

## Cinnamon: A Miracle Tree in Dentistry

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### Abstract

Medicinal plants are important for pharmacological research and drug development. About one fifth of all the plants found in India are used for medicinal purpose. Cinnamon also known as *Cinnamomum verum* is a small evergreen tropical tree, 10-15 meters tall belonging to the family lauraceae native to Sri Lanka and south India. Cinnamon has antimicrobial, antioxidant, antimutagenic and anticarcinogenic activities. However in dentistry till date few studies have been conducted to access antimicrobial, antioxidant, antimutagenic and anticarcinogenic property of cinnamon. It has great potential to be used in treatment of oral candidiasis, oral precancerous lesions and conditions, Vesicobullous lesions, Recurrent Aphthous stomatitis and other oral disorders. However more studies and research is needed to prove the therapeutic potential of cinnamon in treatment of oral diseases.

**Keywords:** Cinnamon; Lauraceae; Medicinal Plants.

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### Introduction

Medicinal plants are important for pharmacological research and drug development. About one fifth of all the plants found in India are used for medicinal purpose. Cinnamon is a small evergreen tropical tree, 10-15 meters tall belonging to the family lauraceae native to Sri Lanka and South India. Cinnamon barks and leaves are widely used as spice and flavoring agent in foods. The flowers are arranged in panicles have a greenish color and have a distinct odor. The fruit is a purple one-centimeter berry containing a single seed. Its flavor is due to an aromatic essential oil which makes up 0.5 to 1% of its composition [1, 2]. The essential oil from Cinnamon *zeylanicum* barks is rich in trans-cinnamaldehyde with antimicrobial effects against animal and plant pathogens, food poisoning, spoilage bacteria and fungi [3, 4, 5]. Till date almost

300 constituents have been extracted from essential oils of cinnamon [6]. The essential oil derived from cinnamon leaves is rich in eugenol [7]. It has been scientifically established that the oils and extracts from cinnamon possess a distinct antioxidant activity due to the presence of phenolic and polyphenolic substances [8, 9]. Many other properties of cinnamon have been studied from time to time but till date few studies have been done in dentistry. As cinnamon possesses antimicrobial, antioxidant, antimutagenic, and anticarcinogenic activities, it has great potential to be used in treatment of oral candidiasis, oral precancer lesions and conditions, Vesicobullous lesions, recurrent aphthous stomatitis and other oral disorders. However more studies and research is needed to prove the therapeutic potential of cinnamon in treatment of oral diseases.

### Chemical Constituents of Cinnamon

The cinnamon contains essential oils, resinous compounds, cinnamic acid, cinnamaldehyde and cinnamate. Tung et al [10] extracted trans-cinnamaldehyde, caryophyllene oxide, L-borneol, L-bornyl acetate, eugenol, B-caryophyllene, E-nerolidol, and cinnamyl acetate as essential oil. Some other constituents are terpinolene,  $\alpha$ -terpineol,  $\alpha$ -cubebene, and  $\alpha$ -thujene [10]. It has been reported that as cinnamon ages pungent taste and scent come from

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cinnamaldehyde and by the absorption of oxygen. In due course of time it darkens in color and develops resinous compounds. The barks of cinnamon are active source of phytochemicals with antimicrobial, antioxidant, antimutagenic, and anticarcinogenic activities [11, 12, 13, 14]. Cao et al [15] has reported that cinnamon extract have insulin-like activity. It may be due to increase in the amounts of TTP (Thrombotic thrombocytopenic purpura), IR (Insulin resistance)  $\beta$  and GLUT4 (Glucose Transporter-4). Cinnamon polyphenols may have additional roles as anti-inflammatory and/or anti-angiogenesis agents [15].

## Discussion

In India, herbs and spices have been added to different types of food to impart flavor since ancient times. Many herbs and spices have been shown to impart antioxidant effects in food. The active principles responsible for antioxidant property are phenolics [16]. Shahidi et al have reported that antioxidants are often added to foods to prevent the radical chain reactions of oxidation and they act by inhibiting the initiation and propagation step leading to the termination of the reaction and delay the oxidation process [16]. Madhavi and Salunkhe have reported that the commonly used synthetic antioxidants such as butylated hydroxyanisole and butylated hydroxy toluene are restricted by legislative rules because of doubts over their toxic and carcinogenic effects [17]. Mathew and Abraham have reported that methanolic extract of cinnamon contains a number of antioxidant compounds which can effectively scavenge reactive oxygen species including superoxide anions and hydroxyl radicals as well as other free radicals under in vitro conditions [18]. Jayaprakasha et al shown that the fruit of cinnamon contains a good amount of phenolic antioxidants to counteract the damaging effects of free radicals and may protect against mutagenesis [19]. Ustaa et al have postulated mitochondria as another possible target of the actions of spices or toxicity whereby deranging mitochondrial functions would lower ATP level which then may influence cell growth, viability and aging process [20].

The efficiency of cinnamon extracts in liquid medium and its resistance to low pH levels may enhance its effect in an environment such as the human stomach reported by Tabak et al [21]. The cinnamon extract is more effective to inhibit growth and urease activity of *H. pylori* in-vitro than thyme extract [22].

Matan et al. have reported antimicrobial activity of cinnamon bark. The volatile gas phase of combinations of cinnamon oil and clove oil showed good potential to inhibit growth of spoilage fungi, yeast and bacteria normally found on Intermediate Moisture Foods when combined with a modified atmosphere comprising a high concentration of CO<sub>2</sub> (40%) and low concentration of O<sub>2</sub> (<0.05%). *Aspergillus flavus* which is known to produce toxins was found to be the most resistant microorganism [23].

Cao et al found that cinnamon extract and polyphenols with procyanidin type-A polymers exhibit the potential to increase the amount of Thrombotic Thrombocytopenic Purpura, Insulin Resistance, and GLUT4 (Glucose Transporter-4) in 3T3-L1 Adipocytes [15].

Tung et al demonstrated that essential oil of cinnamon osmophloeum twigs has excellent anti-inflammatory activities and cytotoxicity against HepG2 (Human hepatocellular liver carcinoma cell line) cells. Furthermore, it also indicated that the constituents of cinnamon osmophloeum twig exhibited excellent anti-inflammatory activities in suppressing nitric oxide production by lipopolysaccharide-stimulated macrophages [24]. It has been shown by Subash et al that oral administration of cinnamaldehyde produces significant antihyperglycemic effect lowers both total cholesterol and triglyceride levels and at the same time increases HDL-cholesterol in STZ-induced diabetic rats. This investigation reveals the potential of cinnamaldehyde for use as a natural oral agent with both hypoglycemic and hypolipidemic effects [25]. Sung Hee et al have reported data of anti-diabetic activity of cinnamon in transgenic mice [26].

## Conclusion

Medicinal plants are important for pharmacological research and drug development. One fifth of all the plants found in India are used for medicinal purpose. Main chemical constituents are cinnamic acid, cinnamaldehyde, eugenol, and essential oils. As cinnamon possesses antimicrobial, antioxidant, antimutagenic, and anticarcinogenic activities, it has great potential to be used in treatment of oral candidiasis, oral precancer lesions and conditions, vesicobullous lesions, recurrent aphthous stomatitis and other oral disorders. However more studies and research is needed to prove the therapeutic potential of cinnamon in treatment of oral diseases.

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