

ASSESSMENT OF SCREENING ANTIBACTERIAL ACTIVITY OF PONGAMIA PINNATA LEAF AGAINST BACTERIAL SPECIES: IN VITRO APPROACH

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ABSTRACT

Background: Antibiotic resistance has become a major global health concern, necessitating the search for alternative therapeutic agents. Pongamia pinnata, a medicinal plant widely used in traditional medicine, is known for its antimicrobial properties. **Objective:** This study aims to evaluate the antibacterial activity of Pongamia pinnata leaf extract against bacterial strains, specifically Streptococcus and Streptomyces species, using an in vitro approach. **Methods:** The leaves were collected, shade-dried, and extracted using the Soxhlet extraction method with ethanol as the solvent. Phytochemical screening was performed, and antibacterial potential was assessed using the agar well diffusion method. **Results:** Phytochemical analysis confirmed the presence of bioactive compounds. The antibacterial efficacy was concentration-dependent, with the highest inhibition observed at 300 mg/ml. **Conclusion:** This study validates the traditional use of Pongamia pinnata and suggests its potential as a natural antibacterial agent.

KEYWORDS: Pongamia pinnata, antibacterial activity, phytochemical screening, Soxhlet extraction, antibiotic resistance.

INTRODUCTION

Antibiotic resistance is a growing concern worldwide, posing significant challenges to public health.^[1] The overuse and misuse of antibiotics have led to the emergence of multidrug-resistant bacterial strains, reducing the effectiveness of existing treatments.^[2] As a result, there is an urgent need for alternative therapeutic agents, particularly those derived from natural sources.^[3]

Medicinal plants have been widely explored for their antimicrobial properties. *Pongamia pinnata*, commonly known as the Indian beech tree, is a leguminous plant with various medicinal applications.^[4] It has been traditionally used in Ayurveda and Siddha medicine for treating skin diseases, wounds, inflammation, and microbial infections.^[5] The plant is known to contain bioactive compounds such as flavonoids, alkaloids, tannins, and saponins, which contribute to its pharmacological properties.^[6]

Several studies have demonstrated the antibacterial, antifungal, and anti-inflammatory effects of *Pongamia pinnata*.^[7] Its extracts have shown potential against various bacterial pathogens, including *Streptococcus* and *Streptomyces* species.^[8] This study aims to evaluate the antibacterial efficacy of *Pongamia pinnata* leaf extract using in vitro approaches, thereby validating its traditional use and exploring its potential as a natural antimicrobial agent.^[9,10]

MATERIALS AND METHODS

The leaves of *Pongamia pinnata* were collected, shade-dried, and subjected to Soxhlet extraction using ethanol as a solvent. Phytochemical screening was conducted, and antibacterial activity was evaluated using the agar well diffusion method against *Streptococcus* and *Streptomyces* species.

RESULTS

The phytochemical analysis confirmed the presence of flavonoids, tannins, alkaloids, and saponins, which contribute to the antibacterial effect. The antibacterial efficacy of the extract was concentration-dependent, with maximum inhibition observed at 300 mg/ml. The zone of inhibition for *Streptococcus* species was measured at 21.2 mm, while for *Streptomyces* species, it was 19.3 mm. At higher concentrations, a slight decline in inhibition was observed, suggesting possible saturation effects.

Results of preliminary phytochemical studies

The preliminary phytochemical studies of extractives of whole plant of *Pongamia pinnata* were carried and results were tabulated in table.

Table No. 2: Phytochemical studies.

Phytochemicals	Leaf Extract
Test for alkaloids	+ve
Test for glycosides	-ve
Test for phenolic compounds	+ve
Test for flavonoids	-ve
Test for saponins	+ve
Test for tannins	+ve
Test for terpenoids	-ve



Fig no 1: Phytochemical screening test of pongamia pinnata.

Table No. 3: Concentration of Pongamia pinnata.

Concentration (mg/ml)	Zone of inhibition (mm)	
	Streptococcus	Streptomyces
	Leaf extract	Leaf extract
100mg/ml	14.5	11.8
200mg/ml	18.1	13.4
300mg/ml	21.2	19.3
400mg/ml	17.3	18.1
500mg/ml	19.7	18.6

Table No. 4: Concentration of standard drug.

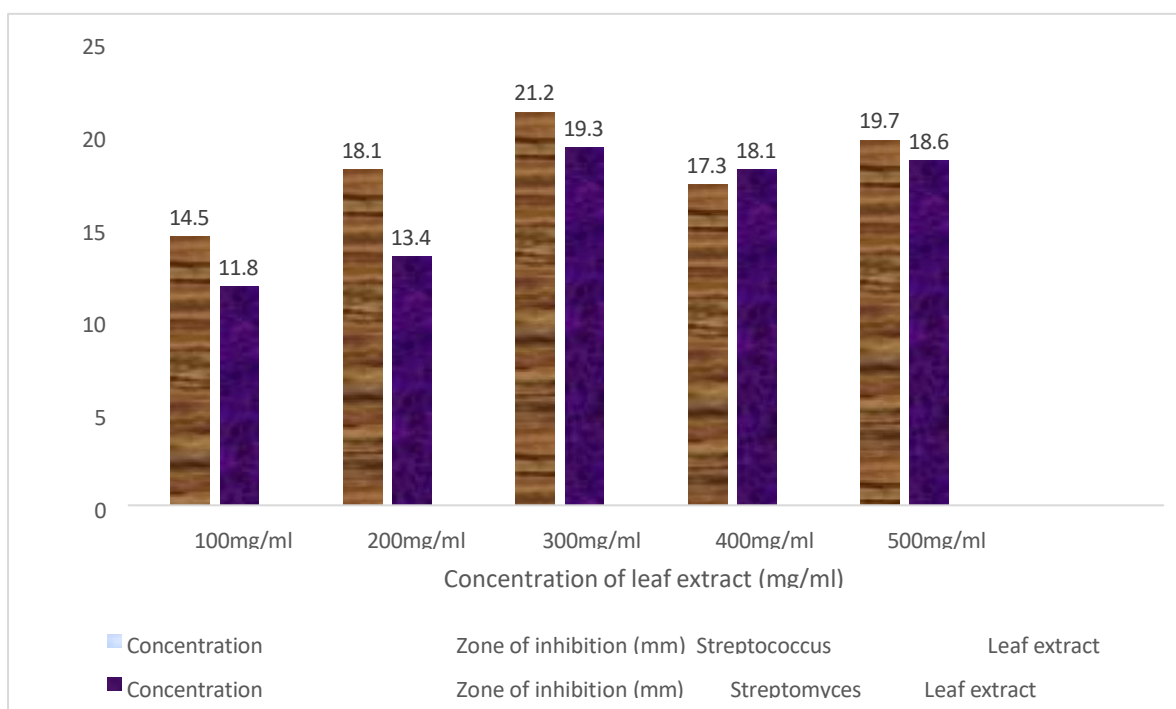
Concentration (mg/ml)	Standard Drug	
	Streptococcus	Streptomyces
100mg/ml	19.7	20.2
200mg/ml	22.6	21.6
300mg/ml	23.8	23.8
400mg/ml	23.4	25.6
500mg/ml	24.6	26.6

Table No. 5: Percentage of zone of inhibition.

Concentration(mg/ml)	% of zone of inhibition (mm)	
	Streptococcus	Streptomyces
	Leaf extract	Leaf extract
100mg/ml	73.60%	58.41
200mg/ml	80.8%	62.03%
300mg/ml	89.07%	81.09%
400mg/ml	73.93%	70.70%
500mg/ml	80.08%	69.92%

Table No. 6: Zone of diameter at 300mg/ml.

Zone of diameter		% Zone inhibition	
Streptococcus	Streptomyces	Streptococcus	Streptomyces
Leaf	Leaf	Leaf	leaf
19.3	21.2	81.09%	89.07%

**Fig no 2: Zone of inhibition.**

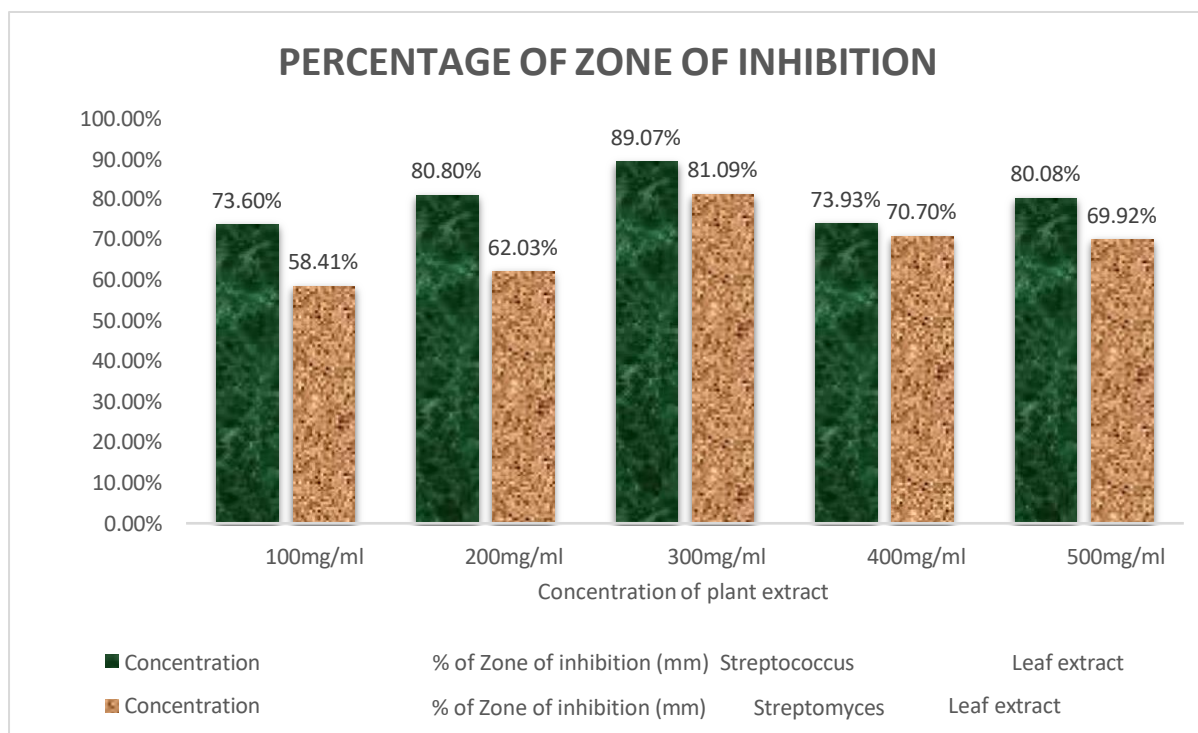


Fig no 3: Percentage of zone of inhibition.

DISCUSSION

The results of this study indicate that *Pongamia pinnata* leaf extract exhibits significant antibacterial activity. The presence of phytochemicals such as flavonoids and alkaloids suggests that these compounds play a crucial role in inhibiting bacterial growth. The concentration-dependent response observed in the study aligns with previous research, which has highlighted the antimicrobial potential of *Pongamia pinnata* extracts.

The antibacterial activity observed was slightly lower compared to standard antibiotics, but the extract still demonstrated considerable efficacy. This suggests that *Pongamia pinnata* could be used as a complementary treatment in cases of bacterial infections, particularly in the face of growing antibiotic resistance. Further research, including in vivo studies and compound isolation, is necessary to explore its full pharmacological potential.

CONCLUSION

This study supports the traditional use of *Pongamia pinnata* as a natural antibacterial agent. The findings demonstrate that the plant extract exhibits significant antimicrobial activity against *Streptococcus* and *Streptomyces* species. Further studies should focus on isolating the active compounds and evaluating their therapeutic potential through in vivo models.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

REFERENCES

1. Yasothkumar D, et al. In vitro anti-inflammatory and antioxidant activity of *Pongamia pinnata*. J Pharm Sci., 2012; 8(3): 120-128.
2. Sekar M, et al. Molecules of interest: Karanjin – A review. Phytochem Res., 2020; 15(2): 200-208.
3. Rakholiya K, et al. Biosynthesis of copper nanoparticles from *Pongamia pinnata* and their antibacterial activity. J Biotech Res., 2024; 10(1): 45-56.
4. Kumar M, et al. Comparative antioxidant efficacy of green-synthesized selenium nanoparticles. Biomed Sci., 2024; 12(5): 301-312.
5. Gargade VA, et al. In vitro evaluation of antibacterial potential of *Pongamia pinnata*. Agri Res., 2015; 6(3): 199-205.
6. Nho LV, et al. Antimicrobial activity and chemical investigation of *Pongamia pinnata* leaf. Phytomedicine, 2022; 29(4): 312-320.
7. Akram M, et al. *Pongamia pinnata*: An updated review on its phytochemistry and pharmacological uses. J Herbal Med., 2021; 9(2): 89-102.
8. Sager PK, et al. Antibacterial potential of *Pongamia pinnata*. Nat Prod Res., 2006; 5(1): 66-72.
9. Rahman MS, et al. Extraction of alkaloids and oil from *Karanja* seed. Phytochem J., 2011; 7(4): 231-240.
10. Yadav RD, et al. *Pongamia pinnata*: An overview. Herbal Res., 2011; 8(3): 143-155.