Root Bark and flower of *Lantana camara* was collected from the tribal region of Mandla district, Madhya Pradesh. The Plant material was thoroughly washed in water, shade dried and powdered with the help of blender. 100g of the dried plant material was used for extraction.

### Extraction

100g of powdered material was filled in thimble and sequentially extracted in soxhlet apparatus with solvents of increasing polarity from petroleum ether, ethyl acetate, ethanol, and finally with water. Extracts were filtered by Whatman filter paper. Filtrate was then concentrated under reduced pressure and preserved at 5°C in air tight bottle.

### Antibacterial Activity

Antibacterial activity was carried out on four crude extract using standard method of agar disk diffusion[10]. Pathogenic bacteria including gram positive and gram negative bacteria, *Escherichia coli, Salmonella typhi, Pseudomonas, Staphylococcus aureus, Bacillus subtilis* was used for testing. All the bacterial strains were obtained from Department of microbiology, Govt. Model Science College, Jabalpur. 50mg/ml of plant extracts were used for the study. Standard antibiotic 50 mg/ml Chloramphenicol concentration was served as positive control.

Sterilized filter paper discs (Whatman no1) 6 mm was saturated with filter sterilized plant extract[11]. The impregnated disc was then placed on to the inoculated

nutrient agar medium plate. Plates were incubated at 37°C for 24 hours. Antibacterial bacterial activity was determined by measuring the inhibition zone diameter around the disc. Zone of inhibition is indicated by the clear area around the disc which shows no bacterial growth.

### Statistical Analysis

The experiments were replicated thrice. Observed data were subjected to analysis of variance (ANOVA) test using CRD design.

## RESULTS

Ethyl acetate extract from root bark and flower produced zone of inhibition 31 mm, 35mm against E. coli. The zone of inhibition 31mm was found to be highly significant statically as compared to positive control. (Fcal-92.884, Df-10, SED-1.074, SEM±-0.760, CD at 5%-2.195). Ethanol extract from root bark and flower showed zone of inhibition 12mm and 30mm against E. coli. Both values were found to be satisfactory as compared to petroleum ether and aqueous extract. Against S. aureus ethyl acetate extract from root bark and flower showed zone of inhibition 40mm and 32mm and both values was found to be statically superior. (Fcal-685, Df-10, SED-0.516, SEM±-0.365, CD at 5%-1.054).

Ethanol extract from root bark showed zone of inhibition 18mm against S. aureus which was found gratifying as compared to petroleum ether and aqueous extract. However flower ethanol extract produced zone of inhibition 34mm against S. aureus which was highly momentous statically as compared to positive control. Ethyl acetate extract from root bark and flower showed zone of inhibition 32mm and 33m against B. Subtilis which was found highly cogent. Ethyl acetate extract of root bark showed zone of inhibition 34mm and 40mm against S. typhi and pseudomonas and both values was highly distinguishable. However ethanol extract of root bark shown zone of inhibition 20mm and 18mm against S. typhi and pseudomonas. Both values were found to be good enough as compared to petroleum ether and aqueous extract.

Ethyl acetate and ethanol extract of flower showed zone of inhibition 33mm and 25mm against B. Subtilis. The value 33mm was portentous as compared to positive control. (Fcal-110.867, Df-10, SED-1.186, SEM±-0.834, CD at 5%-2.409). Both ethyl acetate and ethanol extract of flower produced highly prodigious zone of inhibition of 34mm against S.typhi. Against pseudomonas ethyl acetate and ethanol extract of flower showed zone of inhibition 32mm and 30mm which was found to be significant as compared to positive control.

No zone of inhibition was obtained by aqueous extract for all bacterial species. Petroleum ether extract from root bark showed zone of inhibition of 12 mm against pseudomonas and from flower 10mm against E. coli. Ethanol extract of root bark gives sufficing performance against all bacterial species as compared to petroleum ether and aqueous extract.

**Table 1:** Antibacterial Activity of Various Extract of Root Bark and Flower of *Lantana camara* Against Different Bacterial Species

| Plant Extract (50mg/ml) | Test organism | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Zone of Inhibition (in mm) | | | | | | | | | |
| | *E. coli* | | *S. typhi* | | *Pseudomonas* | | *S. aureus* | | *B. Subtilis.* | |
| | Root Bark | Flower | Root Bark | Flower | Root Bark | Flower | Root Bark | Flower | Root Bark | Flower |
| Petroleum ether | 0 (0.707) | 10 (3.240) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) |
| Ethyl acetate | 31 (5.612) | 35 (5.958) | 34 (5.874) | 34 (5.874) | 40 (6.364) | 32 (5.701) | 40 (6.364) | 32 (5.701) | 32 (5.701) | 33 (5.788) |
| Ethanol | 12 (3.536) | 30 (5.523) | 14 (3.808) | 34 (5.874) | 20 (4.528) | 30 (5.523) | 18 (4.301) | 34 (5.874) | 14 (3.808) | 25 (5.050) |
| Aqueous extract | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) | 0 (0.707) |
| Positive control | 12 (3.536) | 31 (5.612) | 28 (5.339) | 28 (5.339) | 25 (5.050) | 22 (4.743) | 20 (4.528) | 14 (3.808) | 18 (4.301) | 23 (4.848) |
| Fcal | 92.884 | 167.642 | 250.139 | 180.692 | 144.652 | 124.6 | 101.268 | 685 | 123.545 | 110.867 |
| Df | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| SED | 1.074 | 0.966 | 0.798 | 1.074 | 1.011 | 1.154 | 1.349 | 0.516 | 0.988 | 1.180 |
| SEM± | 0.760 | 0.683 | 0.564 | 0.760 | 0.714 | 0.816 | 0.954 | 0.365 | 0.699 | 0.834 |
| CD at 5% | 2.195 | 1.972 | 1.629 | 2.195 | 2.064 | 2.357 | 2.756 | 1.054 | 2.019 | 2.409 |

*Values inside the parentheses are the square root transformations of original values.

Values outside the parentheses are back transformed means of original values.

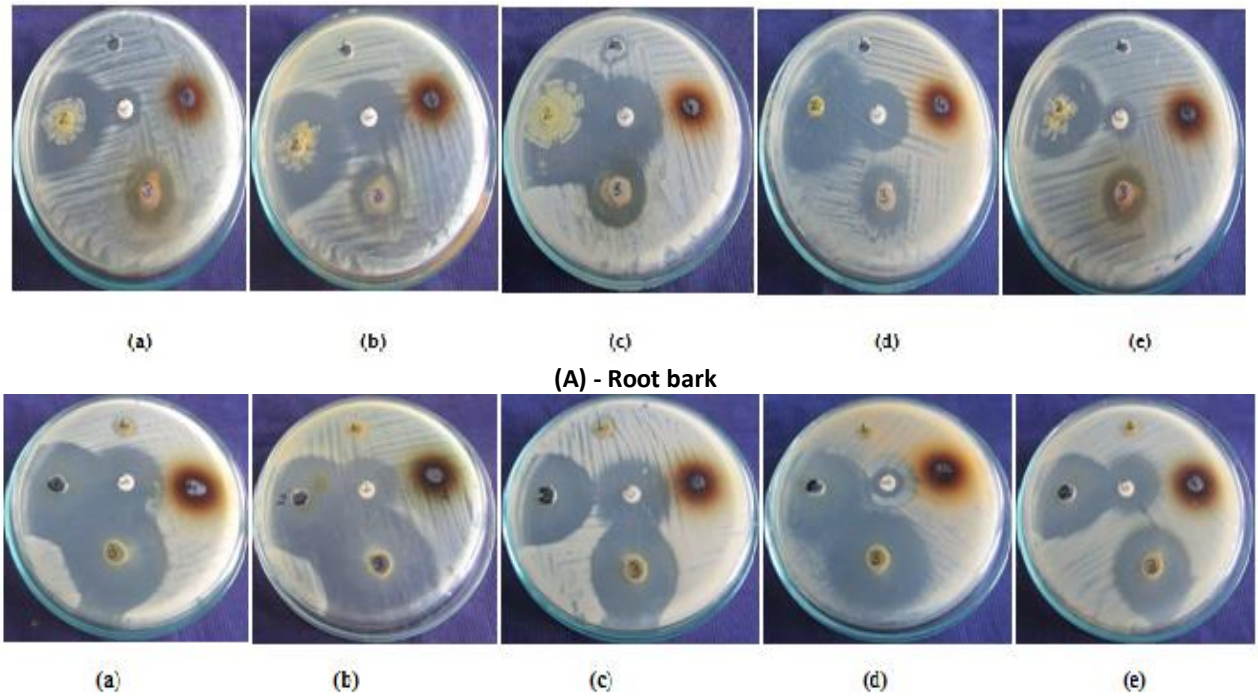


**Figure 1:** Zone of Inhibition produced by (a) Escherichia coli, (b) Salmonella typhi, (c) Pseudomonas, (d) Staphylococcus aureus, (e) Bacillus subtilis with 1. Petroleum ether extract, 2. Ethyl acetate extract, 3. Ethanol, 4. Aqueous extract and 5. Positive control

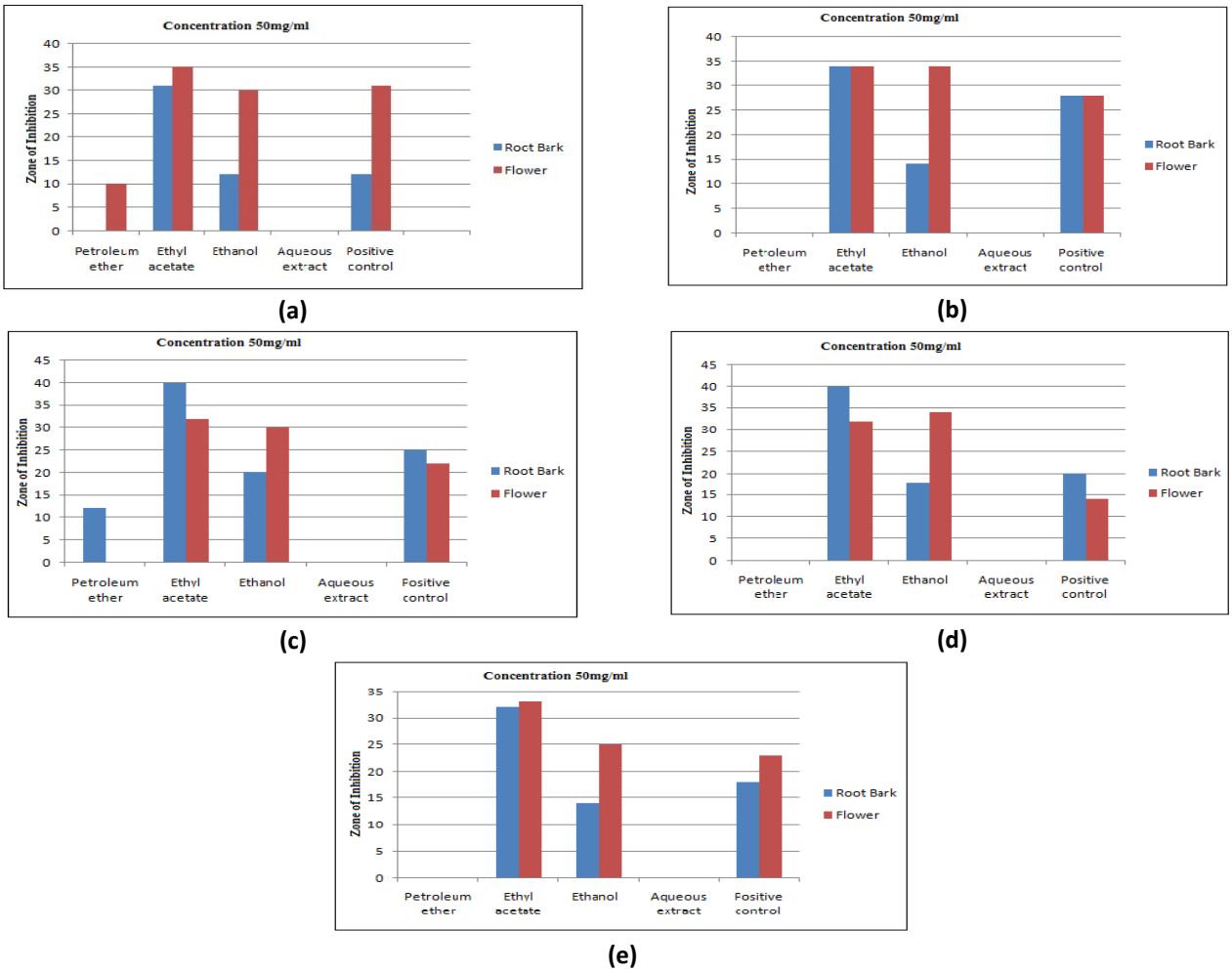


**Figure 2:** Graphical representation of antibacterial activity of various extract of root bark and *flower of Lantana camara* against (a)- *E.coli* (b)- *S. typhi* (c)- *Pseudomonas* (d)- *S. aureus* (e)- *B. Subtilis*

## DISCUSSION

Ethyl acetate extract of root bark showed highly significant antibacterial activity for E.coli, S. aureus, B. Subtilis, S. typhi and pseudomonas bacteria as compared to positive control.

Flowers ethyl acetate extract gives distinguishably activity against S. aureus, B. Subtilis and pseudomonas only.

Ethanol extract of flower shown highly appreciable effect against S. aureus & pseudomonas only and cogent effect against pseudomonas as compared to positive control.

## CONCLUSION

Ethyl acetate extract of root bark showed best antibacterial activity among various root bark and flower extract.

Therefore it can be used for formulation of antibacterial drugs in pharmaceutical industries and also for treatment of various infectious diseases in human.

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## REFERENCES

1. Hancock RE, Nijnik A, Philpott D. Modulating immunity as a therapy for bacterial infections, J Nat Rev Microbiol. 10, 2012, 243-254.
2. Nagesh KS, Shanthamma C. Antibacterial activity of Curculigo orchioides rhizome extract on pathogenic bacteria, Afr J Microbiol Res, 3(1), 2009, 5–9.
3. Adesokan AA. Effect of administration of aqueous and ethanolic extracts of Enantia chlorantha stem bark on brewer's yeast-induced pyresis in rats, Afri J Biochem Res, 2(7), 2008, 165-169.
4. Ghisberti EL. *Lantana camara* L. (verbenaceae), Fitoterapia, 71, 2000, 467-86.
5. Deena MJ, Thoppil JE. Antimicrobial activity of the essential oil of L. camara, Fitoterapia, 71, 2000, 453-5.
6. Hussain T, Arshad M, Khan S, Sattar H, and Qureshi MS. *In vitro* screening of methanol plant extracts for their antibacterial activity, Pak J Bot, 43(1), 2011, 531-538.
7. Mary KV. Studies on photochemical screening and antimicrobial activities of *Lantana camara*, Plant Sci Feed, 1(5), 2011, 74-79.
8. Tesch NR. Chemical composition and antibacterial activity of essential oil of Latana camara var. Moritziana, Nat Prod Commun, 6(7), 2011, 1031-1034.
9. Mohapatra TK. Evaluation of anthelmintic and antimicrobial activity of the leaves of *Lantana camara*, Int Res Pharm Sci, 2(1), 2011, 12-15.
10. Das K, Tiwari RKS, Strivastava DK. Techniques for Evaluation of Medicinal Plant Products as Antimicrobial Agents: Current Methods and Future Trends, J Med Plants Res, 4(2), 2010, 104-111.
11. Ergene A, Guller P, Tan S, Mirici S, Hamzoaglu ED. Antimicrobial and Antifungal Activity of Heracleum sphondylium Subsp. Artivinense, Afr J Biotectnol, 5(11), 2006, 1087-1089.

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