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ANTIMICROBIAL POTENTIAL OF CINNAMON TAMALA LEAF EXTRACTS

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Abstract: The phytochemical components, and antibacterial activity of extracts of Cinnamomum tamala leaves were investigated in this work. Alkaloids, tannins, terpenoids and flavonoids were found to be the most abundant phytochemical elements. The antimicrobial potential of the crude extract and its fractions, namely aqueous, methanolic, n-heaxne and chloroform, was examined using the agar well diffusion method against six gram-negative, three gram-positive, and one fungal strain. The extracts assessed exhibited varying degrees of inhibitory zones against all tested microorganisms. The screening reveals that Cinnamomum tamala has fascinating therapeutic potential, but more biochemical studies are needed to investigate its putative mode of action.

Keywords: Cinnamomum tamala, microbial, fungal

1. INTRODUCTION

Tamale cinnamon (Buch-Ham.) Nees and Eberm are tiny evergreen trees of the Lauraceae family. The height of tree is upto 7.5 m with 1.4 circumference(Mishra et al., 2010; Singh et al., 2005)(Kumar et al., 2022) . It is found all throughout India because to its tropical and subtropical distribution, although it is most prevalent in the Himalayan area and in Northeast of India. The tree has somewhat rough, dark brown or blackish bark. At 1.3 cm in length, Blaze has whitish streaks that extend towards the outside and a pinkish or reddish brown colour. The leaves might be opposite, sub-opposite, or alternating. They have three nerves that go from just above the base almost to the apex, and they are faintly shiny above ovate, coriaceous, or oblong, lanceolate acuminate. The leaves have several traditional names, including Tamalpatra, Tejpat, Tejpatta, and others. They are usually referred to as Indian bay leaves ."Tamalpatra" means "dark leaf" in Sanskrit(Raksha et al., 2021).

The tree's dried leaves are used for making spice. For trees that are 15 years of age or older, a productivity of more than 200 kg on a fresh weight basis is regarded as a satisfactory yield. For five to ten year old trees, it weighs around 100 kg. Starting of plantation was done with seedlings in Nepal, seeds are gathered from forest, after that self germination is allowed. Typically, harvesting starts around five years old for trees(Åäéîéãõ et al., 2008).

Due to the presence of numerous major bioactive constituents, the plant has a variety of pharmacological and medicinal properties that can be used to cure and treat a wide range of diseases. These constituents include: myrcene, eugenol (4-hydroxy-3-methoxyallylbenzene), quercetin-3-Orutinoside, Oglycopyranoside (Astragalin), camphene, kaempferol-3- a-pinene, methyl eugenol, p-cymene, limonene, methyl ether eugenol and eugenol acetate.8–11. The assessment of plant leaf oil revealed that it contains a significant amount of sesquiterpenoids, curcumenol, germacerene D, furanodienone, furanodiene, curzerenone, γ-terpinene,β-caryophyllene, furanogermenone (Haider et al., 2018; Mir et al., 2004).

2. MATERIAL AND METHODS

2.1. CHEMICALS

Methanol, HCl, ethanol, acetic acid, gallic acid, acetic acid(glacial), n-hexane, sulphuric acid, sodium nitrite, sodium hydroxide, aluminium chloride, ferric chloride, quercetin

2.2. COLLECTION AND IDENTIFICATION OF PLANTS

West Bengal, the region Berhampur, was selected for the collection of Fresh *Cinnamomum tamala* leaves. Identification and authentication of *C. tamala* leaves was done from the NISCAIR, New Delhiwith letter reference no NISCAIR/RHMD/Consult/2016/2983-10, dated 23/09/2016(Sharma & Rao, 2014).

3. PHYTOCHEMICAL SCREENING

Various chemical analysis were carried out to determine the presence of secondary active metabolites such as alkaloids, flavonoids, terpenoids, tannins, steroids and saponins(Satyal et al., 2013).

4. CINNAMOMUM TAMALA'S ANTIBACTERIAL TEST AGAINST PARTICULAR BACTERIAL SPECIES

Susceptibility studies were conducted utilizing the modified Agar Well Diffusion method[18] to investigate that the leaves of Cinnamomum tamala have antimicrobial properties. The MHA served as the medium. The fixed temperature for incubation was 37°C, and the culture was stored in triplicate for a period of 24 to 72 hours. In a Petri plate,the test organism's broth culture (0.6 mL) was taken. To this the sterilised melted MHA(20mL) was added. Wells were bored and then added (2 mL) of using an extract made from Cinnamomum tamala leaves to the medium. An hour was spent on inoculation to guarantee the strong diffusion of antimicrobial agent to the medium (Goyal et al., 2009).

5. ANTI-FUNGAL ASSAY

Agar well diffusion assay was used for antifungal activity. The plant extracts were dissolved in different test tubes containing DMSO. Dextrose agar medium (5mL) was placed in test tube and inoculation was done. Slanting position was selected for keeping of test tube overnight at room temperature. Fungal culture was inoculated on slant. Incubation period was for 7 days at temperature 29^0C. Zone of inhibition was calculated(Hassan & Zainab Kazmi, 2015; Satyal et al., 2013).

6. RESULTS

6.1. PHYTOCHEMICAL ANALYSIS

Result of phytochemical screening of various extracts of cinnamon tamala leaves is as follows:

Table I: Phytochemical screening results

Plants	Saponins	Terpenoids	Flavonides	Steroids	Tannins	Alkaloids
Cinnamomum tamala	-ve	+ve	+ve	-ve	+ve	+ve

6.2. ANTIMICROBIAL ACTIVITY

Antimicrobial potential of c. tamala leaves was assayed in vitro by agar well diffusion method. Result is evaluated in table no.2. Variable degree of inhibition was showed by various extracts of c. tamala against gram +ve bacterial stains, gram-ve bacterial stains and fungus. The plant extracts showed a significant effectiveness against most of the bacterial and fungal species. Best inhibition activity was shown by all the extracts towards B. atropheous but maximum zone of inhibition was shown by aqueous extracts measuring 40 mm. aqueous, methanolic, extracts are completely inactive towards S. Typhi.

Table II: Results of antimicrobial activity

Organism	Zone of inhibition			Standard drug inhibition		
	n-hexane	Aqueous	methanolic	chloroform	antibiotics	inhibition
	6µ112µ1	6µ112µ1	6µ112µ1	6µ112µ1	6µ112µ1	
E coli	11 12	11	13	13 14	12 15	Ciprofloxacin 36
S. typhi	12 12	Nil	Nil	Nil Nil	09 10	Ciprofloxacin 23
E. cartovora	12 14	13	17	12 15	11 11	Ciprofloxacin 17
A. Tumifaciens	20 21	18	19	17 19	22 23	Azithromycin 25

S.aureus	12 11	12	11	12 13	11 11	Azithromycin 21
C.albican	15 17	16	14	15 17	14 13	Clotrimazole 32
B.subtilis	14 15	16	17	11 13	11 12	Azithromycin 24
B.atropheous	27 30	33	40	25 26	31 33	Azithromycin 28

In case of fungal inhibition, all the extracts were effective and showed a significant zone of inhibition.

7. DISCUSSION

The phytochemical screening of the spice cinnamon tamala leaves methanolic extracts described the presence of various secondary metabolites viz. tannins alkaloids, terpenoids, and flavonoids. The methanolic extract of the plant exhibited varied degrees of inhibition against selected gramme positive and gramme negative bacteria due to the presence of active compounds with differing solubility and polarity. In this study, we looked into the antibacterial activity of Cinnamomum tamala leaf extracts and discovered that they were equally efficient against gramme positive and gramme negative bacteria, as shown in Table II.

8. CONCLUSION

The gramme negative, gramme positive, and fungal bacteria were all susceptible to the antibacterial action of leaf extracts from Cinnamomum tamala. It was revealed that the plant might be a viable alternative for producing effective medications from natural sources that can be used to treat infectious diseases. The most active extracts might be subjected to additional pharmacological evaluation by isolating therapeutic antimicrobials, and greater research on this plant could provide light on its pharmaceutical potential.

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