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RESEARCH ARTICLE

EVALUATION OF ANTIBACTERIAL AND GC MS ANALYSIS OF *LANTANA CAMARA* LINNAGAINST PATHOGENS

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ABSTRACT

Herbal medicines are being used by about 80 per cent of the world population, primarily in the developing countries for their health care. They have stood for their safety, efficacy and cultural acceptability and less side effects.Multiple resistant organisms render therapy more precarious and costly and sometimes unsuccessful.In presentinvestigation screening of two extract of ethyl acetate and methanol extracts against pathogenic bacteria *Viz., Bacillus* sp, *S.aureus*, *Escherichiacoli*, *Proteus* sp and *Klebsiella* sp.Among the solvents tested, methanol extract recordedmore inhibitory effect than ethyl acetate extracts.The methanol extract of the turmeric extract recorded more mean inhibition zone*Proteus* sp (25 66 mm), *Staphylococcus aureus*and *Klebsiella* sp 24. 56 mm) compared to other extracts.

Key words: Antibacterial, Methanol extract, GC MS.

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INTRODUCTION

The traditional medicinal practice did not give immediate remedies but instead recommended for curing the disease without side effect in due course of time, when there is no modern medicines or only the palliative therapy was available (Kamboj, 2000). Microorganisms can become resistant to antibiotics and chemotherapeutic agents by various mechanisms, such as inactivating drugs by hydrolysis (e.g. via β-lactamase) or modification (e.g. amino glycoside resistance) by altering targets (e.g. by mutating DNA gyrase in fluoroquinolone resistance) or by producing methicillin resistant transpeptidase in MRSA or by preventing the access of drugs to the target (Nikaido, 1998). Various types of organic and inorganic materials leached out from plant which inhibits the growth of microbes (Kamruzzaman *et al*., 2013). These plants produce and contain a variety of chemical substances that act upon the human body. There is a constant search for utilization of the medicinal and aromatic plants in the production of phytochemicals and basic drugs (Scalbert *et al*., 1991). Nowadays, the development of resistance by a pathogen to many of the commonly used antibiotics provides an impetus for further attempts to search for a new antimicrobial agents (Ali-Shtayeh *et al*., 1998; Primo *et al*., 2001). There are numerous natural plant products which has antimicrobial activities that could be used either systemically or locally (Heinrich et al., 2004). A tea prepared from the leaves and flowers was taken against fever, influenza and stomach-ache. In Central and South America, the leaves were made into a poultice to treat sores, chicken pox and measles. Fever, cold, rheumatisms, asthma and high blood pressure were treated with preparations from the plant(Kirtikar and Basu, 1991). Dried leaf powder of *Lantana camara* were extracted using a hot-solvent extraction method with eight polar to non-polar solvents in succession. Crude extracts were tested for antibacterial activity against three multidrug-resistant (Sharma *et al*. 2011). Leaf extracts with dichloromethane and methanol registered the highest antibacterial activity on all bacterial strains (Dubey and padhy 2013).

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MATERIALS AND METHODS

Plants used for the present study

Healthy and well grown leaves of selected plant (*Lantana camara*) were collected from local area and specific part of the plant usedfor the present study.

Preparation of plant extracts (Vogel 1978) Ethyl Actateextracts: 50 gm of shade dried plant leaf powder was soaked in 150 ml of Ethyl actate.Incubated for 72 hr at room temperature. The extract was filtered with whatman filter paper. The extra solvent from the filtrate was evaporated by using water bath at 58°C. The extractswas collected andstored in 4°C for further use.

Methanol extracts: 50 gm of shade dried plant leaf powder was soaked in 150 ml of Methanol. Incubated for 72 hr at room temperature. The extract was filtered with what man filter paper. The extra solvent from the filtrate was evaporated by using water bath at 58°C.The extracts was collected and stored in 4°C for further use.

Antibacterial assay of plant Extract

Microorganisms used: The antimicrobial activity of medicinal plant were tested against five strains of bacteria *viz., Bacillus sp, S.aureus, Escherichia coli, Proteus sp* and *Klebsiella sp.*

Evaluation of antibacterial activity: The antibacterial test was performed using the disc diffusion method (Garge and Jain, 1998) test organism were inoculated on MHA plates and spread uniformly with the help of sterile glass spreader. A SterileDisc (Hi Media) 6mm were impregnated with different concentration10µl, 20µl and 30µl of the extract to obtain 15mg, 30mg and 60mg/disc and allowed to dry at room temperature. Chloramphenicol (30mcg/Disc) was used as the positive control and DMSO was used as blind (negative) control. After drying the disc impregnated the extract disc were placed on the surface of the plate. The inoculated plates were incubated at 37 °C for 24 h. After the incubation period, the inhibition zones were measured.

Identification of antimicrobial compounds

GC-MS spectra: The spectra were recorded in GC instrument (Clarus 680, USA) and MS (Clarus 600 EI) The column was Elite-5MS (5% biphenyl 95% dimethylpolysiloxane, 30.0m, 0.25mm ID, 250µm), column diameter was 5 µm and column length was 46 × 150 mm. Mobile phase of the column was 80% of acetonitrile, 20% of water and 0.1% formic acid. A pinch of plant extract was completely dissolved in 2 mL of methanol and the 1µL of extract sample injected into the GC-MS instrument.

RESULTS

Antibacterial properties of *Lantana camara* plant extracts

The antimicrobial activity of crude leaf extracts of *Lantana camara* and the solvent ethyl acetate and methanol. Antibacterial potential of leaf extract was assessed in terms of zone of inhibition of bacterial growth.The results of the antibacterial activities carried out in 15, 30 and 60 mg/mL of each leaves was used for antimicrobial screening. The antibacterial activity of theextract increased linearly with increase in volume of extract (mg/mL).

The antibacterial acti vity Ethyl acetate extract of *Lantana camara* results are presented in (Table 1 and Figure1). The mean zone of inhibition ranged between 15 to 23 mm. For Chloramphenicol is a positive control, the zone of inhibition ranged from 14 to 19 mm respectively. The highest zone of inhibition observed *Klebsiella* sp. (18 to 23 mm) followed by *S. aureus* (15 to 21mm), *Escherichiacoli* (16 to 21mm), *Bacillus* sp. (15to20mm) and *Proteus* sp. (14 to 21mm). The antibacterial activity methanol extract of *Lantana camara* results are presented in (Table 2 and Figure2). The mean zone of inhibition ranged between 18 to 25 mm. For Chloramphenicol is a positive control, the zone of inhibition ranged from 15 to 19 mm respectively. The highest zone of inhibition observed *Klebsiella* sp. (22 to 24 mm) followed by *Bacillus* sp. (21 to 24 mm), *Proteus* sp. (21 to 25mm), *S. aureus* (20 to 24mm) and *Escherichia coli* (21 to 22mm).

Identification of the bioactive compounds

The antibacterial properties of the two different plant extracts the methanol extract of *Lantana camara*, which showed maximum antibacterial activities against the test organisms was selected for further identification of bioactive compounds. The GC MS spectrum overall nine compounds shows in the beak and compound RT value and chromatogram in (Figure3). *Lantana camara* leaves in methanol extract nine componends were identified (Table 3).

DISCUSSION

Herbal remedies used in the traditional folk medicine provide an interesting and still largely unexplored source for the creation and development of potentially new drugs (Awadh-Ali *et al*., 2001) Multiple resistant organisms render therapy more precarious and costly and sometimes unsuccessful (Kamruzzaman *et al*., 2013). *L.camara* aculeate an important medicinal plant with several medicinal uses in traditional medication system belongs to the family Verbenacea. (Periaswamy Hemalatha *et al*., 2015). Several hundred natural active compounds have been identified worldwide (Atawodi *et al*., 2003).The *Lantana camara* leaves having lots of medicinal activity such as anti-inflammatory, analgesic, anti-tumor, antibacterial, sedative, fungicide and antimicrobial. (Kaur and Mondal 2014).In the present study the results of antibacterial activity of leaves extract were investigated against five bacterial strains. The extract of leaves obtained through ethyl acetate and methanol good to moderate antimicrobial activity against tested all bacterial strains (Richa Seth *et al*., 2012).This may due to the better solubility of their active components in organic solvents (Kumar *et al*., 2006). Present study, based on the antimicrobial properties of the medicinal plant, Lantana

Table 1. Antibacterialactivity of Ethyl acetate extract of *Lantana camara*

S. No	Bacterial pathogens	Zone of inhibition (mm)			Chloramphenicol (30mcg/Disc)
		15mg/mL	30mg/mL	60mg/mL	
1.	Staphylococcus aureus	15	19	22	19
2.	Bacillus sp	15	19	20	16
3.	Escherichia coli	16	19	21	15
4.	Klebsiella sp	18	20	23	19
5.	Proteus sp	14	17	21	14

Zone of inhibition including disc in diameter is 6 mm;

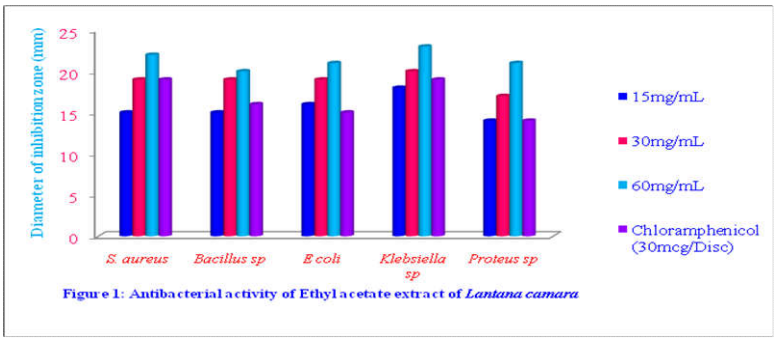

Figure 1: Antibacterial activity of Ethyl acetate extract of *Lantana camara*

Table 2. Antibacterialactivity of Methanol extract of *Lantana camara*

S. No	Bacterial pathogens	Zone of inhibition (mm)			Chloramphenicol (30mcg/Disc)
		15mg/mL	30mg/mL	60mg/mL	
1.	Staphylococcus aureus	20	22	24	18
2.	Bacillus sp.	21	22	24	16
3.	Escherichia coli	21	18	22	15
4.	Klebsiella sp.	22	22	24	19
5.	Proteus sp.	21	21	25	18

Zone of inhibition including disc in diameter is 6 mm;

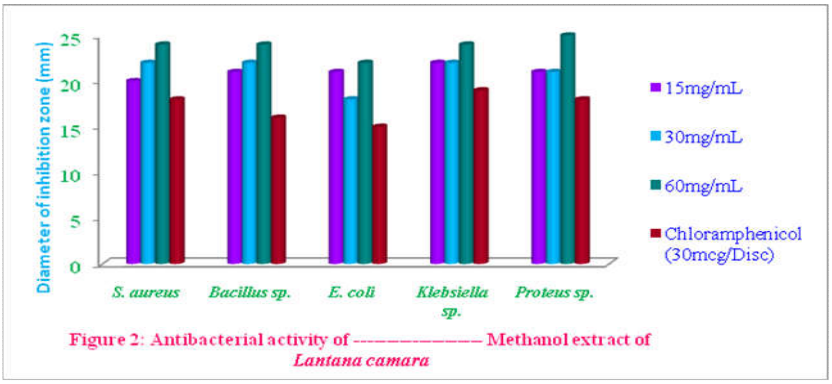

Figure 2: Antibacterial activity of ---------- Methanol extract of *Lantana camara*

Table 3. Biologically active compounds of *Lantana camara*

S. No	RT	Scan	Name of the Compound	Molecular Weight	Molecular formula
1	16.374	2774	L-Gala-L-Idooctes	240	$C_8H_{16}O_8$
2	17.384	2976	Phytol	296	$C_{20}H_{40}O$
3	19.340	3367	Eicosonaic Acid	312	$C_{20}H_{40}O_2$
4	20.671	3633	1-Hexyl-2-Nitrocyclohexane	213	$C_{12}H_{23}O_2N$
5	20.836	3666	9-Octadecynoic acid	280	$C_{18}H_{32}O_2$
6	26.376	4773	Bicyclo[4.1.0] Heptane, 7-Pentyl-	166	$C_{12}H_{22}$
7	28.949	5288	Cycloprop[E]Indene-1A,2(H)-Dimethanol,3A4,5,6,6A,6B-Hexahydro-5,5,6B-Trimethyl-,(1A,ALPHA,3A,B)	136	$C_{15}H_{24}O_2$
8	29.269	5352	Acetic Acid,3-(6,6-dimethyl-2-Methylenecyclohex-3-Enylidene)-1-Methylbutyl Ester	248	$C_{16}H_{24}O_2$
9	29.819	5642	9,19-Cycloergost-24(28)-EN-3-OL,4,14-Dimethyl, acetate,(3,Beta,4,Alpha,5,alpha	468	$C_{32}H_{52}O_2$

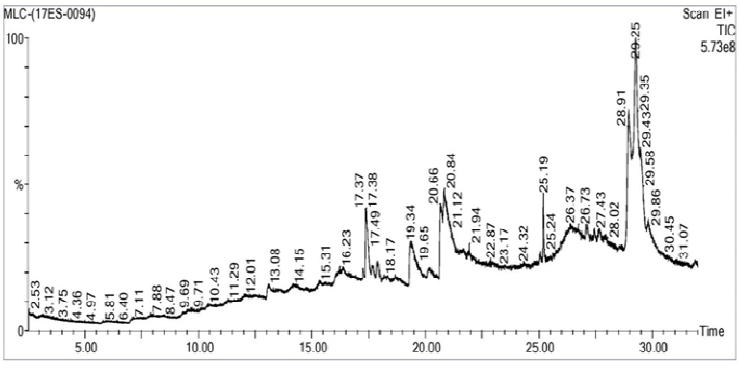

Figure 3. Qualitative report of GC MS

camara was found to be more effective against all the pathogens. The totally nine bioactive compounds were identified plant Lantana camara as GC MS.

Conclusion

The present investigation was undertaken to study the antibacterial properties of selected medicinal plant collected in Hosur, Krishnagiri District, Tamil Nadu, India. The study has revealed strong evidence on the potentials of selected medicinal plant in controlling the pathogenic microorganisms, by possessing bioactive compounds, which can be useful in the treatment of microbial diseases in future.The antibacterial properties of the two crude extracts were screened at different concentrations against five bacteria, viz *Bacillus* sp, *S.aureus*, *Escherichiacoli*, *Proteus* sp and *Klebsiella* sp.From the results of the present investigation, it was confirmed that methanolic extract of *Lantana camara* showed a higher antimicrobial activity. It can be used as a compounds for a drug in the treatment of diseases.

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