



## ANTIMICROBIAL POTENTIAL OF HYDROALCOHOLIC EXTRACT OF *LAGERSTROEMIA SPECIOSA*

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Submitted on: 19.05.2021;

Revised on: 29.05.2021;

Accepted on: 01.06.2021

### ABSTRACT:

The present study was aimed to establish the antimicrobial activity of hydro-alcoholic extract of *Lagerstroemia speciosa*. The hydro-alcoholic extract of *Lagerstroemia speciosa* leaf was subjected to antimicrobial activity study against various gram positive and gram negative microorganism by disk diffusion method. Strains of Gram-negative bacteria (*Pseudomonas aeruginosa*) and Strains of Gram-positive bacteria (*Bacillus subtilis*) were used to carry out antimicrobial activity. The hydro-alcoholic extract of *Lagerstroemia speciosa* has shown zone of inhibition against *Bacillus subtilis*, *Pseudomonas aeruginosa* and *Candida albicans*. In this study Amoxicillin was used as standard drug.

**KEY WORDS:** Bacteria, Fungus, *Lagerstroemia speciosa*, Antimicrobial, Disc diffusion.

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Indian Research Journal of Pharmacy and Science; 29(2021)2527-25;  
Journal Home Page: <https://www.irjps.in>  
DOI: 10.21276/irjps.2021.8.2.2

## INTRODUCTION:

The use of plant and its product incorporates a long history that began with Kabirazi medication and through the years has been incorporated into traditional and allopathic medicine. With the advancement in Science and Technology, exceptional progress has been created within the field of medicine with the discoveries of the many natural and artificial drugs. Antibiotics are indisputably one among the foremost necessary therapeutic discoveries of the 20<sup>th</sup> century that had effectiveness against serious microorganism infections.<sup>1</sup>

Excessive usage of antibiotic is damaging to human health, ecosystem, and surroundings. It may additionally increase the incidences of drug-resistant pathogens. Antibiotics resistance may be a worldwide major downside that is rapidly increasing in each hospitals and therefore the community concerned in morbidity, mortality, and health-care. Almost all unhealthful microorganism, it's been ascertained that they're able to get the resistance issue to the antimicrobial medicine quickly, therefore, multiple drug resistant microorganism caused the most failure within the treatment of infectious diseases. So, it's necessary to find and design the alternative approaches to manage resistant microorganism.<sup>2</sup>

In a surveys conducted by the World Health Organization (WHO) reports that over 80% of the world's population still depends upon the traditional medicines for different diseases.<sup>1</sup> There are various plants and natural products which have bactericidal, fungicidal, and antiprotozoal effect that could be used

either systemically or locally. Medicinal values of plants have also been preferred throughout the world, due to their potent pharmacological activities, low toxicity, and low cost, when compared with synthetic drugs. Medicinal plants are rich in a wide variety of active constituents like secondary metabolites such as tannins, terpenoids, alkaloids, saponins, flavonoids, and phenolic compounds that can be produce a definite physiological action on the human body.<sup>3,4</sup>

*Lagerstroemia speciosa* is a medium-large-sized evergreen tree grows up to 20-25 m high, belonging to the family Lythraceae and commonly known as Jarul tree. *Lagerstroemia speciosa* have valuable property, roots were used as astringent and stimulant, and it was also used for abdomen issues. Tea of the leaves was utilized in the treatment of diabetes mellitus (DM) and for weight loss. The leaves, flowers and barks were used as purgative and treatment of pain, pyrexia, kidney inflammation.<sup>5</sup>

## MATERIALS AND METHODS:<sup>6,7</sup>

### Collection of Plant Material:

The leaves of *Lagerstroemia speciosa* of family: Lythraceae were collected from fields of Uluberia, Howrah. The leaves these plants were subjected to surface sterilization using 70% ethanol and then dried in room temperature for further analysis.

### Extraction of Crude Drug:

The fresh leaves of *Lagerstroemia speciosa* were shade dried, powdered then maceration with petroleum ether for 24 hours and extracted with aqua: alcohol 1:1 by using Soxlet apparatus by hot extraction method. The extract was filtered and the

filtrate concentrated in rotary vacuum evaporator at 40° C. The extracted drug packed in eppendorf and stored at 4° C before performing biological activity.

#### **Primary Phytochemical screening:**

The preliminary phytochemical investigation of the extract of the leaves of *Lagerstroemia speciosa* showed the presence of steroids, terpenoids, glycosides, phenolic compounds,  $\alpha$ -amino acids, saponins, starch, alkaloids, carbohydrates, organic acids, flavonoids, reducing sugars and tannins.

#### **Antimicrobial Activity:**<sup>8,9</sup>

##### **Microorganisms**

The strains were obtained from Medisure Pharmaceuticals Pvt. Ltds, Uluberia, Howrah. The stock culture was maintained on agar nutrient media at 37° C. The 24hr culture of those microorganisms was used in the study. The bacterial cultures were maintained on nutrient agar medium respectively, and were stored at 4°C for determining antimicrobial activity of leaves of the plant *Lagerstroemia speciosa*. Gram Negative Bacteria: *Pseudomonas aeruginosa*, Gram Positive Bacteria: *Bacillus subtilis* and Fungi: *Candida albicans* were used in this study.

##### **Antimicrobial activity by Disk Diffusion method:**

Nutrient Agar media was ready and sterilized in a flask and cooled to 45-50°C and was distributed by pipette (25ml) in every pre sterilized Petri dishes, previously inoculated with 0.01ml of the nutrient broth cultures and homogenously swirled to distribute the medium. Disks injected with extract (600µl/ml) were placed on the solid agar medium by

pressing slightly. The treated petri-plates were put at 4°C for 1 hour and then incubated at 37°±0.1°C for 24 hrs. Same procedure was maintained for standard drug amoxicillin (950µg/ml) and control. At last, the zones of Inhibitions formed on the media and produced by extract which measured with a transparent ruler in millimeters (mm).

#### **RESULT AND DISCUSSION:**

The problems concerning application of conventional antibiotics, including antimicrobial resistance, environmental issues, adverse effects and high prices, have strengthened an inclination to replace artificial antimicrobials with natural alternative agents. Plant based natural product among the alternative agents examined so as to switch conventional antibiotics. Accordingly, extensive research has been carried out for the antimicrobial impact of the essential oils and extracts that showed the power to inhibit the expansion of assorted unhealthful microorganisms.<sup>10</sup>

The results shows that, the hydro-alcoholic extract of the leaves of *Lagerstroemia speciosa* plant exhibited antibacterial potencies affecting Gram positive, Gram negative bacteria used in the present study. The evidence from the results that, the extracts of *Lagerstroemia speciosa* leaves significantly inhibited the growth of *Bacillus subtilis* and *Pseudomonas aeruginosa*. The test organisms like *Pseudomonas aeruginosa* and *Bacillus subtilis*, were proved to be maximum level of susceptibility to *Lagerstroemia speciosa* leaves extract with respect to increasing doses.

**Table 1:** Bactericidal activity of hydro-alcoholic extract of the leaves of *Lagerstroemia speciosa*

Extract & Standard drug	Zone of Inhibition (mm)		
	<i>Bacillus subtilis</i>	<i>Pseudomonas aeruginosa</i>	<i>Candida albicans</i>
Lagerstroemia extract	15.33±1.15	17.33±2.08	13.33±3.05
Standard drug (Amoxicillin)	21.66±3.21	23.66±2.30	-----

#Amoxicillin (950µg/ml) was used as standard drug,

In the present study we have evaluate the antimicrobial potential of extract of the leaves of *Lagerstroemia speciosa* against different microorganisms. Strains of Gram-negative bacteria (*Pseudomonas aeruginosa*) and strains of Gram-positive bacteria (*Bacillus subtilis*) are used to carry out antimicrobial activity. The study showed that hydro-alcoholic extract of the leaves of *Lagerstroemia speciosa* has good antimicrobial activity against the tested strains. The hydro-alcoholic extract of the leaves of *Lagerstroemia speciosa* has shown zone of inhibition of 15.33±1.15mm for *Bacillus subtilis*, for *Pseudomonas aeruginosa* it has shown a zone of inhibition of 17.33±2.08mm. For fungus *Candida albicans*, zone of inhibition was 13.33±3.05mm.

#### CONCLUSION:

The present study concluded that the hydro-alcoholic extract of the leaves of *Lagerstroemia speciosa* could be an excellent source of antimicrobial drug. Probably the activity shown by the plant is due to the active constituents present in the plant like tannins, triterpenoids. Further study could be conduct leading towards isolation of active molecules responsible for antimicrobial activity of plant.

#### ACKNOWLEDGEMENT:

The authors are very much thankful to the executive chairman Dr. R. Debnath and Principal Prof. (Dr.)

Kuntal Hazra of Bharat Technology for providing with facilities to carry out the research work. The authors would also like to thank Medisure Pharmaceuticals Pvt. Ltds, Uluberia, Howrah for providing with microbial strains used in the study.

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CONFLICT OF INTEREST REPORTED: NIL;

SOURCE OF FUNDING: NONE REPORTED