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AN EXPERIMENTAL STUDY ON PHYTOCHEMICAL SCREENING AND IN VITRO ANTI-MICROBIAL PROPERTIES OF EXTRACT OF CINNAMOMUM TAMALA LEAVES

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Abstract
Since ancient times, medicinal plants have been employed in healing. The promotion of illness prevention and usage of medicinal plants integrate into all current preventative efforts. There are even more investigations into and uses for using herbal medicine to cure illnesses. The medicinal herb Cinnamomum tamala's phytochemical screening and in vitro anti-microbial activities are the subjects of this study. The plant material was extracted after being gathered. Additional qualitative and quantitative research on the anti-microbial effectiveness of plant extract was examined. Utilizing moxifloxacin as a reference point, the extract's antibacterial activity was evaluated. Results indicated that plant extract had a 9.35% yield. Alkaloids, glycosides, carbohydrates, flavonoids, tannins, proteins, and amino acids were all present, according to phytochemical analyses, whereas saponins were not present. The zone of inhibition for moxifloxacin at 30 µg/ml for *S. aureus* & *C. albicans* was observed to be 36±2.66mm & 27±0.65mm. In case of plant extract zone of inhibition for *S. aureus* & *C. albicans* at 100mg/ml estimated to be 25± 0.55mm, 16± 0.81mm. The findings suggest that Cinnamomum tamala can function as an anti-microbial agent with greater effectiveness against bacteria than fungi.

Key-Words : Anti-microbial, In-vitro, Phytochemicals, *Cinnamomum tamala,* Extraction

INTRODUCTION

The main role of antimicrobial agents is to lessen the burden of infectious illnesses worldwide [1]. But, because there are fewer, or occasionally no, effective antimicrobial treatments available for the illness caused by pathogenic bacteria, the rise and spread of multi-drug resistance (MDR) strains in pathogenic bacteria have grown to be a serious concern to public health [2, 3].

Finding novel antimicrobial drugs is therefore of utmost relevance in view of the evidence of the fast worldwide spreading of resistant clinical isolates. However, the past record of rapid, widespread emergence of resistance to newly introduced antimicrobial agents indicates that even new families of antimicrobial agents will have a short life expectancy [4, 5]

Numerous therapeutic plants have been identified as important sources of organic antibacterial substances as a possible substitute that may be successful in the management of these troublesome bacterial illnesses [6]. The World Health Organization (WHO) states that the greatest place to get a range of medications is from medicinal plants [7].

Due to their antibacterial properties, which are brought on by phytochemicals produced during the plant's secondary metabolism, several plants have been employed [8, 9]. Plants contain a wide range of secondary metabolites, including flavonoids, phenolic compounds, alkaloids, and tannins, which have been shown to have antibacterial activities in vitro [10, 11]. Numerous phytotherapy

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books have described several herbal plants for managing contagious illnesses include skin infections, respiratory ailments, gastrointestinal problems, and urinary tract infections.

Yunani, the ancient Ayurvedic text, reveals therapeutic use of *Cinnamomum tamala* in the first century A.D. Cinnamomum, cinnamon bark, essential oils, and bark powder demonstrated antioxidant, anti-diabetic, anti-inflammatory, anticancer, and antibacterial potential. It has been established that C. tamala essential oil is harmful to mosquito larvae and fire ants. Alzheimer's disease, diabetes, arthritis, arteriosclerosis, cancer, and inflammatory, cardioprotective, and neurological conditions have all been proven to benefit from its use in therapy. Therefore, the purpose of this study is to evaluate Cinnamomum tamala's antibacterial activity [12,13].

MATERIALS AND METHODS

Plant leaves collection

In August 2023, Telangana residents picked Cinnamomum tamala leaves. Plant portions that had just been harvested were shade-dried for 10 to 15 days at room temperature. Each sample of dried leaves was broken down into a fine powder using a pestle & mortar.

Extraction

Powdered plant drugs were weighed (32 gm) and packed in (1 liter) air tight glass Bottle. For roughly 24 hours, the plant medicines were extracted using methanol as a solvent. A conical flask covered in tar was used to collect the liquid extract. Using heat, the solvent was evaporated out of the extracts.[14]

Percentage yield determination:

The yield of extract of plant was calculated by using formula:

$$\% \text{ Yield} = (\text{Weight of extracts obtained})/(\text{Weight of powder used for extraction}) \times 100.$$

Phytochemical Analysis

To detect the various constituents present in the methanolic extracts of leaves of *Cinnamomum tamala*, were subjected to the phytochemical tests as per standard methods.

In vitro antimicrobial activity of *Cinnamomum tamala*

The agar media was placed in distilled water and brought to a boil in a large enough conical flask. Dry materials are added to a flask with the necessary amount of distilled water and heated to thoroughly dissolve the medium.

Sterilization culture media

The medium-containing flask was cotton-plugged before being autoclaved at 15 lbs/inch2 (121 oC) for 15 minutes to sterilize it.

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Preparation of plates

The medium in the flask was immediately poured (20 ml/plate) into sterile Petri dishes on a flat surface upon sterilization. The poured plates were allowed to harden at room temperature before being incubated at 37 °C overnight to verify for sterility. Before usage, the plates were dried at 50°C for 30 minutes.[15]

RESULTS

Table 1: Extractive values obtained from *Cinnamomum tamala*

S.N.	Solvent	% yield
1.	Methanol	**9.35%**

Table 2: Phytochemicals Analysis of methanolic extract of *Cinnamomum tamala*

S.N.	Phytoconstituents	Test	Result
1.	Alkaloids	Mayer's Test	+ve
		Hager's Test	+ve
2.	Glycosides	Keller-Kilani Test	+ve
		Legal Test	+ve
3.	Flavonoids	Shinoda Test	+ve
		Lead acetate Test	+ve
4.	Carbohydrates	Benedict's Test	+ve
		Molisch's Test	+ve
5.	Tannins	Ferric Chloride Test	+ve
6.	Saponins	Foam Test	-ve
7.	Proteins & Amino acids	Biuret Test	+ve

Table 3: Antimicrobial activity of standard drug against selected microbes

S.N.	Standard Drug	Micro-organism	Zone of Inhibition		
			10µg/ml	20 µg/ml	30µg/ml
1.	Moxifloxacin	*S. aureus*	19±2.21	27±2.12	36±2.66
		Candida albicans	16±0.89	21±0.86	27±0.65

Table 4: Antimicrobial activity of *Cinnamomum tamala* against selected microbes

S.N.	Extract	Micro-organism	Zone of Inhibition		
			25µg/ml	50µg/ml	100µg/ml
1.	Methanolic extract of *Cinnamomum tamala*	*S. aureus*	11± 0.89	22± 1.31	25± 0.55
		Candida albicans	9± 0.73	13± 1.26	16± 0.81

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DISCUSSION

Cinnamomum tamala leaves were discovered to provide yields of (9.35% w/w of crude drug) when methanolic extract was used. Alkaloids, glycosides, carbohydrates, flavonoids, tannins, proteins & amino acids were all present while saponins were absent in the methanolic extract of Cinnamomum tamala. When compared to controls, the anti-microbial activity of Cinnamomum tamala's methanolic extract was found to be effective against *Staphylococcus aureus* and *Candida albicans.*

CONCLUSION

The phytochemical analysis of the methanolic extract of the *Cinnamomum tamala* plant revealed that the extract contained a variety of plant-based constituents According to the study's findings, gram negative, gram positive, and fungus-fighting properties of *Cinnamomum tamala* leaf extracts have been demonstrated. According to the research, the plant offers a viable option for using natural ingredients to make medications that are efficient and successful in treating infectious diseases. By isolating medicinal antimicrobials, the most potent extracts might be exposed to thorough pharmacological examination, and more study on this plant could pinpoint its therapeutic applications.

DECLARATIONS

Conflict of Interest

There is no conflict of interest, The authors alone are responsible for the content and writing of the paper.

Ethical approval

Not applicable

Consent to participate

Not applicable

Availability of data and materials

Not applicable

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REFERENCES

1. Bhatia R., Narain J. P. The growing challenge of antimicrobial resistance in the South-East Asia Region - are we losing the battle? *Indian Journal of Medical Research.* 2010; 132(5):482–486.
2. Boucher H. W., Talbot G. H., Bradley J. S., et al. Bad bugs, no drugs: no ESKAPE! An update from the Infectious Diseases Society of America. *Clinical Infectious Diseases.* 2009;48(1):1–12. doi: 10.1086/595011.
3. Giamarellou H. Multidrug-resistant Gram-negative bacteria: how to treat and for how long. *International Journal of Antimicrobial Agents.* 2010;36(Supplement 2):S50–S54. doi: 10.1016/j.ijantimicag.2010.11.014.
4. Coates A., Hu Y., Bax R., Page C. The future challenges facing the development of new antimicrobial drugs. *Nature Reviews Drug Discovery.* 2002;1(11):895–910. doi: 10. 1038/nrd940.
5. Marasini B. P., Baral P., Aryal P., et al. Evaluation of antibacterial activity of some traditionally used medicinal plants against human pathogenic bacteria. *BioMed Research International.* 2015;2015:6.265425
6. Iwu M. W., Duncan A. R., Okunji C. O. New antimicrobials of plant origin in. Perspectives on new crops and new uses. In: Janick J., editor. *Plant Breeding Reviews.* Alexandria, Virginia: ASHS Press; 1999. 457462
7. *World Health Organization.* Geneva: World Health Organization, WHO Traditional Medicine Strategy; 2002.
8. Medina A. L., Lucero M. E., Holguin F. O., et al. Composition and antimicrobial activity of *Anemopsis californica leaf oil*. *Journal of Agricultural and Food Chemistry.* 2005; 53(22):8694–8698. doi: 10.1021/jf0511244.
9. Romero C. D., Chopin S. F., Buck G., Martinez E., Garcia M., Bixby L. Antibacterial properties of common herbal remedies of the southwest. *Journal of Ethnopharmacology.* 2005; 99(2):253–257. doi: 10.1016/j.jep.2005.02.028.
10. Duraipandiyan V., Ayyanar M., Ignacimuthu S. Antimicrobial activity of some ethnomedicinal plants used by Paliyar tribe from Tamil Nadu, India. *BMC Complementary and Alternative Medicine.* 2006;6(35) doi: 10.1186/1472-6882-6-35.
11. Djeussi D. E., Noumedem J. A. K., Seukep J. A., et al. Antibacterial activities of selected edible plants extracts against multidrug-resistant Gram-negative bacteria. *BMC Complementary and Alternative Medicine.* 2013;13(164)
12. Shah, M. & Panchal, M. (2010) Ethnopharmacological properties of Cinnamomum tamala—A review. International Journal of Pharmaceutical Sciences Review and Research, 5, 141–144.
13. Sharma, G. & Nautiyal, A.R. (2011) Cinnamomum tamala: A valuable tree from Himalayas. International Journal of Medicinal and Aromatic Plants, 1, 1–4

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14. Yahya, N.A., Attan, N. & Wahab, R.A. (2018) An overview of cosmeceutically relevant plant extracts and strategies for extraction of plantbased bioactive compounds. *Food and Bioproducts Processing*, 112, 69–85
15. Baskaran, C., bai, V.R., Velu, S. & Kumaran, K. (2012) The efficacy of Carica papaya leaf extract on some bacterial and a fungal strain by well diffusion method. *Asian Pacific Journal of Tropical Disease*, 2, S658– S662