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Qualitative Phytochemical Screening and *In Vitro* Antifungal Activity of *Lantana camara* Leaf Extracts

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ABSTRACT: A common medicinal plant with antibacterial and antifungal qualities is Lantana camara L. (Verbenaceae). In this study, various solvent extracts (methanol, ethanol, chloroform, and aqueous) of L. camara leaves were subjected to phytochemical screening and antifungal assays. The presence of alkaloids, flavonoids, glycosides, carbohydrates, and amino acids was determined by qualitative phytochemical testing. Fluconazole was employed as a positive control in antifungal tests against Aspergillus niger utilizing the agar well diffusion method. The extracts had detectable antifungal action, confirming L. camara's ethnomedical value. According to these results, the leaves of L. camara may contain bioactive substances that could be used to build antifungal medications.This research validates the traditional use of *L. camara* and highlights its potential as a source of natural antifungal agents, particularly from methanolic leaf extracts.

Index Terms – *Lantana camara*, phytochemical screening, antifungal activity, *Aspergillus niger*, fluconazole

1. INTRODUCTION:

Lantana camara is Commonly referred to as West Indian lantana or wild sage, a medicinal shrub that is well-known for its wide range of pharmacological qualities. It is indigenous to tropical and subtropical areas and has long been used in traditional medicine to treat a wide range of illnesses, including as wounds, inflammatory diseases, respiratory issues, and skin infections. Its antibacterial, antifungal, antioxidant, and wound-healing qualities have been demonstrated by scientific studies, confirming its usefulness in contemporary medicine[1]. Flavonoids, tannins, alkaloids, terpenoids, and glycosides are just a few of the many bioactive substances found in L. camara leaves that support its therapeutic properties. By rupturing fungal cell membranes, preventing spore germination, and causing oxidative stress, these substances demonstrate potent antifungal activity, which hinders fungal growth.

Natural sources of medical compounds have existed for thousands of years, and many modern pharmaceuticals are derived from them. The presence of different phytochemicals in different plant portions confirms that plants can be used as a source of natural medications. Plant extracts and their active phytochemical components have shown significant antibacterial activity and medicinal capabilities. Medicinal herbs are rich in secondary metabolites, many of which have antibacterial properties.Effective broad spectrum antibiotics could be developed with a strong understanding of plants. Medicinal herbs provide an alternative treatment for mild infectious diseases. Some Indian herbs have been found to have anti-inflammatory, antibacterial, and antioxidant properties.[2]

L. camara is a promising option for pharmaceutical and agricultural applications due to its antifungal capabilities as well as its antibacterial and antioxidant qualities. Its broad-spectrum antibacterial properties have been further supported by the observation of its antibacterial activity against a range of Gram-positive and Gram-negative bacterial strains. Its antioxidant qualities also

point to possible therapeutic advantages in the fight against diseases linked to oxidative stress, including diabetes, heart disease, and neurological problems.[3]

Considering its pharmacological importance, more investigation is required to identify and describe the active antifungal substances found in L. camara. Determining its safety and effectiveness for clinical and commercial application will require conducting in vivo investigations, assessing toxicity profiles, and optimizing extraction techniques. There is potential for creating plant-based remedies that are sustainable, environmentally benign, and efficient against resistant fungus strains by including L. camara into natural antifungal compositions [4].

2. RESEARCH METHODOLOGY:

1. Sampling:

Samples of Lantana camara leaves were gathered from Pashan Hills. Baner, Pune. To get rid of dust and debris, the gathered leaves were cleaned under running water. To make sure all impurities were gone, the leaves were further cleansed with distilled water. To preserve the bioactive chemicals, the cleaned leaves were allowed to air dry in the shade at room temperature. An electric grinder was used to grind the leaves into a consistent powder when they had completely dried. For later usage, the ground plant material was kept in airtight containers.

2. Extract Preparation:

Powdered leaf material was extracted using the maceration technique. Approximately 50 g of the powder was soaked in 250 mL of four different solvents: methanol, ethanol, chloroform, and distilled water for 48-72 hrs for continuous shaking. Reduced pressure was used to filter and concentrate the extracts. [5]

3. Chemicals and Reagents

- Mayer's reagent (1.36 g mercuric chloride, 5 g potassium iodide in 100 mL distilled water), 10% lead acetate solution, Chloroform, acetic acid, and concentrated H_2SO_4. Alpha-naphthol reagent with concentrated H_2SO_4. Ninhydrin reagent.
- **Solvents**: Reagents include distilled water, methanol, ethanol, and chloroform.
- **Microorganisms**: Common fungal strains, including Aspergillus niger, subcultured on Potato Dextrose Agar (PDA), a suitable agar medium
- **Culture Media**: Control Sterile PDA Broth
- **Control drugs:** A typical pill of fluconazole (1 mg mL–1)
- **Equipment:** sterile cork borer, filter paper micropipettes, petri plates, an autoclave, and an incubator, Conical flasks, pipettes, beakers, test tubes, and measuring cylinders.

3. METHODOLOGY:

3.1. Qualitative Analysis of Phytochemicals:

1. Alkaloids

Few drops of mayer's reagent to 2-3 ml of plant extract.The formation of a creamy white precipitate indicated the presence of alkaloids.

2. Flavonoid

10% of lead acetate was added to 2ml of plant extract.A gelatinous yellow precipitate indicated the presence of flavonoids.

3. Glycosides

Few drops of plant extract added to 2ml of chloroform & 2 ml of acetic acid.Mixture was cooled in ice. Concentrated sulfuric acid was added next.The formation of a reddish-brown ring indicated the presence of glycosides.

4. Carbohydrate

2 drops af aplha napthol was added to 2 ml of plant extract.Next 2 drops of sulfuric acid were added to the solution. A violet ring at the junction confirmed the presence of carbohydrates.

5. Amino acids

2 ml of plant extract was mixed with 2 drops of ninhydrin acid.The appearance of a purple color indicated the presence of amino acids.

6. **Phenolics:**

The presence of phenolics was assessed by adding a few drops of ferric chloride solution. A dark green or blue color indicated their presence.

7. **Tannins:**

Tannins were detected by adding ferric chloride solution to the extract. The formation of a bluish-black precipitate indicated the presence of tannins.

8. **Saponins:**

The formation of a stable foam upon vigorous shaking indicated the presence of saponins.[6].

3.2. Determination of antifungal activity:

1. Collect fresh *Lantana camara* leaves, wash them thoroughly, and air-dry them in the shade to prevent loss of volatile compounds. Grind the dried leaves into a fine powder and mix with solvent that is methanol.

2. Prepare control solutions:

Positive Control (Fluconazole): Prepare a solution of fluconazole by dissolving a known mass of the tablet powder in sterile distilled water or an appropriate solvent to achieve a standard concentration (e.g., 1 mg/mL).

Negative Control: Use a solvent-only control (e.g., DMSO or sterile water) to ensure the solvent itself has no antifungal effect.

3. Pour molten, sterilized PDA into sterile petri dishes and allow the agar to solidify.

4. Create a sterile fungal suspension of the target microorganism (e.g., *Aspergillus niger*) with a concentration matching the 0.5 McFarland standard. Using a sterile cotton swab, evenly streak the suspension over the entire surface of each agar plate

5. Use a sterile cork borer to create equally spaced wells in the agar. Pipette a specific volume of the *Lantana camara* extracts(25 µL), fluconazole solution (50 µL),and the negative control into separate wells.

6. Incubate the plates in an incubator at an appropriate temperature (e.g., 25–37°C) for 24–72 hours, depending on the fungal strain [7].

4. RESULTS AND DISCUSSION:

4.1. Qualitative Phytochemical Screening:

All extracts tested positive for major phytochemical groups, though with variations depending on solvent polarity. Methanol and ethanol extracts showed stronger reactions for phenolics and flavonoids, while chloroform extract was weaker.

Phytochemical	Methanol	Ethanol	Chloroform	Aqueous	Inference
Alkaloids	+++	++	+	+	Present
Flavonoids	+++	++	+	++	Present
Glycosides	++	++	+	+	Present
Carbohydrates	++	+	–	++	Present
Amino acids	+	+	–	+	Trace
Phenolics	+++	++	+	++	Present
Tannins	+++	++	+	++	Present
Saponins	++	+	–	++	Present

(+++ strong, ++ moderate, + weak, – absent)

4.2. Antifungal Assay

After the incubation period, examine the petri dishes for zones of inhibition.

Fungal Growth: The control plates (containing only solvent) will show robust fungal growth, spreading across the surface of the agar.

Zone of Inhibition (Fluconazole): The plate with the fluconazole disc or well will show a clear, circular area around it where no fungal growth is visible. This demonstrates the effectiveness of the standard antifungal drug.

Zone of Inhibition (*Lantana camara*): The plates with the *Lantana camara* extract will show varying sizes of clear zones around the wells. The size of the zone indicates the potency of the extract at that specific concentration.

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