Phytochemical Analysis and Antimicrobial Studies of *Lantana camara* L.

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Abstract *Lantana camara* is considered as a notorious weed and a popular ornamental plant. It has been observed since ancient times because the plants are an excellent source of medicine. *Lantana camara* has long been considered one of the most important medicinal plants in the world. *Lantana camara* is used in traditional medicine to treat cuts, swelling, ulcers, cataracts, biliary fever, itching, eczema and rheumatism. Different parts of the *Lantana camara* plant are used to treat colds, headaches, whooping cough, asthma, chicken pox, bronchitis, eye lesions, and high blood pressure. *Lantana camara* has been scientifically studied for various therapeutic activities like antibacterial, antioxidant, antipyretic, insecticidal, antimicrobial, wound healing *etc.* Various literatures have reported the phytoconstituents present in all parts of *Lantana camara*. In the current study, phytochemical analysis and antimicrobial activity of leaves and stem of *Lantana camara* were studied. The phytochemical analysis using chloroform and ethanol extracts for phenolic acids (Gallic acid) and flavonoids (Quercetin, Myricetin) by HPLC method in stem and leaves of *Lantana camara*. The present study evaluated the antimicrobial activity of ethanol and chloroform leaves extract against some pathogenic bacteria and fungi by using agar well diffusion method. This study can be concluded that *Lantana camara* of stem and leaves are comprised of bioactive compounds which possess antimicrobial activity against pathogenic bacteria and fungi.

Keywords *Lantana camara*, Crude Extract, Phytochemical Analysis, HPLC Analysis, Antimicrobial Activity

1. Introduction

Lantana camara, a noxious weed, has been increasing and is now mounted in lots of areas of the world, such as India. As it poses foremost threats to the ecosystem, it's been within side the cognizance of manage attempts. For the reason of these studies, diverse traits of *Lantana camara* are mentioned and strategies to fight its invasion in India had been studied. Results display that species have turn out to be threat and increasing its range. Present studies additionally indicate that extra than 80% of research cognizance on its effect use, toxicity and its healing makes use of only.

The phrase *Lantana camara* derives from Latin 'lento', this means that to bend [1, 2]. The species became first defined and given its binomial call through Linnaeus in 1753 [3, 4]. It is the genus of verbenaceae own circle of relatives with six hundred sorts present worldwide. *Lantana camara*, a local species of South, Central America and the Caribbean islands [5], has its presence recorded even in Brazil, Florida, Jamaica, Mexico, and Trinidad. The species is unfolded over huge geographical variety in

neotropics, however none is pronounced from Old World [6, 7]. Some species of *Lantana camara* also are believed to originate from Africa and one from India [8-10].

Lantana camara, additionally called wild sage, is a thorny multi-stemmed, deciduous shrub with a mean top of 2m (6 ft). The shrub's taxonomic function is described as belonging to the elegance of Magnoliopsida, order Lamiales, own circle of relatives Verbenaceae and genus *Lantana*. Stems are rectangular in outline, blanketed with bristly hairs whilst green, frequently armed or with scattered small prickles [11].

Berries of *Lantana camara* are round, fleshy, two-seeded drupe with to begin with inexperienced in shadeation and turning red and ultimately to blue-black shadeation. However, the berries are very toxic in nature alevn though those are appealing to bugs and birds. Seeds germination is simple and quicker in *Lantana camara* [12].

Although *Lantana Camara* is a noxious weed, it has several minor uses, mostly in herbal medicine. There are a number of research studies on the use of chemical components found in different parts of plant species. Studies show that extracts from the leaves can be used to combat antimicrobial, fungicidal, insecticidal and nematocidal problems. Its potential as a biocide has also been shown in various studies [13, 14].

Ethanolic extracts of *Lantana Camara* leaves and roots have been suggested for antibacterial interest. The in vitro antibacterial interest turned into accomplished via way of means of microdilution method. The extracts exhibited antimicrobial interest in opposition to *Staphylococcus aureus*, *Proteus vulgaris*, *Pseudomonas aeruginosa*, *Vibrio cholerae*, *Escherichia coli* and multiresistant traces *E. coli* and *S. aureus* [6]. Three unique solvent extract of leaves and plants of 4 unique varieties of *Lantana Camara* exhibited huge antibacterial interest *E. coli*, *Bacillus subtilis* and *P. aeruginosa*, while negative antibacterial interest in opposition to *Staphylococcus aureus* [3, 4, 13].

The antifungal activity of ethanol and hot water extract from *Lantana camara* was investigated against wood-destroying white and brown rot fungi. Both extracts exhibited efficient antifungal activity against white and brown rot fungi, however ethanol extract was highly potential at very low concentration (0.01%) and also *L. camara* was screened against *Alternaria* sp. which causes different plant diseases especially in vegetable plants [5, 8, 10, 11].

In the present work, the following objectives are to extraction of various phytoconstituents from *Lantana camara* using ethanol and chloroform solvents. Quantitative and qualitative analysis of crude extract by High performance liquid chromatography. To determine the Minimal Inhibitory Concentration in crude extract on bacterial and fungal strains. To evaluate the antibacterial and antifungal activity of crude extract.

2. Materials and Methods

Collection and Identification of Plant Material

Fresh leaves of *Lantana camara*, (Figure 1), which are free from disease and they were collected from outskirts of Kuvempu University at Shankaraghatta in Shimoga District, Karnataka, India. The taxonomic identification was confirmed by comparing with the authenticated specimen deposited at the Department of Botany, Kuvempu University. On that basis, we are identified the *Lantana camara* plant for used the phytochemical analysis and antimicrobial studies.

Figure 1. Flower of *Lantana camara* L. *lantana*

Preparation of Plant Extracts

The gathered plant leaves were brought to the research center. They were washed thoroughly with running water and again with sterile distilled water. The leaves were air dried on sterile blotter under shade. Thoroughly washed, dried leaves of *Lantana camara* were then powdered with the help of mechanical grinder. About 200g of shade-dried powder was filled in the thimble and extracted successively with chloroform and ethanol solvents in Soxhlet extractor for 24h. The solvent extracts were concentrated under reduced and preserved in airtight bottle until further use [15, 16].

Development and Maintenance of Test Microorganism for Antimicrobial Studies

Bacterial cultures such as *Escherichia coli*, *Bacillus subtilis*, *Xanthomonas* sp., *Pseudomonas aeruginosa*, *Bacillus* sp., *Pseudomonas fluorescens* and fungal cultures was followed by *Aspergillus fumigatus*, *Aspergillus niger*, *Aspergillus terreus*, *Aspergillus flavus*, *Aspergillus* sp., *Fusarium oxysporum* were obtained from the Department of Microbiology, Kuvempu University, Shivamogga, Karnataka, India. These strains were used as antimicrobial test organisms. The bacteria were maintained on Nutrient

Broth (NB) at 37°C and fungi were maintained on Potato Dextrose Agar (PDA) media at 28°C in room temperature.

Antibacterial Activity Crude Extract by Agar Well Diffusion Method

Nutrient agar media was prepared, sterilized in autoclave at 121°C for 20 minutes. Then prepared media was poured into Petri plate and allowed for solidification. One day old test bacterial culture were uniformly swabbed on NA media by using sterile swabs and allowed to stand for 30 minutes. Wells were made on pre inoculated agar plates using sterile cork borer. In each plate 4 wells were made. Each extracts were prepared into different dilutions and added into wells using micropipettes. Then the plates were kept for incubation for 24h at 37°C. After incubation the zone of inhibition were observed and measured [17, 18].

Antifungal Activity Crude Extract by Agar Well Diffusion Method

Potato dextrose agar media was prepared and sterilized and poured into sterile Petri plates and allowed for solidification. Spore suspensions of fungal culture were prepared and inoculated on agar plates and spreader by using L-shaped glass rod and allowed for 30 minutes. Wells were made on pre inoculated agar plates using sterile cork borer. In each plate 4 wells were made. Each extracts were prepared into different dilutions and added into wells using micropipettes. Then the plates were kept for incubation for 48-72 h at room temperature. After incubation the zones of inhibition were observed and measured [19, 20].

Determination of Minimal Inhibitory Concentration

Minimal Inhibitory Concentration (MIC) values have been decided via way of means of Broth Dilution Method. Serial dilutions (final volume of 1 ml) of leaf extract of *Lantana camara* (2 to 0.25 mg/ml) were performed with 0.9% saline. Following this, nine ml of nutrient broth become added. Broths were inoculated with 100 µl of each bacterial suspension (5X10⁴CFU) and incubated for 24 h at 37°C. Ciprofloxacin was used as a positive control and 0.9% saline as negative control. After 24 h, bacterial growth was assayed by measuring absorbance at 625 nm [21].

High Performance Liquid Chromatography (HPLC) - UV Analysis

Phenolic acids and flavonoids from chloroform and ethanol extracts of *Lantana camara* were analyzed by HPLC (Model LC-10ATVP. Shimadzu Corp, Kyoto, Japan) on a reversed phase Shimpak C18 column (5 µm, 250 mm × 4.6 mm). Phenolic content material within the extracts

had been detected the usage of octadecylsilyl silica gel as stationary phase. Solvent system consisting of [A] phosphoric acid: water (0.5:99.5, v/v), [B] acetonitrile was used as mobile phase at a flow rate of 1ml/min. Phenolic acid standards such as gallic acid, p-coumaric acid, ellagic acid, hydroxy benzoic acid and vanillic acids were employed for identification of phenolic acids present in chloroform and ethanol extracts of *Lantana camara* by comparing the retention time under similar experimental conditions. The detector used for analysis was UV detector at 220 nm. Flavonoid content within the extracts was detected using octadecylsilyl colloid as stationary phase. Solvent system consisting of methanol, water and orthophosphoric acid (50:49.6:0.4, v/v) was used as mobile phase at a flow of 0.5 ml/min. Rutin, quercetin, myricetin, kaempferol and luteolin were used as references [22, 23].

Statistical Analysis

Data presented on the average of three replicates as means ± standard error obtained from independent experiments.

3. Results

The crude extracts obtained from the *Lantana camara* by hot extraction method using different solvents (ethanol and chloroform) gave varied amounts of yield. These crude extracts were in several colours and have characteristic odours.

Antibacterial Activity

The antibacterial activity of *Lantana camara* using ethanol and chloroform solvents for crude extraction and they were recorded by measuring inhibition zone in mm.

Antibacterial Activity of Standard Antibiotic Ciprofloxacin

The present study evaluated for antibacterial activity of standard antibiotic ciprofloxacin against some pathogenic bacteria by using agar well diffusion method. Inhibition zone shows against the bacteria (Table 1) (Figure 2).

Table 1. Antibacterial activity of standard antibiotic Ciprofloxacin

Sl. No.	Name of the organisms	Inhibition Zone (mm)	
		1 µg/mL	10 µg/mL
1	<i>Escherichia coli</i>	16±1.6	20±3.4
2	<i>Bacillus subtilis</i>	16±1.9	21±4.2
3	<i>Xanthomonas</i> sp.	16±1.5	17±2.1
4	<i>Pseudomonas aeruginosa</i>	18±1.6	20±3.2
5	<i>Bacillus</i> sp.	18±2.5	21±3.3
6	<i>Pseudomonas fluorescens</i>	18±2.9	21±3.8

Note: Results are mean ± S.E of three replicates (n=3)

Figure 2. Antibacterial activity of standard antibiotic Ciprofloxacin**Table 2.** Antibacterial activity of ethanol leaf extract of *Lantana camara*

Sl. No.	Name of the organisms	MIC (mg/mL)	Inhibition Zone (mm)			
			25 mg/mL	50 mg/mL	75 mg/mL	100 mg/mL
1	<i>Escherichia coli</i>	3	4.0±0.02	4.0±0.12	3.0±0.001	3.0±0.001
2	<i>Bacillus subtilis</i>	3	4.0±0.01	5.0±0.05	5.0±0.02	5.0±0.09
3	<i>Xanthomonas</i> sp.	2	6.0±0.10	6.0±0.01	4.0±0.05	4.0±0.01
4	<i>Pseudomonas aeruginosa</i>	3	3.0±0.008	4.0±0.08	4.0±0.08	4.0±0.02
5	<i>Bacillus</i> sp.	3	3.0±0.004	3.0±0.03	4.0±0.10	4.0±0.06
6	<i>Pseudomonas fluorescens</i>	2	2.0±0.01	2.0±0.09	2.0±0.01	2.0±0.01

Note: Results are mean ± S.E of three replicates (n=3)

Antibacterial Activity of Ethanol Leaf Extract of *Lantana camara*

The present study was evaluated for antimicrobial activity of ethanol leaves extract against some pathogenic bacteria and fungi by using agar well diffusion method. The minimal inhibitory concentration (MIC) ranges to some bacteria from 2 mg/mL to 3 mg/mL. The maximum

inhibition zone shows against *Xanthomonas* sp. (6.0 ± 0.01 mm), *Bacillus subtilis* (5.0 ± 0.05 mm), *Pseudomonas aeruginosa* (4.0 ± 0.08 mm), *Escherichia coli* (4.0 ± 0.02 mm), *Bacillus* sp (4.0 ± 0.06 mm) and the minimum inhibition zone shows against, *Pseudomonas fluorescens* (2.0 ± 0.01 mm) (Table 2), (Figure 3).

Escherichia coli

Bacillus subtilis

Xanthomonas sp.

Pseudomonas aeruginosa

Bacillus sp.

Figure 3. Antibacterial activity of ethanolic leaf extract of *Lantana camara*

Antibacterial Activity of Chloroform Leaf Extract of *Lantana camara*

In the current study, evaluated for antimicrobial activity of chloroform leaves extract against some pathogenic bacteria and fungi by using agar well diffusion method. The minimal inhibitory concentration (MIC) ranges to some bacteria from 2 mg/mL to 3 mg/mL. The maximum inhibition zone shows against *Escherichia coli* (4.0 ± 0.20 mm), *Bacillus* sp. (3.0 ± 0.07 mm), *Pseudomonas aeruginosa* (3.0 ± 0.08 mm), *Bacillus subtilis* (3.0 ± 0.19 mm), *Xanthomonas* sp. (2.0 ± 0.21 mm) and the minimum inhibition zone shows against, *Pseudomonas fluorescens* (1.0 ± 0.02 mm) (Table 3).

Antifungal Activity of Standard Antifungal Agent Flucanazole

The present study was evaluated for antifungal activity of standard antifungal agent Flucanazole. It shows inhibition zone (mm) against pathogenic fungi (Table 4) (Figure 4).

Antifungal Activity of Ethanol and Chloroform Leaf Extract of *Lantana camara*

The present study was undertaken to determine the antifungal activity of ethanol and chloroform extracts were recorded by measuring inhibition zone in mm. But there

was no such an antifungal activity. Both solvents ethanol and chloroform leaf extracts fail to inhibit the pathogenic fungal organisms (Table 5 and 6) (Figure 5 and 6).

AN

Note: AN- Aspergillus niger

Figure 4. Antifungal activity of standard antifungal agent Flucanazole

AF

AT

Note: AF- Aspergillus fumigatus, AT- Aspergillus terreus

Figure 5. Antifungal activity of ethanolic leaf extract of *Lantana camara*

Table 3. Antibacterial activity of chloroform leaf extract of *Lantana camara*

Sl. No.	Name of the organisms	MIC (mg/mL)	Inhibition Zone (mm)			
			25 mg/mL	50 mg/mL	75 mg/mL	100 mg/mL
1	<i>Escherichia coli</i>	3	2.0 ± 0.01	2.0 ± 0.002	4.0 ± 0.20	4.0 ± 0.22
2	<i>Bacillus subtilis</i>	3	3.0 ± 0.01	3.0 ± 0.001	3.0 ± 0.31	3.0 ± 0.19
3	<i>Xanthomonas</i> sp.	2	2.0 ± 0.04	2.0 ± 0.01	2.0 ± 0.03	2.0 ± 0.21
4	<i>Pseudomonas aeruginosa</i>	2	2.0 ± 0.05	2.0 ± 0.003	2.0 ± 0.04	3.0 ± 0.08
5	<i>Bacillus</i> sp.	2	3.0 ± 0.01	2.0 ± 0.002	3.0 ± 0.09	3.0 ± 0.07
6	<i>Pseudomonas fluorescens</i>	2	1.0 ± 0.02	1.0 ± 0.001	2.0 ± 0.01	2.0 ± 0.04

Note: Results are mean $\pm$ S.E of three replicates (n=3)

Table 4. Antifungal activity of standard antibiotic agent flucanazole

Sl. No.	Name of the organisms	Inhibition Zone (mm)	
		1 µg/mL	10 µg/mL
1	<i>Aspergillus fumigatus</i>	1.0±0.02	2.0±0.01
2	<i>Aspergillus niger</i>	--	--
3	<i>Aspergillus terreus</i>	--	--
4	<i>Aspergillus flavus</i>	1.0±0.04	2.0±0.08
5	<i>Aspergillus</i> sp.	2.0±0.06	3.0±0.10
6	<i>Fusarium oxysporum</i>	--	--

Note: Results are mean ± S.E of three replicates (n=3)

Table 5. Antifungal activity of ethanol leaf extract of *Lantana camara*

Sl. No.	Name of the organisms	MIC mg/mL	Inhibition Zone (mm)			
			25 mg/mL	50 mg/mL	75 mg/mL	100 mg/mL
1	<i>Aspergillus fumigatus</i>	Nil	1.0±0.01	2.0±0.02	2.0±0.01	2.0±0.03
2	<i>Aspergillus niger</i>	Nil	--	--	--	--
3	<i>Aspergillus terreus</i>	Nil	--	--	--	--
4	<i>Aspergillus flavus</i>	Nil	1.0±0.03	2.0±0.02	2.0±0.06	2.0±0.04
5	<i>Aspergillus</i> sp.	Nil	2.0±0.04	3.0±0.10	3.0±0.08	3.0±0.01
6	<i>Fusarium oxysporum</i>	Nil	--	--	2.0±0.07	3.0±0.03

Note: Results are mean ± S.E of three replicates (n=3)

Table 6. Antifungal activity of chloroform leaf extract of *Lantana camara*

Sl. No.	Name of the organisms	MIC mg/mL	Inhibition Zone (mm)			
			25 mg/mL	50 mg/mL	75 mg/mL	100 mg/mL
1	<i>Aspergillus fumigatus</i>	Nil	1.0±0.01	2.0±0.001	2.0±0.01	2.0±0.02
2	<i>Aspergillus niger</i>	Nil	--	--	--	--
3	<i>Aspergillus terreus</i>	Nil	--	--	--	--
4	<i>Aspergillus flavus</i>	Nil	1.0±0.02	2.0±0.01	2.0±0.02	2.0±0.02
5	<i>Aspergillus</i> sp.	Nil	2.0±0.04	3.0±0.06	3.0±0.08	3.0±0.10
6	<i>Fusarium oxysporum</i>	Nil	--	--	3.0±0.09	3.0±0.20

Note: Results are mean ± S.E of three replicates (n=3)

Note: AF- *Aspergillus fumigatus*, AT- *Aspergillus terreus*, FO- *Fusarium oxysporum*

Figure 6. Antifungal activity of Chloroform leaf extract of *Lantana camara*

High Performance Liquid Chromatography (HPLC) - UV analysis

HPLC was employed to characterize the phenolic acids and flavonoids present in chloroform and ethanol extracts. HPLC analysis of *Lantana camara* (leaves) chloroform extract revealed the presence of gallic acid with retention time of 1.54 (Figure 7a). The HPLC-UV spectral peaks of chloroform extract of *Lantana camara* (Figure 7b) showed the peaks for presence of flavonoid compounds, quercetin at 350nm with the analysis of retention time of standard flavonoids.

HPLC reports indicated that the ethanol extract contains gallic acid with retention time of 1.54 min (Figure 7c). The HPLC-UV spectral peaks of ethanol extract revealed the presence of quercetin, myricetin and one unknown flavonoid (Figure 7d). The quantitative analysis flavonoids by HPLC analysis was shown in the Table 7.

Table 7. Quantitative estimation of chloroform and ethanol extracts for phenolic acids and flavonoids by HPLC method

Phenolic acids and flavonoids		Chloroform extract (mg/g)	Ethanol extract (mg/g)
Phenolic acids	Gallic acid	91.49	219.0
	Coumaric acid	-	-
	Ellagic acid	-	-
	Hydroxybenzoic acid	-	-
	Vanillic acid	-	-
	Rutin	-	-
Flavonoids	Quercetin	104.7	109.3
	Myricetin	-	63.5
	Kaempferol	-	-
	Luteolin	-	-

4. Discussion

Lantana camara great and various distributions is a mirrored image of its extensive ecological tolerances. The species takes place in numerous habitats starting from open unshaded areas which consist of wastelands, rainforest edges, beachfronts, and forests disturbed through sports consisting of hearth place or logging [24, 25]. The species also thrive well in disturbed area which includes roadside, railway tracks and canals. Anthropogenic activity further aggravates the invasion and allows it to spread [26, 27].

Lantana camara extract was not very active against strains of bacteria. A range of zone of inhibition 12-12.3 mm was observed against *Micrococcus luteus*, *E. coli* and *Klebsiella pneumoniae*. A indicate zone of inhibition ten millimetre was showed against *Salmonella setubal* and

Staphylococcus aureus. *Enterobacter aerogenase* showed little zone of inhibition (9 mm) [28-30]. Sharama et al., [10] reported presence of Emodin and Physcion in *L. camara* extract that showed mild activities against different bacterial strains. An antibacterial activity of different *Lantana* species has been evaluated [31] and it is found that *Lantana* species have good antibacterial agents. *S. angustifolia* did not showed activity beside any bacterial strain tested.

The present study, involved various pharmacological activities of leaves of *Lantana camara*. The dried and powdered leaf material was extracted with ethanol and chloroform solvents. The extract was investigated for phytoconstituents, antibacterial and antifungal activity. The extract was subjected to HPLC (High Performance Liquid Chromatography) to find out the presence of phytoconstituents like phenols and flavonoids.

The standard antibiotic ciprofloxacin showed inhibition zone against all the tested pathogenic bacteria and fluconazole showed inhibition zone against all the tested pathogenic fungi. In this work, the antibacterial activity of extract was determined by using agar well diffusion method against few pathogenic bacteria. In this study, marked the inhibitions of test bacteria were observed. Among bacteria, *Xanthomonas* sp. was found to be more sensitive to ethanol extract and *Bacillus subtilis* was found to be more sensitive to chloroform extract. The antifungal activity of *Lantana camara* leaf extracts were determined using agar well diffusion method against certain pathogenic fungi. In this study, there was no such marked inhibition showed for all fungi.

Similar to this work, Suthar and Sharma, [32] work suggested that oils obtained from *Lantana camara* caused a significant inhibition on fungal growth, as compared to controls. In the primary days of assessment the oil of *L. camara* at an attention of one thousand mg/L brought about a discount with inside the increase of the fungal colonies of 25.0% and 19.6%, respectively. At higher concentrations the fungus growth was completely inhibited during the first day and for 10000 mg/L a full inhibition was still observed during the second day.

Misra et al., [33] studied the consequences of hydroalcoholic extract from *Lantana camara* var. *aculeata* leaves on fertility, popular reproductive overall performance and teratology within side the rat. The statistics confirmed that the extract interfered with inside the frequency of fetal skeleton anomalies from dams handled with the extract and prompted embryo toxicity as indicated with the aid of using post-implantation loss, with none symptoms and symptoms of maternal toxicity. The different parameters evaluated did now no longer endorse modifications.

Figure 7a. HPLC chromatogram of phenolic acids of chloroform extracts (1- Gallic acid)

Figure 7b. HPLC chromatogram of flavonoids of chloroform extracts (a- Quercetin)

Figure 7c. HPLC chromatograms of phenolic acids of ethanol extract (1- Gallic acid)

Figure 7d. HPLC chromatograms of flavonoids of ethanol extract (a- Quercetin, b- Myricetin, c-Unkonown)

In the current study, HPLC was employed to characterize the phenolic acids and flavonoids present in chloroform and ethanol extracts. Bacterial infections essentially talk to any sort of contamination this is initiated with the aid of using a specific form of bacterium or micro organism. Most bacterial infections in people are as a result of a set of micro organism called mesophilic micro organism, *E. coli*. Bacteria like *P. aeruginosa* and *E. coli* cause infections like nosocomial infections, food borne illness, gastrointestinal infections, wound infections etc.

The extracts of *Lantana camara* var. *aculeata* leaves had been studied for his or her phytochemical materials and termiticidal results towards grownup termite workers. The 5% chloroform extract was found to be significantly effective against termite workers [34, 35]. The antimicrobial efficacy of flavonoids (free and bound) and crude alkaloids of *Lantana camara* was determined by disc diffusion assay against three bacteria (*Escherichia coli*, *Proteus mirabilis*, and *Staphylococcus aureus*) and two fungi (*Candida albicans* and *Trichophyton mentagrophytes*) [36, 37].

S. aureus is the same old pathogen, even though publicity to *Pseudomonas aeruginosa* in warm tubs or swimming pools can result in folliculitis. Folliculitis is a superficial contamination of the hair follicles characterised through erythematous, follicular-primarily based totally papules and pustules. Furuncles are deeper infections of the hair follicle characterized by inflammatory nodules with pustular drainage, which can coalesce to form larger draining nodules and many skin infections are caused due to the fungal organisms [38-40].

Thus bacterial and fungal infections can be cured by some of these types of plant extracts by suppressing those pathogens without any side effects.

5. Conclusion

The present study, involved various pharmacological activities of leaves of *Lantana camara*. The dried and powdered leaf material was extracted with ethanol and chloroform solvents. The extract was investigated for phytoconstituents, antibacterial and antifungal activity. The extract was subjected to HPLC to find out the presence of phytoconstituents like phenols and flavonoids. The antibacterial activity of extract was determined by using agar well diffusion method against few pathogenic bacteria. Among bacteria, *Xanthomonas* sp. was found to be more sensitive to ethanol extract and *Bacillus subtilis* was found to be more sensitive to chloroform extract. The antifungal activity of *Lantana camara* leaf extracts were determined using agar well diffusion method against certain pathogenic fungi. In this study, there was no such marked inhibition showed for all fungi. HPLC was employed to characterize the phenolic acids and flavonoids present in chloroform and ethanol extracts. Thus bacterial and fungal infections can be cured by some of these types of plant

extracts by suppressing those pathogens without any side effects.

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