

Phytochemical Screening and Antimicrobial Activity of Lemongrass (*Cymbopogon citratus* L.)

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SUMMARY

Lemongrass (*Cymbopogon citratus* L.) is a perennial plant. The preliminary phytochemical screening of the ethanol leaf extracts revealed the presence of flavanoids, tannins, alkaloids, glycoloids, phenols, steroids, and phytosteroids and carbohydrates some of which could be used as medical regimes. Lemongrass has demonstrated antimicrobial properties which could be harnessed for the development of alternative means of therapeutic control of bacterial pathogens. Lemongrass has demonstrated antimicrobial properties which could be harnessed for the development of alternative means of therapeutic control of Bacterial pathogens. Lemongrass has demonstrated antimicrobial properties which could be harnessed for the development of alternative means of therapeutic control of bacterial pathogens.

INTRODUCTION

Lemongrass (*Cymbopogon citratus* L.) is a perennial plant with thin and long leaves and it is indigenous to India and other areas. It is one of the commercially cultivated aromatic crops in India. It belongs to the family of *Poaceae* and grows in many parts of tropical and sub-tropical Africa & South East Asia. It is mainly grown in India along Western Ghats (Kerala, Maharashtra), Tamil nadu, Assam and Karnataka besides foot-hills of Sikkim and Arunachal Pradesh. It has a lot of medicinal properties and health benefits. It can be used in regular tea consumption for a best aromatic flavor. It needs a warm humid climatic condition with full of sunshine and rainfall ranging from 200 to 250 cm well distributed throughout the year. It thrives well in a wide range of soils ranging from rich loamy to poor laterite, but sandy loam soil and red soils with good drainage and good organic matter are best suited for its cultivation. Lemongrass is a herbal plant. Its leaves and the oil are used to make medicine. It is used for treating digestive tract spasms, stomachache, high blood pressure, convulsions, pain, vomiting, cough, achy joints (rheumatism), fever, the common cold, and exhaustion. It is also used to kill germs and as a mild astringent. Some people apply lemongrass and its essential oil directly to the skin for headache, stomachache, abdominal pain, and muscle pain. The inhalation, the essential oil of lemongrass is used as aromatherapy for muscle pain. In food and beverages, lemongrass is used as a flavoring. Lemongrass leaves are commonly used as “lemon” flavoring in herbal teas. In manufacturing, it is used as a fragrance in soaps and cosmetics. Lemongrass is also used in making vitamin A and natural citral. Plants are very important sources of drugs used for centuries in the treatment of various microbial infections. Most of the plant-based drugs we used correctly, pose less or no toxic effect to the recipients compared to the chemically synthetic drugs. This necessitates the use of natural plants in the complementary medicine in order to showcase the long term adverse effects of some synthetic drugs. Herbal drugs have increasingly been used worldwide during the last few decades as evidenced by rapidly growing global and national markets of herbal drugs. Now people rely more on herbal drugs because of high price and harmful side effects of synthetic drugs, and this trend is growing not only in developing countries but in developed countries too. The present study was done by using following objectives: 1) To preparation of plant extract. 2) To study of phytochemical analysis. 3) To study Antimicrobial Activity.

Material And Methods:

A. Materials: -1. Collection of plant material: Different parts of plants like leaves were collected from Local market saralgaon.

2. Instruments: Test Tubes, Mixer Grinder, Hot Plate stirrer, Airtight Bottles, Petri Plate

3. Chemicals: Methanol, Ethanol, Hydrochloric Acid (HCL), Sodium Hydroxide (NaOH), Benzene, Sulphuric Acid

B.Methods:

1.Preparation of Plant Extract: Take a fresh leaves is wash 2-3 times with tap water and dry at room temperature. Then dry powdered using a clean mixer grinder and filled airtight container. Store it in dry place at room temperature.

2.Lemongrass (Cymbonpogan citratus) Extraction: The powdered materials of were extracted Lemongrass (Cymbonpogan citratus) with methanol. During extraction the ratio was taken 1:10 placed into Soxhlet apparatus which run for ten cycles. The duration of each cycle was about 55 minutes. After the completion of ten cycles the color of powdered material was disappeared or light. After extraction the crude extract were evaporated at 40 0C with the help of Hot plate stirrer. The extracts were collected and stored at 4°C in sterile air tight containers for further analysis.

3. Preliminary Phytochemical analysis: Qualitative photochemical analysis for the identification of secondary metabolites was carried out for Lemongrass extracts. The plant parts (leaves) were shade dried in laboratory and grind into homogenized powder and stored in airtight bottles. Those plant parts were subjected to preliminary or qualitative chemical screening for the identification of various classes of active chemical constituents using standard prescribed methods. For certain compounds several tests were carried out. Positive result of any one test was considered as an indicative of the presence of that compound. The reason of this is that certain tests are possibly more sensitive than others. Positive tests was denoted as (+) and absent was (-).

The following active compounds observed in plants are as follow:

- **Saponins**
- **Tannins**
- **Glycosides**
- **Alkaloid**
- **Flavanoids**
- **Terpenoids**

1. Saponins: Weighed 1g of the sample into a conical flask adds 10ml of distilled water in a test tube. Shake it vigorously for about 30 seconds & allow standing it for half an hour. Honeycomb froth indicated the presence of Saponins.

2. Tannins: To dilute extract with water add 3-4 drops of 10% ferric chloride solution. Blue colour observe for Gallic tannins and green colour for calecholic tannins.

3.Glycosides: 25 ml of dilute Sulphuric acid was add to 5 ml extract in test tube and boiled for 15 minutes Cool it and neutralized with 10 % NaOH .Then 5 ml Fehling solution add Brick red precipitate form.

4. Alkaloid: Measure 2ml of extract in test tube .Add picric acid solution Orange coloration indicates presence of alkaloids.

5. Flavonoids: 4 ml of extract treated with 1.5 ml of 50%Lemongrasssolution .Solution was warmed and add metal magnesium. Add 5-6 drops of concentrated hydrochloric acid. Red color observed for Flavonoids and orange for flavones.

6. Terpenoids: 4 mg of extract was treated with 0.5 ml of acetic unhydrid and 0.5 ml of chloroform. Add slowly concentrated solution of sulphuric acid .Red violet colour was observed for terpenoid.ter & boiled it for 5 minute. Then filter it & add 2.5 ml of the filtrate was added to 10 ml of distilled.

Antimicrobial Activity

1. Agar well diffusion method :

On Nutrient agar plate spread the bacteria species colony by using sterilized borer make well culture plate. Add different conc. of leaf extract in each well keep the plates in refrigerator for 20 to 30 minute allow the diffusion of extract in culture medium. Incubate the plate (28 to 30 °C) for 18 to 24 hr. observed the diameter of zone of inhibition. Note down the result as follow:

Observation:

Table 1. Phytochemical analysis of Methanol and Water extracts:

Sr.No.	Test	Inference	Ehtyl Acetate Extract
1.	Test for flavonoids	Formation of white precipitaite	+ve
2.	Test for saponins	Formation of persistence foam	-ve
3.	Test for tannins	Formation of blue greenish color	+ve
4.	Test for cardiac glycosides	Brown ring at the interface	+ve
5.	Test for alkaloids	Presence of green color or white precipitate	+ve
6.	Test for terpenoids	Formation of intense color	-ve



Fig.1) Results of Flavonoids



Fig.3) Results of tannins

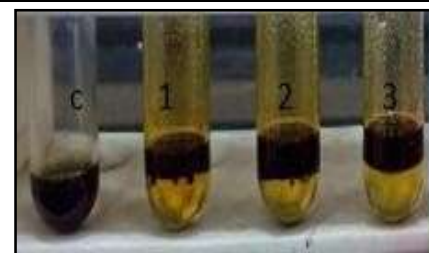


Fig.5) Results of Alkoloids

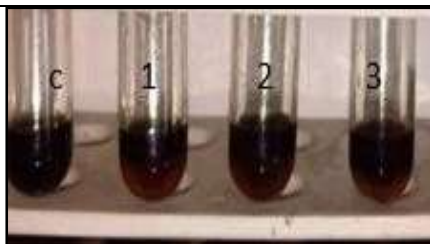


Fig .2) Results of Saponins



Fig. 4) Results of cardiac glycosides



Fig. 6) Results of Terpenoids

The results of this study showed the presence of the phytochemicals namely (flavonoids, phenols, tannins, alkaloids, cardiac glycosides & coumarins). The microbe i.e. *Shigella spp.*, *Escherichia spp* was inoculated on the LB media and kept for incubation at 28⁰ C for 2 days and observed that there was zone of inhibition, from the below figure we can interpret that the ethyl acetate extract has inhibition on the growth of the bacteria.

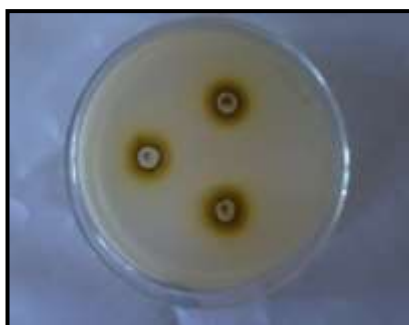


Fig.6. Zone of inhibition of Lemongrass (*Cymbopogon citratus* L.) extract against test organisms i.e.

Table 2. Antimicrobial activity of aqueous extract:

Sr.No.	Bacterial organism	Zone of Inhibition in mm for 100µl Lemongrass plant extracts against test bacterial organisms
1.	<i>Shigella spp.</i>	0.3 mm
2.	<i>Escherichia spp.</i>	0.2 mm
3.	<i>Proteus spp.</i>	0.4 mm

Ethyl acetate and water soluble fractions of green banana peel displayed high antimicrobial and antioxidant activity. Most of the compounds isolated from green peel β -sitosterol, malic acid, 12-hydroxystearic acid and succinic acid, which showed significant antibacterial activities and low antioxidant activities. While, those compounds isolated from water soluble extracts glycoside and monosaccharide components displayed significant antioxidant and low antimicrobial activity. The preliminary phytochemical screening of the ethanol leaf extracts revealed the presence of flavanoids, tannins, alkaloids, glycoloids, phenols, steroids, and phytosteroids and carbohydrates some of which could be used as medical regimes. Lemongrass has demonstrated antimicrobial properties which could be harnessed for the development of alternative means of therapeutic control of bacterial pathogens. Lemongrass has demonstrated antimicrobial properties which could be harnessed for the development of alternative means of therapeutic control of bacterial pathogens.

CONCLUSION

The result of this study show that phytochemical i.e , Flavonoids, Saponin, Tannins, Glycosides, Alkaloids & Terpenoids are present in the Lemongrass (*Cymbopogon citratus L.*) leaves. The result of this study show that Lemongrass (*Cymbopogon citratus L.*) Leaves show antimicrobial activity against on microbials species.

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