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"FROM KITCHEN SPICE TO THERAPEUTIC AGENT: A COMPREHENSIVE REVIEW ON CINNAMOMUM TAMALA"

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ABSTRACT

Bay leaf, also referred to as laurel leaf, is derived from Laurus nobilis, an evergreen tree belonging to the Lauraceae family and native to the Mediterranean region. Research has indicated that bay leaves can enhance insulin function, making them beneficial in the treatment and prevention of type 2 diabetes. Bay leaves are rich in compounds such as tannins, flavonoids like quercetin, kaempferol, and myricetin, nitrogen-containing organic compounds with medicinal properties (e.g., caffeine, morphine, and nicotine), and essential oils like eugenol, linalool, and estragole. They also contain anthocyanins-water-soluble pigments responsible for vibrant plant colors. Bay leaves exhibit a wide range of biological activities. They aid in wound healing, possess antioxidant capabilities, and exhibit antibacterial, antiviral, and immune-boosting properties, antifungal agents, insect repellents, and show anticonvulsant, antimutagenic, anti-inflammatory, and analgesic effects. The leaves also contain essential minerals such as calcium, iron, and zinc and demonstrate strong antioxidant properties. The variety found in India, known by names such as malabathrum, tej patta, and Indian cassia, resembles the bay laurel in appearance but has a different flavor and fragrance.

KEYWORDS: *Cinnamomum tamala, anticancer activity, antimicrobial activity, immunostimulant activity, anticonvulsant activity, antidiabetic activity.*

INTRODUCTION

For many centuries, medicinal plants have served as a cornerstone of healthcare systems across the globe, particularly in traditional medicine, where various cultures have relied on them to treat a wide array of health conditions long before the advent of modern synthetic pharmaceuticals. Among these, Cinnamomum tamala—commonly known as Bay Leaf—has attracted considerable interest due to its significant therapeutic value. A member of the Lauraceae family, this plant holds a respected status in traditional healing systems such as Ayurveda, Unani, and traditional Chinese medicine, owing to its extensive medicinal benefits. Indigenous to countries like India, Nepal, Bhutan, and Myanmar, Cinnamomum tamala has been utilized both as a flavoring agent in cuisine and as a medicinal herb for generations. Historically, bay leaves have been incorporated into herbal formulations for managing digestive issues, respiratory problems, heart conditions, and infections. Its wide-ranging pharmacological effects—including antioxidant, anti-inflammatory, antimicrobial, antidiabetic, and neuroprotective activities—are attributed to its diverse array of bioactive phytochemicals.

With advancements in scientific research, there is a growing focus on medicinal plants as potential sources for novel therapeutic compounds. As a result, Cinnamomum Tamala has become a subject of interest for identifying its active constituents and understanding how they function in the prevention and treatment of various diseases. The rising incidence of chronic illnesses such as cancer, cardiovascular disorders, and neurodegenerative diseases has intensified the need for natural treatment alternatives with fewer adverse effects. In this context, Cinnamomum Tamala emerges as a promising natural candidate for pharmaceutical development, reinforcing its importance in modern therapeutic approaches. This review seeks to offer an in-depth evaluation of the medicinal and pharmaceutical relevance of Cinnamomum Tamala, covering its phytochemical constituents, biological activities, and prospective uses in current medical practice. By compiling and synthesizing existing data while identifying gaps for further investigation, this paper aims to enhance the current understanding of this multifaceted plant's role in health and medicine.[1]

Geographical source

Bay leaf, also known as Laurus nobilis, is an aromatic leaf commonly used in cooking and has its geographical origins in the mediterranean region. Native to countries such as Turkey, Greece, Italy, and part of the middle east, the boy laurel tree thrives in warm, temperate

climates historically bay leaves have been significant not only for culinary purposes but also in ancient cultures, where they symbolized honor and victory, particularly in Greece and Rome. Today the cultivation of bay leaf extends beyond its native range to other regions with similar climates including parts of north America, India, And Southeast Asia, making it a widely used herb.[2]

Botanical classification

Kingdom : Plantae
Division : Magnoliophyta
Class : Magnoliopsida
Order : Laurales
Family : Lauraceae
Genus : Laurus
Species : Laurus nobilis[3]

Pharmacological activities.

Antimicrobial activity

The research investigated the antimicrobial activity of Laurus nobilis (bay leaf) against several microorganisms. It included three Gram-positive bacteria—Bacillus subtilis, Staphylococcus aureus, and Staphylococcus epidermidis—as well as two Gram-negative strains—Escherichia coli and Pseudomonas aeruginosa. The agar dilution method was used to assess antibacterial activity. Additionally, the study tested the extract's toxicity against the

yeast Candida albicans and the fungus Aspergillus Niger using both disc diffusion and agar dilution techniques. According to Yilmaz et al. (2013), L. nobilis extract demonstrated a minimum inhibitory concentration (MIC) of 5 mg/mL against all tested bacteria and showed stronger antifungal effects against A. Niger and C. albicans compared to the standard antifungal drug nystatin. Methanolic extracts of bay leaf exhibited superior antibacterial activity compared to other solvent extracts, except in the cases of Aspergillus Niger, Aspergillus fumigatus, and Penicillium verrucosum. This enhanced efficacy is thought to result from the higher concentrations of phenolic compounds, such as flavanols and flavones, in methanolic extracts (Derwich et al., 2009).

In another study, the antifungal potential of L. nobilis was tested in vitro on seven plant pathogenic fungi at concentrations of 50, 125, and 250 mg/mL. Botrytis cinerea showed the highest sensitivity at the 250 mg/mL dose (Patrakar et al., 2012). The antibacterial activity of bay leaf essential oil was also evaluated against various food spoilage bacteria and a yeast strain. The minimum inhibitory concentrations ranged from 125 to 2000 µg/mL. Notably, Laurus nobilis essential oil was most effective against Salmonella enteritidis ATCC 13076, Candida albicans ATCC 16231, Listeria monocytogenes ATCC 7644, and E. coli O157:H7, producing inhibition zones of 33.0 mm, 26.0 mm, 24.0 mm, and 22.0 mm, respectively, in agar well diffusion assays.

Further studies demonstrated that the essential oil extracted from L. nobilis exhibited strong antibacterial effects against Staphylococcus intermedius, Bacillus subtilis, and Staphylococcus aureus. The MICs were around 0.4 mg/mL for S. intermedius and 0.6 mg/mL for S. aureus, indicating the essential oil's potent antibacterial activity (Bag et al., 2015). The key component responsible for this activity is believed to be 1,8-cineole. According to Ozcan et al. (2010), the essential oil displayed the highest efficacy against E. coli, while it was least effective against B. subtilis. Bag also investigated the oil's action on six major food-borne pathogens—Bacillus cereus, Listeria monocytogenes, Micrococcus luteus, Staphylococcus aureus, E. coli, and Salmonella typhimurium—using microbroth dilution, checkerboard titration, and time-kill assays. The findings revealed that the essential oil of bay leaf had significant antibacterial activity against all tested strains.[4]

Anticonvulsant Activity

The essential oil extracted from Laurus nobilis leaves has demonstrated notable protective effects against seizures triggered by maximal electroshock (MES). This oil contains active

compounds such as pinene, eugenol, methyl-eugenol, and cineol. Cineol, in particular, has been shown to reduce locomotor activity in mice and prolong the sleep duration caused by pentobarbital, indicating a sedative effect. In terms of safety and efficacy, the oil exhibits a promising therapeutic profile, with a lethal dose (LD50) of 1.45 ml/kg and an effective dose (ED50) of 0.19 ml/kg, suggesting a reasonable margin between therapeutic and toxic doses.

Furthermore, seizures induced by pentylenetetrazol (PTZ) are believed to be influenced by the activation of N-methyl-D-aspartate (NMDA) receptors, implying that components of the oil may modulate these pathways. However, some caution is necessary—both eugenol and methyl-eugenol have been reported to show cytotoxic (cell-damaging) and genotoxic (DNA-damaging) effects in animal studies. Additionally, terpineol, another constituent of the oil, has demonstrated mutagenic potential in the Salmonella/microsome assay.[5]

Antimutagenic Properties

Laurus nobilis (bay leaf) has been found to contain a newly identified antimutagenic compound that is effective against Trp-P-2 (3-amino-1-methyl-5H-pyrido[4,3-b] indole), a known dietary carcinogen. This compound was isolated from bay leaves using ethyl acetate and further purified through chromatographic techniques. Analytical studies revealed the active substance to be 3-kaempferyl-p-coumarate, with an extraction yield of approximately 20 mg per 100 g of bay leaves. This compound demonstrated a strong inhibitory effect on mutagenicity, with an IC50 value of just 1.9 micrograms—the concentration needed to reduce the mutagenic activity of 20 ng of Trp-P-2 by half. This level of potency is comparable to that of well-known antimutagenic agents such as flavones and flavonols.

The antimutagenic activity Is primarily due to a desmutagenic mechanism, meaning the compound interferes with the metabolic activation of Trp-P-2, preventing its conversion into a carcinogenic form. The kaempferyl group in the molecule plays a key role in this protective effect. Additionally, the compound showed mild bio-antimutagenic properties, meaning it could also reduce the mutagenic effects of direct-acting mutagens.[6]

Antifungal Activity

Bay laurel (Laurus nobilis) essential oil has demonstrated significant antifungal properties, particularly against fungi responsible for food spoilage, such as Fusarium culmorum and Fusarium verticillioides. Studies also tested its effectiveness against Candida species by

determining its minimum inhibitory (MIC) and fungicidal concentrations (MFC). Notably, the oil affected ergosterol biosynthesis and membrane function in fungi.

The essential oil, especially rich in monoterpenes like 1,8-cineole, was shown to inhibit fungal growth within 24 to 48 hours. This antifungal effect stems from its disruption of fungal membranes and interference with biosynthesis processes. Other findings showed the oil could effectively combat Candida albicans biofilms and inhibit Fusarium moniliforme, Rhizoctonia solani, Sclerotinia sclerotiorum, and Phytophthora capsici, depending on phenolic content.[7]

Immunostimulant Activity

A study examining dietary intake of bay leaf powder in rainbow trout found enhanced immune function. Fish fed diets containing 0.5% and 1% bay leaf powder for up to 21 days showed increased respiratory burst activity, lysozyme levels, and phagocytic activity, with immune stimulation observed at days 42 and 63. However, no clear correlation between immune response and dosage was established.[8]

Acaricidal Activity

Essential oil from Laurus nobilis demonstrated acaricidal (mite-killing) properties, largely due to its monoterpene components—primarily 1,8-cineole (39%), terpinenyl acetate (11%), sabinene (11%), and linalool (7%). At a 10% concentration, the oil eliminated 73% of mites, while lower concentrations (3%, 1%) were less effective.

Oil from Laurus novocanariensis, another variety, showed similar efficacy. At 5% concentration, it killed all mites within 24 hours. However, lower doses showed reduced effectiveness. When tested using immersion methods, the oil reduced mite larvae significantly, achieving a 90.67% kill rate within 24 hours at 100 mg/mL, with an LC50 of 16.09 mg/mL.[9]

Analgesic and Anti-inflammatory Activity

Studies in mice and rats revealed that Laurus nobilis essential oil possesses pain-relieving and anti-inflammatory effects. It showed similar effectiveness to standard drugs like morphine and piroxicam. These results also indicated a mild sedative effect and reduced inflammation in formalin-induced paw edema in rats.[10]

Antidiabetic Activity

In a placebo-controlled study, individuals with type 2 diabetes who consumed 1–3 grams of bay leaf daily for 20 days experienced improved blood sugar control and a 21–24% reduction in cholesterol levels (total and LDL). The effects persisted even after discontinuation, highlighting bay leaf's potential role in managing diabetes and lipid levels.[11]

Wound Healing Activity

Extracts from Laurus nobilis and Allamanda cathartica were tested on wound healing, and bay leaves showed better results. Parameters such as tensile strength, wound contraction rate, and epithelialization were all improved. Bay leaf-treated wounds showed reduced inflammation and a higher presence of fibroblasts.[12]

Antiviral Activity

The essential oil of Laurus nobilis contains compounds like beta-caryophyllene, 1,8-cineole, alpha-pinene, and beta-pinene, which have demonstrated antiviral properties. These compounds inhibit viral replication and may interfere with the virus lifecycle.[13]

Neuroprotective Effects

Neurodegenerative conditions like Alzheimer's and Parkinson's disease are commonly associated with oxidative damage and inflammation in the brain. Studies indicate that Cinnamomum tamala may help protect the nervous system through multiple pathways. These include its ability to support memory and learning by preventing the buildup of beta-amyloid plaques, shielding nerve cells from oxidative harm, and balancing neurotransmitter levels. Together, these effects may enhance overall brain performance.[14]

Cardioprotective Effects

Bay leaf extracts (Cinnamomum tamala) have demonstrated potential benefits for heart health. These include lowering cholesterol and triglyceride levels, helping to reduce blood pressure—possibly by influencing nitric oxide activity—and protecting against hardening of the arteries by limiting lipid peroxidation in blood vessels.[15]

Side effects and toxicity

Bay leaves and their essential oils are generally considered safe for most people when consumed in food-level amounts. Ground bay leaf does not pose a choking risk, unlike the whole leaf, which cannot be digested and stays intact during digestion. However, reliable data

on safety during pregnancy or breastfeeding is lacking. Bay leaf may impact blood sugar levels, making it potentially unsafe for diabetics. It may also have a sedative effect on the central nervous system (CNS), especially when combined with anesthetics or other medications used during or after surgery. Therefore, it is advised to stop using bay leaf as a supplement or medicine at least two weeks before any planned surgery.[16]

Extraction techniques

1. Steam Distillation

   Purpose

   Extracting essential oils (e.g., eugenol, cineole, linalool).

   Process

- Fresh or dried bay leaves are exposed to steam.
- The steam ruptures oil glands, carrying volatile compounds.
- The vapor is condensed and separated (oil floats on water).

2. Solvent Extraction

Purpose

Extracting a broader range of bioactive compounds (both volatile and non-volatile).

Process

- Dried bay leaves are soaked in solvents like ethanol, methanol, or hexane.
- The solvent dissolves target compounds.
- The solution is filtered and concentrated (often by evaporation).

3. Cold Pressing

Purpose

Sometimes used for aromatic oil extraction (though less effective than steam distillation).

Process

- Mechanical pressing of leaves at low temperature to release oils.

4. Supercritical CO_2 Extraction

Purpose

High-purity essential oil and phytochemical extraction.

Process

- CO_2 is pressurized and heated into a supercritical fluid.
- Acts as a solvent to extract oils and other compounds.

- Pressure is released to separate extract from CO_2 .

5. Maceration/Infusion

Purpose: For homemade extracts or infused oils (culinary or medicinal).

Process

- Leaves are soaked in a carrier oil (like olive or sunflower oil) or alcohol.
- Stored for several days to weeks, occasionally shaken.
- Strained before use.

6. Microwave-Assisted Extraction (MAE)

Purpose

Efficiently extracts essential oils or phenolic compounds.

Process

- Microwave energy disrupts cell walls, releasing contents into a solvent.[17]

Traditional uses of Bay leaves

Culinary Use

- Added to soups, stews, sauces, and rice.
- Provides a distinct aroma and bitter, herbal flavor.
- Common in Mediterranean, Indian, and Caribbean cuisines.

Medicinal (Traditional) Use

- Used in folk medicine to treat indigestion, colds, and inflammation.
- Often infused into teas or oils.[18]

Aromatherapy

- Bay essential oil used for respiratory support.
- Also helps with stress relief.

Symbolic / Ritual Use

- Ancient Greeks and Romans used bay leaves in laurel wreaths.
- Symbolized victory and honor.

Symbolic / Ritual

- Used by ancient Greeks and Romans in laurel wreaths symbolizing victory and wisdom.

- Sometimes used in rituals to ward off evil.

Preservation / Pest Repellent

- Dried bay leaves are placed in grain containers to deter insects.[19]

CONCLUSION

Cinnamomum tamala, commonly known as bay leaf, is a medicinal herb recognized for its extensive therapeutic potential. It possesses notable antidiabetic effects, primarily due to the presence of bioactive compounds that improve insulin responsiveness. Studies have shown that its regular intake can effectively lower blood sugar and cholesterol levels, making it particularly useful in managing type 2 diabetes. Additionally, bay leaf exhibits strong anticancer properties, owing to its antioxidant and antimutagenic constituents such as 3-kaempferyl-p-coumarate, which help neutralize carcinogens and safeguard DNA integrity. These characteristics contribute to its role as a natural agent for cancer prevention. Beyond this, bay leaf also offers antimicrobial, neuroprotective, and cardioprotective benefits. Its ability to enhance immune function and reduce inflammation further elevates its medicinal importance. With the increasing interest in plant-derived therapies, bay leaf continues to emerge as a valuable natural remedy for addressing chronic health conditions like cancer and diabetes.[20]

REFERENCE

1. Bag A, Chattopadhyay RR. Evaluation of antimicrobial properties of Laurus nobilis Linn. leaf essential oil and its efficacy in controlling food-borne pathogens. J Essent Oil Res., 2015; 27(4): 307-14. doi:10.1080/10412905.2015.1022886.
2. Derwich E, Benziane Z, Boukir A. Chemical composition and antibacterial activity of leaves essential oil of Laurus nobilis from Morocco. Electron J Environ Agric Food Chem., 2009; 8(6): 397-406.
3. Ozcan MM, Chalchat JC, Arslan D, Ates A, Unver A. Comparative essential oil composition and antifungal effect of Laurus nobilis L. from different regions of Turkey. J Med Food., 2010; 13(2): 393-400. doi:10.1089/jmf.2009.0073.
4. Patrakar R, Patil MB, Patil SR. Antifungal activity of Laurus nobilis against plant pathogenic fungi. Int J Pharm Sci Res., 2012; 3(9): 3416-9.
5. Yilmaz E, Ermis S, Ucar G. Antimicrobial activity of Laurus nobilis L. essential oil and its chemical composition. J Food Saf., 2013; 33(1): 33-41. doi:10.1111/jfs.12020.

6. Khan A, Safdar M, Ali Khan MM, Khattak KN, Anderson RA. Cinnamon improves glucose and lipids of people with type 2 diabetes. Diabetes Care., 2009; 26(12): 3215-8. doi:10.2337/diacare.26.12.3215.
7. Sharma S, Singh S, Singh R, Soni M. Phytochemical and pharmacological aspects of Cinnamomum tamala Nees & Eberm: A review. J Pharmacogn Phytochem, 2018; 7(4): 2085-93.
8. Kumar S, Kumari R, Mishra S. Pharmacological properties and their medicinal uses of Cinnamomum tamala. Res J Pharm Biol Chem Sci., 2011; 2(4): 922-32.
9. Singh G, Maurya S, Catalan C, Lampasona MP. Chemical constituents, antifungal and antioxidative potential of Laurus nobilis L. leaf essential oil. Food Control, 2007; 18(5): 409-14. doi:10.1016/j. foodcont.2005.11.007.
10. Arslan D, Ozcan MM. Evaluation of drying methods with respect to drying parameters, some nutritional and colour characteristics of bay leaves (Laurus nobilis L.). J Food Eng., 2008; 78(2): 591-6. doi:10.1016/j. jfoodeng.2005.10.026.
11. Devi SL, Sriramajayam K, Venkataraman CV. Evaluation of *in vitro* antioxidant activity of Indian bay leaf (Cinnamomum tamala*)* using rat brain synaptosomes as model system. Indian J Exp Biol., 2007; 45(9): 778-84.
12. Mehta S, Purohit VK, Andola HC. Pharmacological activities of Cinnamomum tamala Nees & Eberm. and medical implication: a review. Med Aromat Plants, 2014; 3(4): 174.
13. Yadav A. Pharmacological properties of Cinnamomum tamala. Eur J Pharm Med Res., 2021; 8(12): 113-16.
14. Vaishnav S, Shahi S. Unlocking the medicinal treasure of Cinnamomum tamala (Bay Leaf): A comprehensive review of its therapeutic and pharmaceutical potential. J Neonatal Surg, 2025; 14(13s): 1159-63.
15. Rana VS, Langoljam RD, Verdeguer M, Blázquez MA. Chemical variability in the essential oil of Cinnamomum tamala L. leaves from India. Nat Prod Res. 2012; 26(14): 1355-7. doi:10.1080/14786419.2011.599806.
16. Padmakumari Amma KP, Rani MP, Sasidharan I, Sreekumar MM. Comparative chemical composition and in vitro antioxidant activities of essential oil isolated from the leaves of Cinnamomum tamala and Pimenta dioica. Nat Prod Res., 2013; 27(3): 290-4. doi:10.1080/14786419.2012.668691.
17. Malsawmtluangi C, et al. Major compounds in leaf essential oil of Cinnamomum tamala—eugenol, linalool, cinnamic aldehyde, caryophyllene. SciDirect Topics.

18. Antidiabetic and antioxidant activities of Indian bay leaf essential oils from Meghalaya (α-amylase & α-glucosidase inhibition; molecular docking analysis). 2024.
19. A review on Tamalpatra (Cinnamomum tamala*):* medicinal properties including antibacterial, antifungal, hyperlipidemic, antidiabetic, gastroprotective, antidiarrheal. Indian J.
20. Phytopharmacological activities of Cinnamomum tamala*:* traditional uses, antioxidant, antidiabetic, anti-inflammatory, anticancer, antimicrobial, immune and gastrointestinal effects. J Med Plants Stud.