

# Importance of *Cinnamomum Tamala* in the Treatment of Various Diseases

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## ABSTRACT

*Cinnamomum tamala* is a multipurpose evergreen plant it is a native of India. The plant is commonly known as Indian cassia, Tejpatta, Indian bay leaf etc. All parts of plant possess many major bioactive constituent due to the presence of major phytoconstituent it is useful for the treatment of various diseases or disorders such as Cancer, cardiac diseases, diabetes, Anxiety, depression, ulcer, GI diseases and possess many pharmacological activity includes anti-oxidant, anti-hypercholesterolemia, anti-diarrhoeal, anti-inflammatory, anti-fungal, anti-bacterial etc. In Ancient time the plant also used as for its medicinal value and it contains a aromatic property due to the presence of these property it is used in perfumery industry and used as mouth refreshing, useful for removal of bad odour from body, mouth and also used in pharmaceutical industries. The leaves of the plant possess flavouring agent property it is used as a flavouring agent in food, curry, fast food, pickles and used as a spice. The main aim of this review/study was to promote and upgrade the knowledge of the use of this multipurpose evergreen plant.

**Key words:** *Cinnamomum tamala*, Pharmacological activity, Diseases, Uses.

## INTRODUCTION

*Cinnamomum tamala* (*C. tamala*) is a multipurpose valued, Perennial plant. It is commonly known as Tezpat/ Tezapatta or Indian Cassia and Indian bay leaf. Its belongs to Lauraceae Family.<sup>1</sup> It is mainly found in moist slopes of Himalayan regions at height up to 900m to 2500m. Regions like uttrakhand, Manipur, nainital, Himachal Pradesh, Assam, Arunachal Pradesh and some hills area includes mikir hill, garo hill, khasi hill, nilgiri hill jaintia hill and also found some regions of india, Nepal, Bhutan, China.<sup>2-4</sup> The plant contains a up to 7-12m height, rugged bark which is dark brown to reddish brown in colour. And the leaf of the plant is thickened, ovate shaped and glossy in appearance. It is commonly used for its aromatic property in food, used in some perfumery industry for fragrance, used in pharmaceutical industries because it possess many medicinal property<sup>5,6</sup> and leaves extract of plant is used as clarifier in dyeing method. In anient time the plant parts are also used in ayurveda system of medicine for preparation of Ayurvedic formulations includes Sudarshan choorna, chandraprabhavati.<sup>7</sup> The plant possess a various pharmacological/ medicinal property useful for cure and treat various diseases due to the presence of many major **bioactive constituents** such as:-

Cinnamaldehyde, trans-cinnamaldehyde, 3,4,5,7-tetrahydroxyflavone, 3,3',4',5,7- pentahydroxyflavone (non-glycoside compounds), kaempferol-3-O-glycopyranoside (Astragaln), quercetin-3-O-rutinoside, quercetin-3-O-sophoroside (flavonoid glycoside), kaempferol-3,7di-O-rhamnopyraoside, *a*-pinene, myrcene, camphene, *p*-cymene,

limonene, eugenol (4-hydroxy-3-methoxy-allylbenzene), methyl eugenol, methyl ether eugenol and eugenol acetate.<sup>8-11</sup> In the evaluation of leaf oil of plant the study found that plant leaf oil possess a major bioactive compound includes Furanogermenone,  $\beta$ - caryophyllene, germacerene d, curcumenol, curzerenone, furanodiene, furanodienone, and contains a rich amount of sesquiterpenoids compounds, and mainly contains some other phytochemical compounds cinnamaldehyde, eugenol, $\alpha$ - linalool, carophyllene oxide, geraniol, Benzaldehyde, 1,8-cineole, Salicylaldehyde,  $\gamma$ -terpinene, acetophenone, cis-sabinene hydrate, trans-sabinene hydrate, 3-phenyl propanala, Pinocarpone, borneol, 2-methylbenzofuran, tepinen-4-ol, *p*-cymen-8-ol,  $\alpha$ -terpineol, bornyl acetate, cinnamyl alcohol, hydrocinnamyl acetate, cinnamyl acetate, cinnamic acid, coumarin, cinnamyl acetate,  $\alpha$ -humulene, nerolidol, spathulenol, Monoterpenoid Hydrocarbons, Oxygenated Monoterpenes, Sesquiterpens Hydrocarbons, Oxygenated Sesquiterpens, Phenylpropanoids and also includes in small quantity of  $\alpha$  - humulene,  $\alpha$  - muurolene.<sup>1,8,3,9</sup>

Numerous researchers study shown that the tejpatta possess a various pharmacological activity such as anti-hyperlipidemic activity, anti-diabetic activity, gastro protective activity, anti-helminthic/ antiprotozoal activity, anti-inflammatory property, antiemetic activity, anti-diarrhoeal, antifungal activity, it shown potent antibacterial property against various micro-organism such as *Escherichia coli* (*E.Coli*), *Bacillus subtilis*, *Saccharomyces cerevisiae*, anti-oxidant property, free radical scavenging activity also exhibit CNS protective activity like anticonvulsant, hypothermic activity. The extract of plant reduces the oxidative damage and useful

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for the protective against renal toxicity induced by gentamicin etc. and useful for treat various diseases includes anal and rectal disease, protective against flatulence, cancer, coryza (inflammation in mucous membrane), anorexia, liver and spleen diseases, prevent bleeding (used as a coagulating agent), cardio vascular diseases and used for induce blood circulation. leaves oil is useful for dermatophytic infection.<sup>10-12</sup> Tejpatta leaves is commonly used in foods, beverages, pickles, meats, fast foods, chewing gums as a flavouring agents,<sup>6</sup> it is also exhibit a mouth freshening property. It is a natural food preservative agent used in some juices like pineapple juice. In another hand the plant possess many other beneficial effect against nematode worms (used as nematicidal), useful to kill the insects in crops (insecticidal), exhibits mosquito larvicidal activity (kill mosquito/larvae), useful for pest control in field, used as anti-termitic agent (Table 1).<sup>5,13</sup>

### MORPHOLOGY CHARACTERISTICS OF C. TAMALA PARTS<sup>5,6,8,3</sup>

All parts of plant possess a various different property which is useful for treat and cure many disease and contains a many major bioactive

compounds and various pharmacological activity and also used as a commonly in spices , flavouring agent it is aromatic in nature (possess pleasant odour) and clove like taste. Some morphological properties of plant parts are discussed in below (Figure 1 and Table 2).

**Used Plant Parts:** - Bark, Leaves, Fruit, Flowers, Seeds etc.

**Bark:-** The plant contains a up to 7m height, branches up to 95cm width, rugged bark which is greyish red to dark brown in colour. Bark of the plant produces a mucilage/gum.

**Leaves:-** Leaves of the plant is thickened, pointed/acuminate ovate shape. It is 12-20cm long, 5-8cm wide (centre), Progeny/Young leaves are reddish pink in colour and after some time leaves colour is change (dark green), glossy appearance. leaves of the plant consist a 3 nerves like line from the base to top. The taste of leaves is clove like and odour is pepper like.

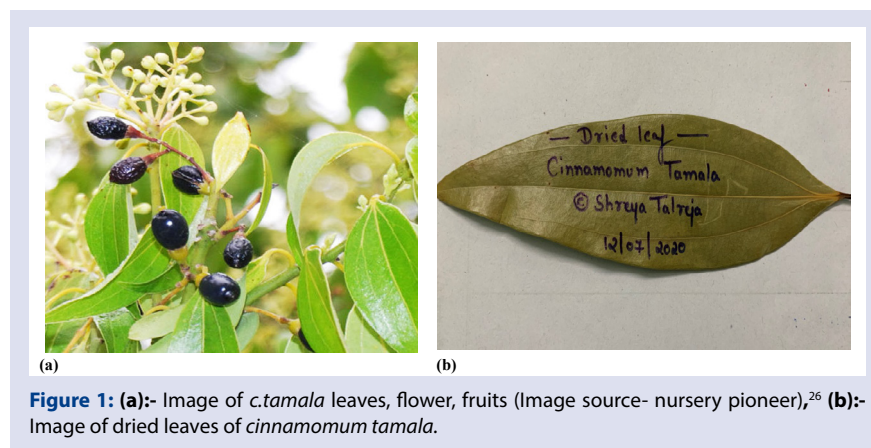
**Flower:-** Tejpatta contains a small epicene flower in same plant, white in colour, long up to 7.5 mm. Twigs of the flower are long same as calyx. It is cross fertilized/ Pollinated by honey bees.

**Table 1: Scientific/Botanical Classification of C.tamala.<sup>1,8,3</sup>**

Category	Botanical description
Kingdom	Plantae
Subkingdom	Tracheobionta (vascular plant)
Division	Magnoliophyta (flowering plant)
Class	Magnoliopsida (Dicotyledons)
Subclass	Magnoliidae (group of flowering plant)
Order	Laurales
Genus	Cinnamomum Schaeff
Family	Lauraceae
Species	Cinnamomum Tamala (Buch-Ham)
Synonym	<i>Cinnamomum albiflorum</i> Nees, <i>Cinnamomum cassia</i> D.Don nom. illeg.

**Table 2: Various name of C.tamala in Different languages.<sup>1,3</sup>**

Languages	Names
Sanskrit	Tamalpatra
Hindi	Tejpatta
English	Indian Bay Leaf, Indian cassia
Marathi	Tamalpatra
Tamil	Talishappattiri/ Katu-kurnnap
Assam	Tejpat
Malayalam	Tamalapatram/ Karuntoli
Telugu	Talisapatri
Canada	Patraka
Bengali	Tejpat



**Figure 1: (a):-** Image of *c.tamala* leaves, flower, fruits (Image source- nursery pioneer),<sup>26</sup> **(b):-** Image of dried leaves of *cinnamomum tamala*.

**Fruit:-** the plant ripe fruit is dark purple colour, ovate drupe (fruit with thin skin and they contain a seed), the plant contains a drupe up to 13mm long and the fruit required a seed for 1 year attaining full growth. The fruit contain a single seed.

**Flowering & Fruiting Time:-** The flowering period of the plant is March last week to mid-April and fruiting period of plant is April – May.

## TRADITIONAL USE OF *C. TAMALA*<sup>5,6,14</sup>

The plant is used in many years ago in Indian system, ayurvedic system and also traditionally system for its medicinal property, aromatic property and used as a flavouring agent in food detail discussed in below:-

- In traditionally tejpatta is used in food, beverages, fast food, pickle used as a flavouring agent or as a spices and also useful for its aromatic property.
- The presence of flavouring agent, mouth refreshing property the plant is also used in chewing gums and also beneficial for breath problems.
- Tejpatta powder is used for some dental problems like reducing tooth pain.
- Traditionally the plant is useful for the treatment of many diseases and disorders includes colon cancer, Diabetes, cardiac disease, CNS disorders, bleeding disorder (useful for increase blood circulation in uterus) and it is also useful in appetite problem, mouth problems like dryness of mouth, unpleasant/poor breath problem, rheumatism, etc.
- Tejpatta leaves and bark also exhibits astringent, antiemetic, anti-diarrhoeal, anti-inflammatory includes wound healing property, carminative property (relieving flatulence).

## C. TAMALA IS USEFUL FOR TREAT VARIOUS DISEASES AND DISORDERS

### CNS Disorders (Depression, anxiety)

Numerous researchers reports shown that the extract of plant possess anti-depressant effect same as imipramine (antidepressant drug) at proper dose administration (400 mg/kg) and in another hand the studied found that plant possess beneficial effect against anxiety disorder (used as a anti-anxiety/anxiolytic agent) and also useful for the treatment or management of psychological disorders.<sup>2</sup>

### Useful for the prevention of Gastrointestinal (GI) diseases

Leaves Extract of *c. tamala* possess GI protective activity. In the evaluation of study, the orally administration of leaves extract of plant in rats at proper dose level 50 mg/kg, 100 mg/kg, 100 mg/kg (Body weight) for 5 day daily twice time. Result found that the extract of plant is effective against cold restraint stress, ethanol, pylorus ligation (increase acid secretion in stomach) which induced gastric ulcer. In other words, say that the leaves extract of plant is useful for the prevention of gastric ulcer.<sup>3</sup>

### Useful for the prevention of Renal/nephrotic diseases

According to Authors *c. tamala* leaves extract possess renal protective effect against renal toxicity/nephro toxicity induced by gentamicin in rabbit. In Evaluation of study through various histopathological examination/test were measured such as serum creatinine, creatinine clearance, uric acid, volume of urine, blood urea nitrogen, body weight and excretion of urinary protein.

In study 'A' group rabbits treated with gentamicin. result showed that kidney damage through increase level of blood urea nitrogen, serum creatinine, creatinine clearance, uric acid, increase level of urinary protein and also increases body weight. But In another hand 'B' group rabbits are treated with gentamicin and tejpatta they shown beneficial effect against kidney and shown no any harmful effect against renal function at administration of proper dose level 200 mg/kg per day. Hence, the study proves that the plant leaves extract is useful and possess significant effect against nephrotoxicity induced by gentamicin.<sup>3</sup>

### *C. tamala* is useful for the treatment of cancer

The tejpatta plant leaves extract contains a various major bioactive constituents such as bornyl acetate which is useful against cancer (ovarian cancer). Study found that these major bioactive constituent possess cytotoxic effect against cancer cell and decreases the prostate growth and inhibit/reduces the growth of no. of abnormal cell (hyperplastic) and also possess anti-inflammatory activity.<sup>2</sup>

### Useful for the treatment of diabetes

Numerous researchers studied shown that the plant extract contains many phytochemical constituents (procyanidins) which is effective against diabetes/ hyperglycaemia by increasing insulin level through treating pancreatic  $\beta$ -cells.

Ethanol extract of the leaves of this plant also shown hypoglycaemic activity through increasing insulin level and also enhance the oral glucose tolerance by inducing the insulin level. Hence, the study proves that the plant possess anti-hyperglycaemic activity by reducing glucose level and induce insulin secretion in pancreatic  $\beta$ -cells. It possess potent effect against diabetes.<sup>2</sup>

In another study found that the diabetic patient recover delay wound/cuts or any inflammation due to the presence of high glucose level in blood. The plant extract also contains many phenolic compounds; flavonoids may be due to the presence of these compounds they possess wound healing activity.<sup>15</sup>

### Ulcer Preventive

The leaves extract (hydro alcoholic) of *C. tamala* shown protective effect against ulcer. They protect the gastric mucous membrane from secretion of harmful chemicals, stress/pressure, and any cause of ulcer. These extract is useful for block the hydrogen, potassium, ATPase activity and they inhibit/reduce gastric acid secretion. Hence, this shown that the extract of plant is useful for the treatment of ulcer.<sup>16</sup>

### Other Diseases

- **Malarial disease** the leaves extract (hydro-alcoholic) of *c. tamala* possess inhibitory/protective effect against malaria pathogen (*plasmodium falciparum*) and also useful for the treatment of malaria.<sup>17</sup>
- **Food borne diseases** the *c. tamala* leaves oil possess a antifungal activity against many fungi such as *Aspergillus niger*, *A. fumigatus*, *Candida albicans*, *Rhizopus stolonifer* and *Penicillium spp* which cause food spoilage and induce the risk of food borne diseases/food poisoning. In this study researchers found that *c. tamala* plant useful for inhibit the the growth of fungi which cause food spoilage and prevent food borne disease.<sup>2</sup>

### Important Pharmacological activity

#### *C. tamala* possess wound Healing Activity

According to researchers study reports that tejpatta leaves ethanol extract are possess wound healing property and Earlier study shown the high glucose level cause the delay recovery of wounds and any incision.

These evaluation of study found in diabetic rat through administration of ethanol extract of leaves tejapatta they promote wound healing activity by reducing glucose level in blood, increase contraction of wound/cuts and also possess increased tensile strength. The plant possess this action due to the presence of many bioactive constituents includes phenolic compounds, tannins etc.<sup>6,18</sup>

### Useful for anti-inflammatory Activity

The leaves powder of tejapatta extracted with distilled water through hot maceration method. These aqueous extract useful for anti-inflammatory activity. The administration of dose (100mg/kg, 200mg/kg, and 400 mg/kg) in rats and induced paw oedema in rat through carrageenan and acetic acid is used in rat for vascular permeability. The plant extract Anti-inflammatory activity is evaluated through membrane stabilizing property. The aqueous extract inhibit or reduce the oedema in rat induced by carrageenan and also decrease/inhibit vascular permeability induced by acetic acid and the study also found that the In vitro administration of plant extract possess membrane stabilizing activity in conc. Dose dependent manner up to (1mg/ml).<sup>19,10</sup>

### C. tamala exhibits anti hyperlipidemic activity

Researchers study found that the Aqueous, ethanol extract of leaves of this plant is possess hypo cholestrolemic effect. The ethanol and aqueous leaves extract of plant is administered orally in rats (dose 400mg/kg per day) for 10 days. Continuously administration of leaves extract dose results found that prevent or reduce the increased level of serum in total cholesterol, LDL (LOW DENSITY LIPOPROTEIN)/Bad cholesterol, VLDL(VERY LOW DENSITY LIPOPROTEIN), and increase/improve the level of Good cholesterol/HDL (HIGH DENSITY LIPOPROTEIN).<sup>19</sup>

### Plant possess skin whitening property (anti tyrosinase activity)

The plant exhibit many major bioactive constituents which possess skin whitening property. Compounds are: - cis-2-methoxycinnamic acid, cinnamaldehyde.

These compounds inhibits the activity of tyrosinase enzyme (enzyme is responsible for the production of melanin and other pigments).<sup>2</sup>

### C. tamala possess antifungal activity

Numerous researchers study reports that used in agar diffusion evaluation for these study. leaves oil of this plant are possess potent anti fungal activity against many fungi such as *Aspergillus niger*, *A. fumigatus*, *Candida albicans*, *Rhizopus stolonifer* and *Penicillium spp.* And leaves oil also useful for the food spoilage.

### C. tamala possess antibacterial activity

The bark extract of the tejapatta is a good source for antibacterial effect and the evaluation is done through using agar diffusion method. And these study show that the plant bark extract is possess anti-bacterial activity.<sup>16</sup>

### Ethanobotanical uses<sup>1,19</sup>

- Bark and dried leaves powder are used for reducing fever, anaemia (lack of blood), unpleasant body odour, bad mouth odour and the plant seed powder are combined with honey prescribed for children in purpose of diarrhoea, cough problem.
- The plant possess aromatic property due to the presence of its property it is useful in perfumery industry and also useful in preparation of soaps, detergents, cosmetics, toothpaste etc and also useful in food industry as a spice.

- *C.tamala* plant parts are useful for preparation of some ayurvedic formulation like Sudarshan churna, Chandraprabhavati etc.
- Leaves extract of plant used as a clarifier in dyeing method with emblic myrobalans. *C.tamala* plant is also used as a food, fodder, medicine etc. Numerous study shown that the plant leaves is also use for its green dyeing property.

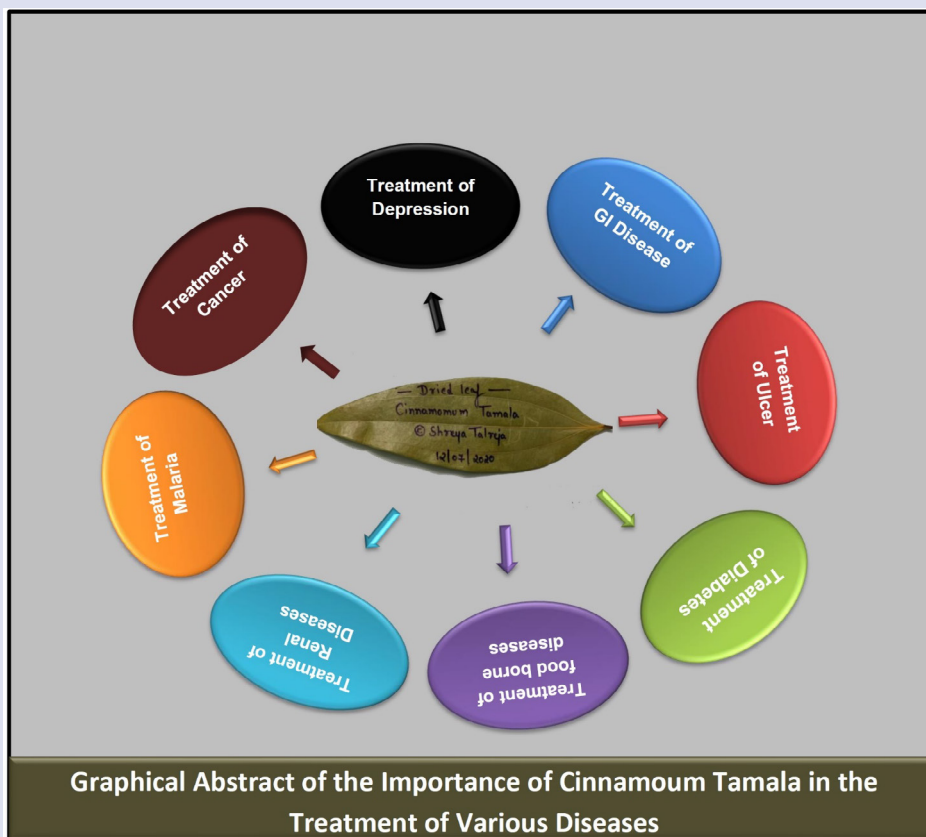
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## GRAPHICAL ABSTRACT



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Prof. Dr. Shashank Tiwari is currently working as a Director Academic and Research in Lucknow Model College of Pharmacy, Lucknow, he is also a Certified Practitioner of Cognitive Behavioral Therapy (CBT), a Life and Spiritual Coach. Three patents in his name act as icing on the cake to support his professional acumen. He is an author of 5 national/international books. Dr. Tiwari is associated with various science promoting activities in India for the reform of Science and Technology. Award, Most Inspirational Director of the Year, Pride of National Pratibha Samman, Guru Vashishtha Samman, Best International Educator Award, Global Times Award for Teaching Excellence and many more. Various institutions have approached him to impart Guest Lectures on topics of Pharmacy and critical social issues.



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