

## Antimicrobial Activity of Powdered Bark Extract of *Albizzia Lebbeck* on Some Bacteria.

Devendra S. Shirode\*, Samiksha S. Deokar, Advait B. Chautmal, Prachi Kulkarni, Pallavi Gholap, Priyatama Powar.

Dr. D. Y. Patil College of Pharmacy, Akurdi, Pune, India-411044

**Running title:** Antimicrobial Activity of *Albizzia Lebbeck*

\*For correspondence to: Dr. D. S. Shirode  
Associate Professor  
M.Pharm, Phd.

**Dept. of Pharmacology, Dr. D. Y. Patil College of Pharmacy, Akurdi, Pune India**

### ABSTRACT

*The present study was conducted to investigate the antibacterial effect of Albizzia lebbeck (powdered bark) against human pathogens such as Escherichia coli (E.coli) and Pseudomonas aurogenosa (P. aurogenosa). Minimum inhibitory concentration (MIC) of the aqueous powdered bark extract of Albizzia lebbeck (AL) was determined using the following concentrations 200 mg/ml, and 400 mg/ml. It indicates that the concentration of test sample is directly proportional to the zone of inhibition. Zone of inhibition of AL at 200mg/kg and 400 mg/kg is 13 mm & 18 mm respectively for E.coli, whereas zone of inhibition of AL 200mg/kg and 400 mg/kg is 17 mm & 18 mm respectively for P.aurogenosa. This study indicates that Albizzia lebbeck has an important antimicrobial effect, which justifies its potential use in development of new antimicrobial medicines for the treatment and management of diseases.*

**Key Words:** *Albizzia lebbeck, Antibacterial activity, E-coli, P.aurogenosa*

### INTRODUCTION

Infectious diseases caused by many pathogenic bacteria and yeast are a major problem despite the tremendous achievement in human health care. According to a statement from the WHO, infectious diseases are the primary cause of early death worldwide and account for around 17 million deaths

each year. [1] Some of the multidrug-resistant (MDR) pathogenic microbes commonly reported worldwide are;

- Staphylococcus aureus
- Salmonella typhimurium
- Escherichia coli
- Klebsiella pneumonia
- Candida albicans [1]

In the allopathic treatment, azithromycin, ampicillin, levofloxacin and tetracycline are used but simultaneously these drugs also cause adverse effect like gastric upset, diarrhea, and hypersensitivity. [2] In this aspect, on the basis of literature survey, we selected *Albizzia lebeck* to evaluate its antimicrobial activity.

*Albizzia lebeck* (Shirish) [3] is a tree found in the Fabaceae family (formerly leguminosae), and sub-family Mimosae) [4, 5]. The plant is found throughout India, Bangladesh and planted in tropical and subtropical Asia and Africa [6, 3]. Plant may reach 25 m, usually 8–14 m; trunk often short, crown low and spreading. Leaves are compound, pairs of pinnae, 3–11 pairs of leaflets, each oblong, tip rounded, usually 2–3 cm. The flowers are green to yellow; fragrant brush heads on a stalk, short lived. The fruits are shiny yellow to brown pods in clusters decorate the tree for a long time, each pod up to 30 cm long, bulging over seeds, the seeds and pods “chatter” in the wind [7], Considering these, the present investigation was undertaken and evaluates the antimicrobial activity of *Albizzia lebeck*.

## **MATERIAL AND METHODS**

### **Plant source and identification**

The powdered bark extract (10:1) of *Albizzia lebeck* was obtained from Amsar Private Limited, INDORE – 425006, Madhya Pradesh.

### **Source of test organisms**

All the microbial strains were obtained from from Dr. D. Y. Patil Medical College, Hospital & Research Centre, Pimpri, Pune.

**Culture media**

Nutrient agar was used for the antimicrobial sensitivity test. [10]

**Standardization of inoculums**

Nutrient agar was prepared and sterilized with the support of an Autoclave at 121°C. [14] After the bacterial cultures were inoculated into separate flasks and incubated in a shaker for 24 and 48 hours for preparation of fresh culture and turbidity of fresh culture was visually adjusted to equal that of a 0.5 McFarland turbidity standard.

**Antibacterial activity of bark extracts**

The antibacterial efficacy of the aqueous extract of *Albizzia lebeck* was tested by cup plate method. 100µl of above fresh bacterial cell suspension/culture was poured in sterilized Petri dishes (9 cm diameter) onto which 20 ml of sterile nutrient agar were poured and thoroughly mixed. It was allowed to solidify at room temperature. In the plate of the nutrient agar medium, cup cavities of 7 mm diameter were made with a sterilized cork-borer. These cups were filled with fifty micro liters of each dilution i.e. 200mg/ml concentration, 400mg/ml concentration, and control. The Petri-dishes were incubated for 24 hrs. At 25±2°C for bacteria and the observations were recorded as diameter of an inhibitory zone in mm. All experiments were repeated three times. [10]

**Determination of minimum inhibitory concentration (MIC).**

The minimum inhibitory concentration of the aqueous powdered bark extract of *Albizzia lebeck* was determined using the following concentrations 400 mg/ml, and 200 mg/ml. The wells of 7 mm were punched in the inoculated plates using a sterile borer. Aliquots of 100 µl of different concentrations of bark extract were transferred into labeled wells by using a micropipette. The plates were incubated for 24 hours at 37°C before being checked for the presence or absence of growth. The MIC was taken as the lowest concentration that prevented bacteria growth. [4]

**RESULTS AND DISCUSSION**

Anti-microbial activity of 200mg/ml concentration, 400mg/ml concentration, and control against *E.coli* (bacteria) and *P.aurogenosa* (bacteria) was performed. Zone of inhibition of these test samples and standard are given in table no. 1 and table no. 2.

## DISCUSSION

Since plant-derived medications have significantly improved human health, plants have served as a source of inspiration for new medicinal molecules. Phytomedicine can be utilized to treat illnesses, as is the case with the Unani and Ayurvedic medical systems, or it can serve as the foundation for the creation of new medications, acting as a natural blueprint for their creation. [10]

Table no. 2 shows the antimicrobial activity of the aqueous extract of *Albizzia lebeck* on selected bacteria like E Coli and *P. aurogenosa*.

In case of E Coli, the result indicate that the antimicrobial activity of 200mg/kg concentration of test sample shows zone of inhibition as same as that of standard, and 400mg/kg concentration of test sample shows maximum zone of inhibition. It indicates that the concentration of test sample is directly proportional to the zone of inhibition.

In case of *P.aurogenosa*, the result indicates that antimicrobial activity of 200mg kg and 400 mg/kg concentration of test sample shows zone of inhibition minimum as compared to the standard.

This study revealed that the bark extracts of *Albizzia lebeck* possess appreciable antibacterial activity against the tested organisms as zone of inhibition was found to be above 10 mm. As per result, this bark extract shows the highest antibacterial activity against E coli than *P.aurogenosa*. This result may be due to the presence of flavonoid, tannin [9, 11] and saponin [12] in AL. So, the presence of polyphenol compounds and antioxidant properties may be responsible for antimicrobial activity [7, 13].

## CONCLUSION

Based on the results of this study, it can be concluded that *Albizzia lebeck* is an antibacterial plant that may be a valuable resource for the development of new antimicrobial medicines for the treatment and management of various diseases.

## ACKNOWLEDGEMENT

We are grateful thanks to Dr. D.Y. Patil College of Pharmacy, Pune for providing laboratory facilities.

## CONFLICT OF INTREST

The authors declare there is no conflict of interest

**REFERENCE**

1. Hosur narayanappa venkatesh, devihalli chikkaiah mohana (2019). Antimicrobial activities of successive solvent extracts of *albizia lebbeck* and *solanum seaforthianum* against some human pathogenic microorganisms, *Asian J Pharm Clin Res.*, 12(6): 294-296. <http://dx.doi.org/10.22159/ajpcr.2019.v12i6.32706>
2. K D Tripathi (2013). *Essentials of Medical Pharmacology*. Seventh Edition. Jaydeep Brothers Medical Publisher (P) Ltd, India, pp. 735-737.
3. Rashid R, Chowdhury R, Choudhury Mahmood Hasan, Mohammad Abdur Rashid (2013). Constituents of *albizia lebbeck* and antibacterial activity of an isolated flavone derivative. *Saudi pharmaceutical journal*, 11(1-2): 52-56.
4. Z. Sheyin, J. Maimako, J. Shindang, C.U. Essien, E.I. Bigwan (2015). Antimicrobial Activity of *Albizia lebbeck* Leaf Extract on some Medically Important Bacteria. *International Journal of Current Microbiology and Applied Science*, 4(9): 473-477.
5. Leutchka, B.P., Dzoyem, J.P., Jouda, J.B., Sema, D.K., Tsague Tankeu, V.F., Bitchagno, G.T.M., Tchegnitegni, B.T., Essoung, F.R.E., Ndjakou Lenta, B., Fogue Kouam, S., et al. (2022). Antimicrobial and Cytotoxic Activities of Constituents from the Fruit of *Albizia lebbeck* L. Benth (Fabaceae). *Molecules*. 2022; 27: 4823. <https://doi.org/10.3390/molecules27154823>
6. Chulet Rahul, Pradhan Pankaj, Sharma K Sarwan, Jhajharia K Mahesh (2010). Phytochemical screening and antimicrobial activity of *Albizzia lebbeck*. *Journal of Chemical and Pharmaceutical Research*, 2(5): 476-484.
7. Henok Abriham and Biniam Paulos (2015). In vitro Antioxidant and Antibacterial Activity of *Albizia Lebbeck* (L) Benth Stem Bark. *Science, Technology and Arts Research Journal*. 4(2): 204-206. <http://dx.doi.org/10.4314/star.v4i2.25>

8. Tushar Patel, et al. (2010). Evaluation of Antioxidant and Hepatoprotective effects of 70 % ethanolic bark extract of *Albizzia lebbek* in rats. International Journal of Research in Pharmaceutical Sciences, 1(3): 270-276.
9. Mohamed Farag, et al. (2013). Evaluation of Some Biological Activities of *Albizzia lebbek* Flowers. Pharmacology & Pharmacy. 4: 473-477. <http://dx.doi.org/10.4236/pp.2013.46068>
10. Mohammed Sayeed, et al. (2018). Anti-Bacterial and Phytochemical Screening of *Trachyspermum Ammi* – An In Vitro Approach. International Research Journal of Pharmacy and Medical Sciences, 1(4): 40-45
11. C. R. Resmi, M. R. Venukumar and M. S. Latha (2006). Antioxidant Activity of *Albizzia lebbek* (Linn.) Benth. In Alloxan Diabetic Rats. Indian Journal of Physiology and Pharmacology, 50 (3): 297-302.
12. K. Sanjay (2003). Saponins of *Albizzia lebbek* in Alzheimer's and Parkinson's disease. Indian Journal of Natural Products, 19(1): 42-48.
13. Rakesh, K.N., Junaid, S., Dileep, N., Vinayaka, K.S., Kekuda, P.T.R., Raghavendra, H.L. (2013). Antibacterial and antioxidant activity of *Fahrenheitia zeylanica* (Thw.) Airy. Science, Technology and Arts Research Journal, 2(4): 27- 33.
14. Dr. Chandrakant Kokare (2013). Pharmaceutical Microbiology Experiments and Techniques. Fourth edition. Career publication, Maharashtra, India, pp.70-72.

## TABLES

Table 1: Reported activities of *Albizzia lebeck* [2, 4, 7, 8, 9]


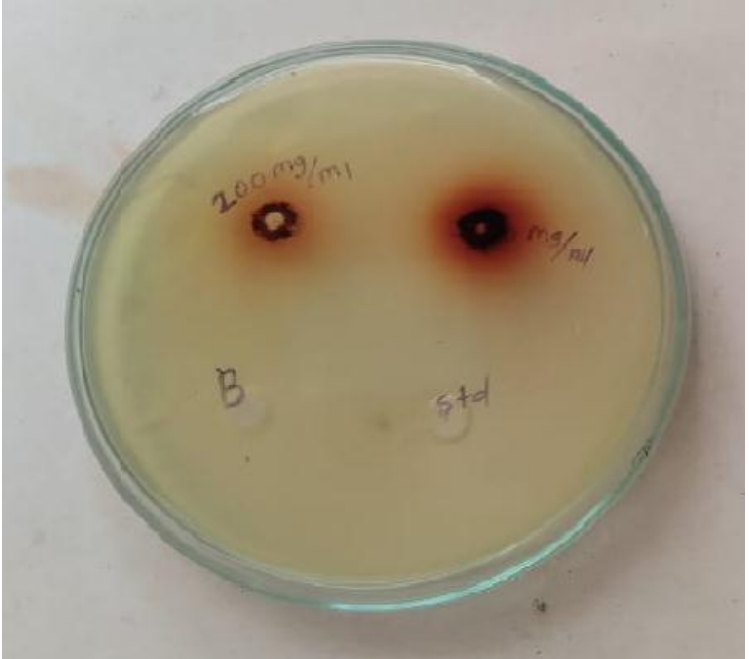
Plant Part	Reported Activity	Chemical present
Respiratory problem [Asthma], snake bite, scorpion sting and malaria/intermittent fever, bronchitis, leprosy, paralysis, helminth infections antiseptic, anti-dysenteric, antitubercular properties		
		
Figure 1: <i>Albizzia lebeck</i> plant		
<b>Leaves</b>	Anticonvulsant activity, nootropic effect	alkaloids, flavonoids, Caffeic acid, alkaloids, flavonoids, Albiziahexoside A(1) & A(2)
<b>Bark</b>	Immunomodulatory effect, antimicrobial activity Useful in bronchospasm	tannins, D- catechin, Isomer of leucocyanidin [5,7,3',4'- tetrahydroxy flavon-3,4diol], Melacacidin, Leuco-anthracyanidin, Lebbecacidin [8,3',4'- tri-hydroxyl flavon -3,4-diols], Friedelin, Beta- Sitosterol, Betulinic acid, albizia saponins A, B and C
<b>Seed</b>	anti-fertility effect, antidiarrhoeal activity	alkaloids, flavanoids, tannins, proteins, Saponins, Budmunchiamine (1-3), N-dimethyl budmunchiamine(1), Acyclic ester heneicos - 7 (z) enyl 24-hydroxy tetracos - 10 (z) enoate

Table 2: Anti-microbial activity of *E.coli* and *P.aurogenosa* bacteria

Name of micro-organism	Zone of Inhibition (mm)			
	Test Samples		Control (Negative)	Standard
	200mg/ml	400mg/ml		
<b>Bacteria</b>				
<b>1. E.coli</b>	13 mm	18 mm	-	13 mm
<b>2. P.aurogenosa</b>	17 mm	18 mm	-	27 mm

[\*Potential antimicrobial activity as Zone of inhibition above 10mm]

Table 3: Observations

Name of micro-organism	Antimicrobial Activity
Bacteria	
<i>E.coli</i>	<p data-bbox="722 488 826 517">Figure 2</p> 
<i>P.aurogenosa</i>	<p data-bbox="722 1178 826 1207">Figure 3</p> 