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ANTIBACTERIAL ACTIVITY OF ROOT BARK OF *LANTANA CAMARA*

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ABSTRACT

The development of bacterial resistance to presently available antibiotics has leaded a great demand of search for new antibacterial substance from other source including screening of medicinal plants. This study was aimed to elucidate the antibacterial activity of Root bark of lantana camara. Various extract of root bark of lantana camara was prepared and antibacterial activity was carried out by disc diffusion method against gram positive and gram negative bacteria. Significantly higher activity was shown in ethyl acetate extract and produced zone of inhibition 31mm, 34mm, 40mm, 40mm and 32mm respectively against Escherichia coli, Salmonella typhi, Pseudomonas, Staphylococcus aureus, and Bacillus subtilis whereas ethanol extract possesses satisfactory effect. Chloramphenicol was used as a positive control.

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

1. INTRODUCTION

Many modern drugs which form the basis of traditional medicine have been isolated from natural sources. Medicinal plants have been used for primary health care[1] by 80% of the world's inhabitants. India has a rich tradition of plant based knowledge in health care. Among the large number of herbal drugs existing in India, very few have been studied systematically so far. In the pharmaceutical industry natural products play a vital role in drug development [2]. Various studies have been done to show the effects of various plant extract on different bacterial species in different parts of the world[3-5]. In India a large number of studies have been done on ethano-medicinal plants [6].

Lantana camara is a flowering ornamental plant belonging to family Verbenaceae found throughout India. Various scientific data's revealed it's traditional uses in treating various ailments and the phytoconstituents present in different parts of *Lantana camara.* This plant is known by different name in India such as Raimuniya (Hindi), Chaturangi and anacehdi (Sanskrit), Arippu and Unnichedi (Tamil), Tantani and Ghaneri (Marathi). Phytochemical composition of the *L. camara* has been extensively studied. Various phytochemicals such as, flavonoids, carbohydrates, proteins, alkaloids, glycosides[7], essential oils, phenolic compounds, iridoid glycosides, phenyl ethanoid, oligosaccharides, quinine, saponins, steroids, triterpens, sesquiterpenoides and tannin[8-10] are present in different parts of *L. camara.* For the treatment of various diseases such as skin itches, leprosy, cancers, chicken pox, measles, asthma, ulcers, tumors, high blood pressure, tetanus, rheumatism, etc *essential* oils and extracts are used in the form of herbal medicine. Many literature related to this

plant reported that various extracts from the leaves and roots have been shown antimicrobial, fungicidal, insecticidal and nematicidal activity[11]. Essential oil contains phytochemical like ß-caryophyllene, geranyl acetate, terpinyl acetate, bornyl acetate and limonene inhibit the growth of many bacterial and fungal species, among them the most affected and sensitive are *P.aeruginosa*, *A.niger*, *F.solani, C.albicans*[12]. Lantana camara species as one of the important medicinal plants of the world due to the presence of of terpenoids, steroids, and alkaloids as major chemical constituents[13].

In the present research work, various extract of root bark of lantana camara was prepared and antibacterial activity was carried out against gram positive and gram negative bacteria and compared with positive control Chloramphenicol.

2. MATERIALS AND METHOD

2.1 Collection of plant material

Root Bark 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.

2.2 Solvent extraction

100g of powdered material was filled in thimble and sequentially extracted in soxhlet apparatus with solvents of increasing polarity starting 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^{o}c in air tight bottle.

2.3 Antibacterial activity

Antibacterial activity was carried out on four crude extract using standard method of agar disk diffusion. 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. The impregnated disc was then placed on to the inoculated nutrient agar medium plate[14, 15]. Plates were incubated at 37^{o}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.

2.4 Statistical Analysis

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

3. RESULT AND DISCUSSION

The values of zone of inhibition for ethyl acetate extract was found at 40mm against *Pseudomonas* and *Staphylococcus aureus* which was found statically highly significant as compared to positive control. (Fcal-144.652, Df-10, SED-1.011, SEM± 0.714, CD at 5%-2.064) (Table1). (Fcal-101.268, Df-10, SED-1.349, SEM± -0.954, CD at 5%.) Against *E. coli, S. typhi,* and *B. Subtilis,* ethyl acetate extract produced 31mm, 34mm and 32mm size zone of inhibition respectively which were found statically highly significant as compared to positive control. Positive control showed zone of inhibition 12mm, 28mm, 25mm, 20mm and 18mm against *E. coli, S. typhi, Pseudomonas, S. aureus,* and *B. subtilis* respectively. (Fcal-250.139, Df-10, SED-0.798, SEM±-0.564, CD at 5%-1.629).

The zone of inhibition for ethanol extract was found 12mm against E.coli which was found to be satisfactory as compared to petroleum ether (0mm) and aqueous extract(0mm). Ethanol extract showed zone of inhibition 14mm, 20mm, 18mm and 14mm against *S. typhi,*

Pseudomonas, S. aureus, and *B. Subtilis* respectively. All these values was found satisfactory as compared to petroleum ether (0mm) and aqueous extract(0mm). No zone of inhibition was obtained by petroleum ether and aqueous extract for all bacterial species

The present study revealed that ethyl acetate extract of root Bark of *Lantana camara* gives maximum zone of inhibition against *Escherichia coli, Salmonella typhi, Pseudomonas, Staphylococcus aureus,* and *Bacillus subtilis* as compared to positive control therefore it possess potential antibacterial activity. Table 1, indicates maximum activity against *Pseudomonas, S. aureus and* least activity against *E. coli*. Ethanol extract gives satisfactory performance against all bacterial species as compared to petroleum ether and aqueous extract.

Table 1: Antibacterial Activity Of Different Extract of Root Bark 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.***
Petroleum ether	0(0.707)	0(0.707)	0(0.707)	0(0.707)	0(0.707)
Ethyl acetate	31(5.612)	34(5.874)	40(6.364)	40(6.364)	32(5.701)
Ethanol	12(3.536)	14(3.808)	20(4.528)	18(4.301)	14(3.808)
Aqueous extract	0(0.707)	0(0.707)	0(0.707)	0(0.707)	0(0.707)
Positive control	12(3.536)	28(5.339)	25(5.050)	20(4.528)	18(4.301)
Fcal	92.884	250.139	144.652	101.268	123.545
Df	10	10	10	10	10
SED	1.074	0.798	1.011	1.349	0.988
SEM±	0.760	0.564	0.714	0.954	0.699
CD at 5%	2.195	1.629	2.064	2.756	2.019

*Values inside the parentheses are the square root transformations of original values.
Values outside the parentheses are back transformed means of original values.

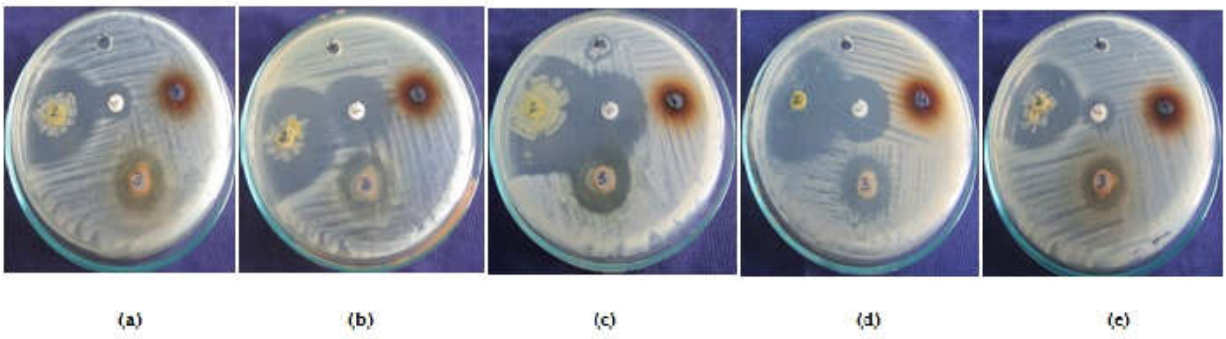

Figure 1: Zone of Inhibition produced by (a)Escherichia coli, (b)Salmonella typhi, (c)Pseudomonas, (d)Staphylococcus aureus, (e)Bacillus subtilis with 1. Petroleum ether extract, 2. Ethyl acetate extract, 3. Ethanol, 4. Aqueous extract and 5. Positive control

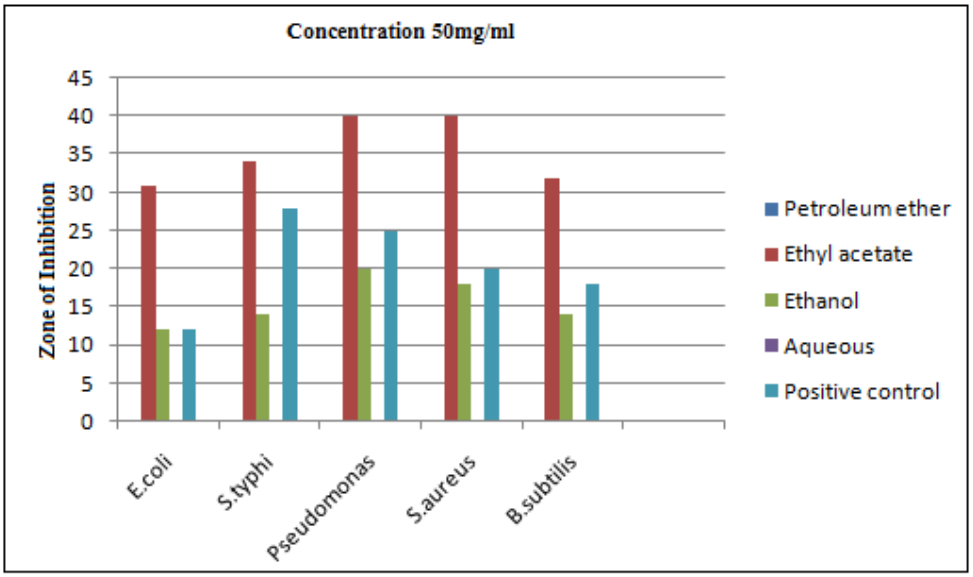

Figure 2: Graphical representation of antibacterial activity of different extract of root bark of *Lantana camara*

4. CONCLUSION

Ethyl acetate extract of root Bark of *Lantana camara* showed maximum zone of inhibition as compared to positive control against all bacterial species therefore it possesses potential antibacterial activity against *E. coli, S. typhi, Pseudomonas, S. aureus,* and *B. Subtilis.* Thus ethyl acetate extract can used in pharmaceutical industry for the formulation of antibacterial drug. Whereas ethanol extract showed satisfactory zone of inhibition as compared to petroleum ether and aqueous extract.

5. ACKNOWLEDGEMENTS

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