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Recent Pharmacological Review on *Cinnamomum tamala*

Borhade Pravin*, Lone Krishnkant, Joshi Shreyas, Kadam Ajay, and Gaikwad Priyanka

Department of Pharmacognosy, JSPM's Rajarshi Shahu College of Pharmacy and Research, Tathawade, Pune, Maharashtra – 411 033, India

ABSTRACT

Cinnamomum tamala (Buch-Ham.) is a tree within the Lauraceae family which native to India, Nepal, Bhutan, and China, commonly known as the tejpat, Malabar leaf and Indian bay leaf in India and grow upto to 1.4 m girth and 7.5 m high. The used parts are leaves, bark and essential oil. Used as carminative, used in colic and diarrhoea. Bark is aromatic, stimulant, antigonorrhoeic, hypoglycemic, stimulant, anti rheumatic and antidote for scorpion sting. The leaf is bitter, sweetish; heating, alexiteric; useful in vata and tridosha condition like scabies, diseases of the anus and rectum, piles, heart troubles, ozoena, bad taste. While leaf extracts shows antioxidant, anti-ulcer and antimicrobial effect.

Keywords: *Cinnamomum tamala,* phytochemical, antimicrobial, Lauraceae

Corresponding author

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INTRODUCTION

Cinnamomum tamala also known as tejpat, Malabar leaf, Indian bay leaf, is a moderate sized evergreen tree attaining a height of 8 m and a girth of 50 cm. Leaves lanceolate, glabrous; alternately placed, opposite and short stalked. 3-nerved from the base. The genus Cinnamomum has about 250 tropical tree and shrub species. The etymology is derived from the Greek word 'kinnamomon' (meaning spice).The Greeks borrowed the word from the Phoenicians, indicating that they traded with the East from early times. The specific epithet 'tamala' is after a local name of the plant in India.

The leaf is bitter, sweetish; heating, alexiteric; useful in vata and tridosha condition like scabies, diseases of the anus and rectum, piles, heart troubles, ozoena, bad taste. As per the Unani medicine, the leaf has a sharp taste and use as a tonic to the brain, anthelmintic, diuretic, in inflammation, sore eyes, stops salivation and good for liver and spleen condition. The bark is given for gonorrhea and given in decoction or powder in suppression of lochia after child birth. It is mainly used for flavouring food and widely used in pharmaceutical preparation because of its hypoglycemic, stimulant and carminative, antidiabetic, antibacterial, antioxidant, anti-ulcer and antimicrobial properties [1-9].

Botanical name: *Cinnamomum tamala*
Family: Lauraceae
Common name: Tejpat, Kumaon.
Synonyms: *Cinnamomum tejpata* hort., Laurus *tamala* Buch. - Ham.
Part used: Leaves, Essential oil.
Habitant: The plant grows in tropical rain forests at varying altitudes.

Plant Profile

Kingdom	→	Plantae
Division	→	Angiosperms
Class	→	Magnoliids
Order	→	Laurales
Family	→	Lauraceae
Genus	→	*Cinnamomum*
Species	→	*C.tamala*
Synonym	→	*Cinnamomum albiflorum* Nees, *Cinnamomum cassia* D.Don nom. illeg.

Vernacular Names

Marathi	→	Tamalpatra
Hindi	→	Tejpatta
English	→	Indian Bay Leaf, Indian cassia, Indian cassia bark
Bengali	→	Tejpat
Tamil	→	katu-kurrnap

Malyalam → Karuntoli

Ayurvedic Properties

Rasa	→	Katu (pungent), tikta (bitter), madhur (sweet)
Guna	→	Laghu (light), ruksha (dry), tiksna (sharp)
Vipak	→	Katu (pungent)
Virya	→	Ushna (hot)

Distribution

This plant is native to India, Nepal, Bhutan, and China.

Description

Bark dark brown or blackish, slightly rough, blaze 13 cm. pinkish or reddish –brown with whitish streaks towards the exterior. Leaves opposite, subopposite or alternate 12.5 – 20 by 5-7.5 m., ovate – lanceolate or oblong, acuminate, the acumen often falcate, coriaceous, glabrous, scarcely shining above, glaucous beneath, 3 – nerved from close above the base almost to the apex. Petiole 7.5 – 13 mm long. Flowers 7.5 mm long, pale yellowish, in axillary and terminal lax puberulous panicles 5- 15 cm long. Perianth –lobes 6, oblong, silky pubescent, breaking off transversely below the middle after flowering. Perfect stamens 9. Filaments villous. Drupe 13 mm long, ovoid, fleshy, black, supported by the somewhat enlarged perianth – tube bearing the truncated perianth-lobes [10-11].

Phytochemistry: - The major constituents of the leaf essential oils of these species contain furanosesquiterpenoids as principal constituents. Furanogermenone (59.5%) was found to be the major compound in the leaf essential oil is β- caryophyllene (6.6%), sabinene (4.8%), germacrene D (4.6%) and curcumenol (2.3%). The leaf oil was characterized by a high content of sesquiterpenoids (96.8%), dominated mainly by furanosesquiterpenoids (79.3%) viz. furanodienone (46.6%), curzerenone (17.6%), furanodiene (1.8%) and curzerene (1.2%). Cinnamon leaf oil contains a variety of constituents including eugenol and cinnamaldehyde, which is a local mucous and dermal membrane irritant [12].

Pharmacological

Lipid Lowering Activity and Free Radical Scavenging Effect: - R Al-Mamun and et al study the methanolic extract of leaf for lipid lowering activity on rabbit and found that lipid profile was reduced by 14.0, 1.0, 4.0 and 15.0 mg/dl for total cholesterol, HDL-C, LDL-C and triglyceride respectively after using the plant extract (dose 500mg/rabbit for 10 days); where atorvastatin (0.005mg/rabbit) was used as standard lipid lowering agent. We also focused on the antioxidant property of crude methanol extract. Here we also carried out free radical-scavenging activity study and found the IC_{50} value for *C. tamala* is 6.00 µg/ml where the standard antioxidant (ascorbic acid) gave the value of 3.21µg/ml [13].

Reno-protective properties: - Naveed Ullah and et al investigate the reno-protective properties of Cinnamomum tamala against gentamicin-induced nephrotoxicity in rabbits. Rabbits were randomly divided into four groups (n = 6) including Group-1 (normal saline), Group-2 (gentamicin, 80 mg/kg/day), Group-3 (C. tamala, 200 mg/kg/day) and Group-4 (gentamicin, 80 mg/kg/day and C. tamala, 200 mg/kg/day). Body weight, blood urea nitrogen, serum creatinine, creatinine clearance, serum uric acid, urinary volume and urinary protein excretion were measured followed by histological examination. Gentamicin-treated animals showed significant renal damage as indicated by rise in blood urea nitrogen (54.18 ± 2.60 mg/dl), serum creatinine (4.02 ± 0.14 mg/dl), serum uric acid (2.34 ± 0.12 mg/dl), urinary proteins (3.86 ± 0.32 mg/dl) and decrease in creatinine clearance (0.76 ± 0.09ml/min), urinary volume (126.00 ± 9.09 ml) and body weight (10.80 ± 1.09 %). However, animals treated with gentamicin and C. tamala significantly protected rabbit kidney from structural and functional changes associated with gentamicin. Result shows that concurrent administration of 200 mg/kg/day of *C. tamala* leaf extract and gentamicin effectively prevented gentamicin-induced renal damage [14].

Immunomodulation property: - Jitendra K Chaurasia and et al use *C. tamala* hexane fraction (CTH) was orally given to rats for 10 days and delayed type of hypersensitivity (DTH), antibody producton against sheep red blood cells (SRBCs), mitotic index in bone marrow cells and concanavalin A (Con A) mediated proliferation of lymphocytes were assessed. Further on 30 days treatment, change in body weight (BW), spleen weight, thymus weight, bone marrow cellularity and hematological changes were observed. It inhibited significantly the DTH response (IC50 1475±57.19mgkg−1 BW), antibody production, suppressed mitotic index in bone marrow cells along with the suppression of lymphocyte proliferation against Con A (IC50 63.33±1.95µgmL−1). In all experiments, cyclophasphamide & dexamethasone had been used as reference drug for in vivo and in vitro studies, respectively. On 30 days treatment, the CTH (800mgkg−1 BW and above) significantly suppressed growth rate, increase of spleen and thymus weight and low bone marrow cellularity. In hematological examination, it inhibited total white blood cell and lymphocytes count & increased per cent of polymorphs. Thus, it suggested that the fraction possesses immunosuppressive property at doses, higher than 800mgkg−1 BW in rats [15]**.**

Antifungal and antioxidative: - Pandey AK and et al reports the fungicidal potential of *Cinnamomum tamala* Nees & Eberm (Lauraceae) leaf oil against five food spoilage and pathogenic fungi. In addition antioxidant efficacy of seven different solvent extracts derived from leaf was also evaluated using in vitro models. The oil demonstrated potent antifungal activity against *Aspergillus niger, A. fumigatus, Candida albicans, Rhizopus stolonifer* and *Penicillium spp*. in agar diffusion assay. Zone of inhibition ranged from 17-25 mm. The MFC values of oil against all the test fungi were found to be 230µg/ml. Phytochemicals present in *C. tamala* leaf were extracted in several solvents for assessing their effect in oxidative defense. The extracts exhibited appreciable antioxidant activity in β-carotene bleaching assay and reducing power assay. The antioxidative activities of extracts were compared with the activities of standard antioxidant compounds BHA and ascorbic acid. Petroleum ether, ethanol, acetone and chloroform extracts exhibited about 30-67% antioxidant activity in β-carotene bleaching assay. Aqueous and ethanol extracts exhibited better reducing power which increased gradually

with increasing amount of the extract concentration showing dose dependent response. Results indicated that natural phytochemicals present in *C. tamala* leaf extracts have potential to prevent growth of food spoilage/pathogenic fungi. In addition they also have capability to mitigate the oxidative stress by antioxidant response [16].

Gastroprotective activity: - Eswaran MB and et al test *Cinnamomum tamala* leaves extract (CTE; 50,100 and 200mg/kg body weight) was administered orally, twice daily for 5 days for prevention from ethanol (EtOH)-, cold-restraint stress (CRS)- and pylorus ligation (PL)-induced ulcers. Estimation of H(+)K(+)ATPase activity and gastric wall mucous were performed in EtOH-induced ulcer model, antioxidant enzyme activities was carried out in CRS-induced ulcer model, and various gastric secretion parameters like volume of gastric juice, acid output, and pH value were estimated in PL-induced ulcer model. A significant reduction in lesion index was observed in ulcer-induced animals treated with CTE at different doses when compared with ulcerated rats in all models. A significant decrease occurred in the level of H(+)K(+)ATPase, volume of gastric juice, and acid output. Simultaneously the level of gastric wall mucus and pH were increased significantly. These showed dose-dependent action of CTE. The antioxidant enzyme levels of LPO and SOD were decreased while administering CTE at different doses, compared with their control values. Contrary to this the level of CAT enzyme showed significant increase. The results of our study showed that *Cinnamomum tamala* possess significant gastroprotective activity, probably due to its free radical scavenging activity [17].

Antidiarrhoeal activity:- **Rao CV** and et al investigate the antidiarrhoeal potential of 50% ethanolic extract of *Cinnamomum tamala* on experimentally induced castor oil diarrhoea, gastric emptying of phenol red meal, gastrointestinal transit of charcoal meal and in vitro mast cell degranulation activity. *C. tamala* extract (25, 50 and 100 mg/kg, orally) produced a dose-dependent reduction in the total amount of faecal matter in castor oil-induced diarrhoea. The mean distance travelled by charcoal meal at 50 and 100 mg/kg of extract showed a significant reduction in the secretion of gastrointestinal fluid accumulation by 32.5-65.0%. The Na(+) and K(+) concentrations on castor oil-induced fluid accumulation showed a greater inhibitory effect on Na(+) levels than on K(+) concentrations. *C. tamala* significantly reduced the lipid peroxidation ($P < 0.001$) and increased the catalase ($P < 0.01$) activity in comparison to the castor oil-induced groups. *C. tamala l*eaf extract did not show any significant effect at a higher dose (15 mg/ml) on mast cell degranulation. However, the extract in the dose of 5 and 10 mg/ml conferred significant mast cell protective action ($P < 0.001$). The result indicates the Indian spice *C. tamala* is useful for diarrhea [18].

Pro- or antioxygenic activity: - **A.D Semwal** and et al study the pro- or antioxygenic activity of tejpat and red chilli, their fractions extracted using various solvents, and of chlorophyll, capsaicin and dihydrocapsaicin were determined in refined sunflower oil at 37°C. Tejpat and its fractions containing chlorophyll showed pro-oxygenic activity and the catalytic action increased with increase in concentration of chlorophyll in the fractions. On the other hand, fractions which did not contain chlorophyll, such as the aqueous extract, and chlorophyll-free spice or fractions freed of chlorophyll by column chromatography were devoid of pro-oxygenic activity [19].

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CONCLUSION

Cinnamomum tamala is one of the economic species belong to this genus where the dried leaf is used as a spice for flavoring culinary preparation. The leaf oil obtained by distillation is used as flavouring liquiors and confections, and have immense pharmaceutical application. The present review reveals some other new pharmacological properties that the plant is used in treating various ailments. It elicits on all the aspects of the herb and throws the attention to set the mind of the researchers to carry out the work for developing its various formulations, which can ultimately be beneficial for the human beings as well as animals.

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