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Review Article

## A Review on Medicinal Uses of *Cinnamomum verum* (Cinnamon)

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### Abstract

*Cinnamomum verum* is a spice plant that is well-known for its medicinal and pharmacological qualities. The old botanical synonym for this tree, *Cinnamomum zeylanicum*, is derived from Sri Lanka's former name, Ceylon. Since ancient times, *Cinnamomum zeylanicum* has been frequently used as a medicinal condiment. It's native to Sri Lanka and India's southern states. *Cinnamomum verum* belongs to the Lauraceae family and is also known by the synonym *Cinnamomum zeylanicum* Blume. It's a dried bark that's been stripped of its outer cork and underlying parenchyma. *Cinnamomum verum* is a popular medicinal herb with a wide range of applications. It has long been used to flavour food and in pharmaceutical preparations to treat a variety of ailments. For commercial purposes, it is commonly used as candies, chewing gums, mouthwash, and toothpaste in the current period. Many volatile oils, primarily cinnamaldehyde, cinnamic acid, and cinnamate, are abundant in the plant. Eugenol is the active principal ingredient linked to a variety of biological functions. This herb is found in almost every pharmacological system on the planet. Each of these features is essential for human health development. Antimicrobial, wound healing, antidiabetic, anti-HIV, anti-anxiety, and anti-Parkinson's among of the plant's key medical characteristics. The major components of the *Cinnamomum verum* plant include eugenol, cinnamaldehyde, cinnamyl acetate, copane, and camphor. The pharmacological effects of cinnamon aldehyde have been extensively researched. Every aspect of the plant was thoroughly examined in this study, from its morphological description to its phytochemical profile and therapeutic action. In this review, we've attempted to compile a comprehensive list of its medical and pharmacological qualities.

**Keywords:** *Cinnamomum verum*, Dalchini, Medicinal Properties, volatile oils, Antimicrobial, Anti-HIV, antidiabetic

## INTRODUCTION

*Cinnamomum verum* (Lauraceae) is grown in several Asian countries, particularly in Sri Lanka and Southern India. Cinnamon is a traditional folk herb that can be found in Korea, China, and Russia.<sup>1</sup> Cinnamon has been used by various cultures all over the world for ages. Cinnamon comes in two varieties: *Cinnamomum zeylanicum* (CZ) and Cinnamon cassia (CC), both of which are obtained from the inner bark of the tropical evergreen plant *Cinnamomum zeylanicum* (CZ).<sup>2</sup> *Cinnamomum verum* shoots of their outer cork beneath parenchyma are used to make the medication.<sup>3</sup> The surface is longitudinally striated and the fracture is short and splintery. It contains a minimum of 12 millilitres per kilogramme of essential oil obtained through steam distillation. It has a distinct odour that is both aromatic and pleasant. It has a pungently spicy, slightly sweet, mucilaginous flavour with only a tiny harshness.<sup>4</sup> Cinnamon bark contains up to 4% essential oil, most of which is cinnamaldehyde (60-75%), cinnamyl acetate (1-5%), eugenol (1-10%), -caryophyllene (1-4%), linalool (1-3%), and 1,8-cineole (1-2 percent). oligopolymeric procyanidins, cinnamic acid, phenolic acids, pentacyclic diterpenes cinnzeylanol and its acetyl derivative cinnzeylanine, sugars mannitol,<sup>5</sup> L-arabino-Dxylosanose, L-arabino-Dxylose, D-xylene, D-glucane, and mucilage polys Cinnamon's

pharmacological characteristics, such as anti-inflammatory, anti-microbial, blood glucose, cardiovascular, cognitive function, and anticarcinogenic, have been proven in several research.<sup>6-7</sup> In the traditional Chinese system, cinnamon is regarded as a potent neuroprotective agent<sup>8</sup> as well as a medicine for the treatment of type 2 diabetes mellitus.<sup>9</sup>

## HISTORY

Cinnamon has been utilized in a variety of culinary applications for thousands of years. It has been employed as an antiemetic, antidiarrheal, ant flatulent, and stimulant in Ayurvedic medicine due to its high healing importance. It was employed for mummification by the Egyptians.

During the 16th and 17th centuries, Portuguese traders brought the spice (*C. zeylanicum*) from Sri Lanka to Europe. Cinnamon cultivation began in Java under the Dutch occupation in the 17th century, and it was brought to Europe by the East India Company. After Ceylon cinnamon farming declined, Sri Lanka became the primary source of cinnamon oils, which are utilised in the pharmaceutical and food industries. Pharmaceutical companies also employ Chinese cinnamon oil.

## PHYTOCHEMICAL CONSTITUENTS OF CINNAMOMUM ZEYLANICUM (DALCHINI)

Cinnamon contains a variety of resinous compounds, such as cinnamaldehyde, cinnamate, cinnamic acid, and a variety of essential oils. Because of the cinnamaldehyde component, cinnamon has a spicy flavour and a strong aroma<sup>10</sup>. Trans-cinnamaldehyde, cinnamyl acetate, eugenol, L-borneol, caryophyllene oxide, b-caryophyllene, L-borneol acetate, E-nerolidol, alpha-cubebene, alpha-terpineol, terpinolene, and alpha thujene are some of the essential oils found in cinnamon<sup>11-18</sup>. Aldehydes, alcohols, esters, phenols, acids, monoterpenes, diterpenes, sesquiterpenes, benzopyrones, hydrocarbons, and flavonoids are among the chemical substances found in *Cinnamomum zeylanicum*. The aldehydes contained in the bark essential oil of *C. zeylanicum* include cinnamaldehyde, methoxycinnamaldehyde, hydrocinnamic, benzaldehyde, vanillin, cuminaldehyde, benzenepropanal, 2-methyl-3-phenyl-propanal, and citronellal. Cinnamyl alcohol,  $\alpha$ -terpineol, linalool, and  $\alpha$ -Bisabolol are alcohols derived from the *Cinnamomum zeylanicum* plant; esters are cinnamyl acetate, cinnamaldehyde diethyl acetal, methyl cinnamate, hydrocinnamyl acetate, benyl benzoate, bornyl acetate. Different sections of the plant contain cinnamic acid, ferulic acid, caffeic acid, gallic acid, protocatechuic acid, oleic acid, and phydrobenzoic acid. P-cymene, limonene,  $\alpha$ -terpinene,  $\alpha$ -pinene, camphene, camphor, 1,4-cineole,  $\beta$ -pinene,  $\alpha$ -Phellandrene,  $\alpha$ -phellandrene, and 3-carene are among the

monoterpenes found in *Cinnamomum zeylanicum*<sup>19-20</sup>. Because there are so many essential oils, isolating and separating them might take a long time<sup>21</sup>. The hydro-distillation method is the most often utilised separation method. The bark, leaves, fruits, buds, and stalks of the plant are used to extract chemical components<sup>22</sup>. The procedure is both quick and inexpensive. The downside of this approach is that it causes chemical changes, and heat-sensitive substances are readily destroyed<sup>23</sup>. The supercritical fluid extraction method was introduced to overcome this constraint. This approach is suitable for the isolation of thermally and chemically unstable substances. The major component found in cinnamon leaves is eugenol, with  $\alpha$ -ylangene, methyl, and ethyl cinnamate also present in the leaf oil. Cinnamon also included benzyl benzoate in bark oil and terpinene-4-ol in root-bark oil. A study by Jayaprakasha and Jagan Mohan Rao found 72 chemicals in diverse portions of *C. zeylanicum*, including leaf, stem bark, and root bark oils, of which 32 compounds were previously described. There were 11 monoterpenes, 4 sesquiterpenes, 2 aliphatic, and 15 aromatic compounds among the newly discovered compounds. Isogai et al. also discovered two novel chemicals, cinnzeylamine and cinnzeylanol, in the dried bark of *C. zeylanicum*. By analysing the oil of *C. zeylanicum* leaves, Vermin et al. discovered the presence of p-cymene (21.35 percent) and eugenol (16.7%). GC-MS study of essential oils from cinnamon leaves cultivated in India detected 47 chemical components<sup>24-26</sup>. Figure 02 depicts the structures of some of *C. zeylanicum*'s main compounds.

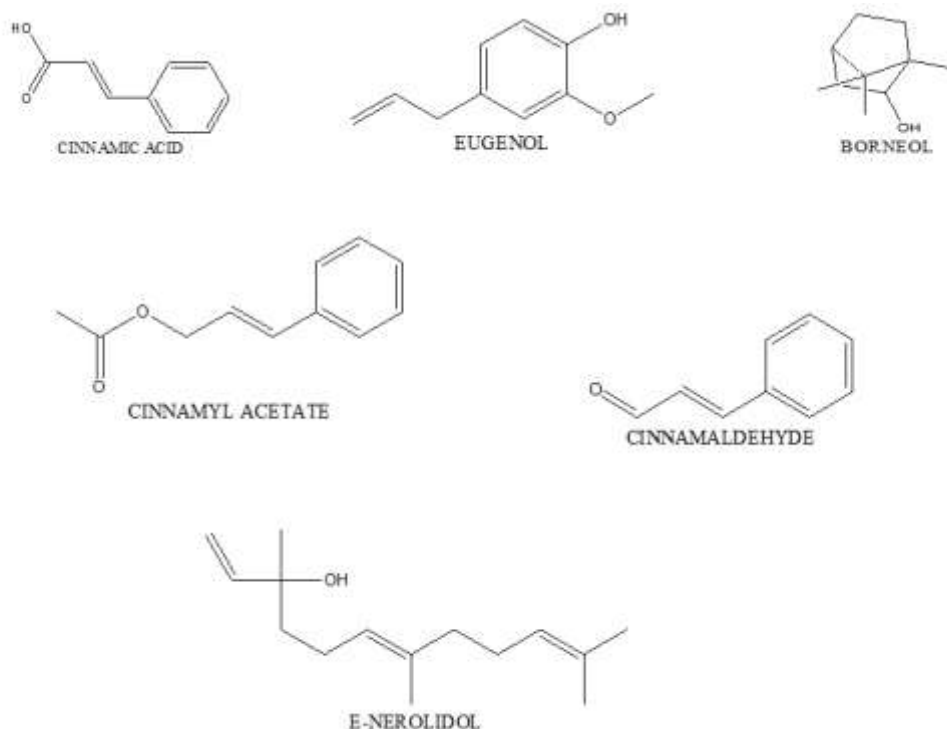


Figure 1: Some of the Important Elements in *C. zeylanicum*'s Chemical Structure

## BOTANICAL DISTRIBUTION OF CINNAMOMUM ZEYLANICUM

*Cinnamomum zeylanicum* (Dalchini) is an evergreen tropical shrub with thick, smooth, reddish-brown bark that grows to a height of around 6-8 metres. The opposite or sub-opposite leaves are glabrous, ovate and lanceolate, hard and coriaceous, and opposite or sub-opposite leaves are

glabrous, ovate and lanceolate, hard and coriaceous. The leaves are brightly coloured above and pale beneath, with 3-5 major nerves.

Petiole flattened to  $\frac{1}{2}$  inch in length. Axillary or sub-terminal cymes or panicles produce flowers. The fruit is ovate or oblong in shape, about 1.5-2 cm long, minutely apiculate, dry or somewhat fleshy and dark purple in colour.



**Figure 2: *Cinnamomum Zeylanicum* (Dalchini)**

**Table 1: Vernacular names of *Cinnamomum Zeylanicum***

Spanish	Canela
French	Cammelle
Urdu	Darchini
Gujarati	Taja
Hindi	Dalchini
English	Cinnamon
Punjab	Dalchini, Darchin
Telugu	Lavanga Patta
Oriya	Dalechini, Guda twa
Malayalam	Karuvapatta, Ilavarngathely
Bengali	Daruchini
Tamil	Ilayangam

**Table 2: Morphological Classification of *Cinnamomum Zeylanicum***

Taxonomical Rank	Taxon
Kingdom	Plantae
Phylum	Magnoliophyta
Class	Magnoliopsida
Order	Laurales
Family	Lauraceae
Genus	<i>Cinnamomum</i>
Species	<i>Zeylanicum</i>

## TRADITIONAL USES

Its wood is used to make decorations, furniture, cabinets, and plywood. *C. javanicum* produces durable wood that is utilised in construction and housing construction. It's used to make chocolate, beverages, spicy candies, and liquors, among other things.<sup>27</sup> True cinnamon is made from the bark of the *Cinnamomum verum* tree and is one of the most often used spices.<sup>28</sup> *C. politum* bark is added to hot beverages to help strengthen muscles and reduce discomfort. For headaches, *C. crassinervium* crushed leaves and bark paste are recommended. Stomach discomfort and food poisoning are treated using the leaves of *C. rhynchophyllum* and *C. soeengii*.<sup>29</sup> Mosquito coils, scented joss sticks, and formica are all made with the mucilage of *C. iners*.<sup>30</sup> Cinnamon has antifungal, antibacterial, antitermitic, larvicidal, nematocidal, and insecticidal effects, among others.<sup>31-32</sup> This plant balances the Vata and Pitta energies in the body.<sup>33-34</sup> It helps to relieve menstruation pain. According to a study, drinking a

cup of warm cinnamon water every day can assist women have less pain during menstruation for a brief period of time.<sup>35</sup>

### Some Major Ayurvedic Medicinal Uses of *Cinnamomum Zeylanicum* are:

-It relieves sore throats, influenza, the common cold, and headaches.

-It also has antitubercular properties and is used as an expectorant.

-In the case of rheumatoid arthritis, it is a natural treatment.

-It's also good for lowering cholesterol and strengthening the cardiac muscles.

-It provides relief in menstrual pain. A study says women should drink a cup of warm cinnamon water every day it helps in experiencing less pain during menstruation for a short duration.

## MEDICINAL USES OF *CINNAMOMUM VERUM*

### Antimicrobial Activity

Because of its strong hydrophobic character, *Cinnamomum zeylanicum* is a well-documented antibacterial agent, according to many researches<sup>36-37</sup>. The antimicrobial activity of essential oils of *C. zeylanicum* and three other herbs, *Cuminum cyminum*, *Amomum subulatum*, and *Syzygium aromaticum*, against *Salmonella typhi*, *Salmonella paratyphoid*, *Escherichia coli*, *Staphylococcus aureus*, *Bacillus licheniformis*, and *Pseudomonas fluorescens*, was investigated using the broth *C. zeylanicum* was found to have more powerful antibacterial action against all bacteria than the other three plants<sup>38</sup>. The results revealed that ethyl acetate exhibited substantial antibacterial action against *Staphylococcus aureus*, *Escherichia coli*, and *Pseudomonas aeruginosa*, while petroleum ether extract had the highest sensitivity against *Bacillus subtilis*<sup>39</sup>. Another study looked at the effects of 15 essential oil extracts from 15 different plants on distinct bacterial strains. Cinnamon essential oil has a higher antimicrobial action than other essential oils<sup>40</sup>.

### Antioxidant Activity

DPPH, phosphomolybdate, and ferric reducing antioxidant power assays were used to determine the antioxidant activity of hexane, chloroform, and methanol extracts of cinnamon, black pepper, ginger, and turmeric. Cinnamon methanol extract has the highest antioxidant activity of all the extracts<sup>41</sup>. Cinnamon essential oil was found to have the highest antioxidant activity when compared to lemon oil in another study<sup>42</sup>. Cinnamon powder has antioxidant action in alloxan-induced diabetic rats. Cinnamon powder contains antioxidant enzymes such as glutathione, peroxidase, catalase, and superoxide dismutase, which dramatically boosted and reduced blood glucose levels in rats<sup>43</sup>.

### Anti-inflammatory Activity

The methanolic and ethanolic extracts of *C. zeylanicum* inhibited the lipooxygenase (LOX) enzyme activity in mice, resulting in anti-inflammatory action. Collagen-mediated arthritis was artificially produced in the animals. In the model, both extracts were observed to lower the production of pro-inflammatory cytokines<sup>44</sup>. Another study looked at the anti-inflammatory efficacy of ethanolic extracts of *C. zeylanicum* and *C. longa* in polymorph nuclear cells that had been exposed to lipopolysaccharide (LPS)-induced interleukin-6 (IL-6) and tumour necrosis factor (TNF- $\alpha$ ). Cinnamic acid was found to have anti-inflammatory

properties in vitro by lowering the levels of IL-6 and TNF- $\alpha$  in the cells <sup>45</sup>.

#### Anticancer Activity

A cell proliferation assay was used to test the anticancer efficacy of the water-soluble polysaccharide and other cinnamon extracts against macrophage cell lines in an in-vitro investigation. When compared to other cinnamon extracts, the polysaccharide component of cinnamon was found to have greater immunostimulatory properties. <sup>46</sup> Cinnamon aqueous extract considerably slowed the progression of oral cancer, according to the findings. <sup>47</sup>

#### Antidiabetic Activity

Cinnamon methanol extract and 50 green teas have anti-diabetic action in 50 diabetic rats caused by streptozotocin (STZ). The treatment lasted six weeks. The rats' glucose levels were found to be much lower after therapy. The extracts have been found to have a synergistic impact in the treatment of diabetes <sup>48</sup>. Streptozotocin was used to stimulate the mice. Cinnamon was given to mice for a period of 14 days. Diabetic mice were then tested using a glucose oxidase (GOD) assay and a radioimmunoassay (RIA). Cinnamon maintains blood glucose and insulin levels in rats, according to the findings. <sup>49</sup>

#### Wound Healing Activity

Cinnamon ethanolic extract has wound-healing properties in mice. For 14 days, the mice were given either 1.5 percent or 3 percent cinnamon extract. The results revealed that 3 percent cinnamon extract had potent wound-healing properties. <sup>50</sup>

#### Anti-HIV Activity

*C. zeylanicum* was found to be useful in the treatment of acquired immunodeficiency disorders (AIDS). A total of 26 plants were employed to treat HIV/AIDS in the study. <sup>51</sup>

#### Antianxiety and Antidepressant Activity

Cinnamon essential oil has anti-anxiolytic and antidepressant properties. To investigate the antidepressant efficacy of Cinnamon essential oil, they used various experiments such as the forced swim test (FST) and the tail suspension test (TST). To investigate the anti-anxiety activity of CEO, researchers used the elevated plus maze test (EPM) and the open field test. <sup>52</sup> Cinnamon considerably shortened the immobility time delay and increased the overall period of immobility in the FST test, while the EPM test demonstrated a significant reduction in open arms entries. As a result, cinnamon extract has anti-anxiolytic and anti-depressant properties. <sup>53</sup>

#### Anti-Parkinson Activity

*Cinnamomum zeylanicum* has antiparkinsonian actions in MPTP-intoxicated mice. In mice, a dose of 100  $\mu$ l cinnamon powder dissolved in 0.5 percent methylcellulose (MC) was given. Cinnamon appears to be effective in the treatment of Parkinson's disease, according to the findings. <sup>54</sup>

#### Spasmolytic and Cardiovascular Activity

Cinnamaldehyde's effects on the cardiovascular and digestive systems were investigated. Cinnamaldehyde's papaverine-like muscolotropic action appeared to be involved in vasodilation. <sup>55</sup>

#### Overdose

Cinnamon bark oil and cinnamaldehyde have irritating characteristics in doses greater than 0.2 g/day (equal to 15-20 g of crude drug) (ESCOP, 2003). <sup>56</sup>

#### CONCLUSION

*Cinnamomum verum* is a widely used medicinal herb for a variety of pharmacological purposes. Almost every pharmaceutical system in the world contains this herb. *Cinnamomum verum* has been reported to have anti-diabetic, antibacterial, antioxidant, anti-inflammatory, and anticancer effects. Each of these characteristics is critical to the growth of human health. The *Cinnamomum verum* plant contains eugenol, cinnamaldehyde, cinnamyl acetate, copane, and camphor as main components. Cinnamaldehyde's pharmacological effects have been studied extensively. From its morphological description to its phytochemical profile and therapeutic action, every aspect of the plant was thoroughly examined in this study.

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