

# “Emerging Trends of Herbs and Spices in Dentistry”



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## Abstract

Many researches have indicated that spices and herbs can be used for therapeutic purposes and has been long used in complementary & alternative medicine (CAM) and probably most miraculous therapies available on our planet at this time. The present article discusses various medical and oral/dental uses of some of the common herbs and spices.

**Keywords:** Herbs; spices; Dentistry

## Introduction

Herbs are one of remedial agents which God has created for afflicted humans. Herbal extracts have been used in traditional medicine for several thousand years. The knowledge on medicinal plants has been accumulated in the course of many centuries. According to the World Health Organization (WHO), as many as 80% of the world's people depend on traditional medicine (herbal) for their primary healthcare needs. The development of indigenous medicines and the use of medicinal plants carry considerable economic benefits in the treatment of various diseases [1]. Spices are dried seeds, fruit, root and bark, flower of plant or herb used in small quantities for flavor, color or preservative and forms an important part in culinary art to improve the flavor and aroma of food. Traditional systems of medicines like Ayurveda employ the use of these spices to treat various diseases, based on practical experiences passed on from generations. Researches done on the chemicals present in these spices have confirmed their use in medicine.

## Commonly Used Herbs and Spices in Dental Practice

### Spices

**I. Cinnamon:(Cinnamomumverum):** Cinnamon is a spice that is made from the inner bark of trees called Cinnamomum. Four species have great economic importance for their multiple culinary uses as common spices worldwide: Cinnamon zeylanicum Blume (a synonym of Cinnamon verum J. Presl, known as Sri Lanka cinnamon), Cinnamon loureiroi Nees (known as Vietnamese cinnamon), Cinnamon burmanni (Nees & T. Nees) Blume (known as Indonesian cinnamon) and Cinnamon aromaticum Nees (a synonym of Cinnamon cassia (L.). J. Presl, known as Chinese cinnamon) [2]. Cinnamon

is a popular spice. It is high in a substance called cinnamaldehyde, which is responsible for most of the health benefits. Cinnamon is loaded with powerful antioxidants, such as polyphenols [3]. The antioxidants in cinnamon have anti-inflammatory effects, which may help lower the risk of disease [4]. Cinnamon has been linked with reduced risk of heart disease, the world's most common cause of premature death. In people with type 2 diabetes, 1 gram of cinnamon per day has beneficial effects on blood markers. It reduces levels of total cholesterol, LDL cholesterol and triglycerides, while HDL cholesterol remains stable. Cinnamon can improve some key risk factors for heart disease, including cholesterol, triglycerides and blood pressure. Cinnamon has been shown to lead to various improvements for Alzheimer's disease and Parkinson's disease in animal studies. The mechanism by which cinnamon exerts its anti-diabetic activity is debated and is probably the result of its action at different levels of the insulin-signaling pathway.

**II. Oral/Dental uses:** Cinnamaldehyde has antifungal and antibacterial properties, which may reduce infections and help fight tooth decay and bad breath [5]. It has been used as a flavor in sweets and chewing gum due to the pleasant and refreshing effect that develops in the mouth. It also shows beneficial effects on oral health and is used for toothaches, oral infections, and to remove bad breath. Cinnamon has also been used to treat acne and melisma [5].

### Clove:(Syzygiumaromaticum)

Cloves offer many health benefits, some of which include aiding in digestion, fighting against cancer, protecting the liver, boost-

ing the immune system, controlling diabetes, and preserving bone quality. They also contain anti-mutagenic and anti-microbial properties, along with fighting against oral diseases and headaches. Certain bioactive compounds have been isolated from clove extracts. Some of them include flavonoids, hexane, methylene chloride, ethanol, thymol, eugenol, and benzene. These biochemicals have been reported to possess various properties, including antioxidant, hepatoprotective, anti-microbial and anti-inflammatory properties [6]. The main compound found in cloves that are believed to be responsible for most of its medicinal action is the essential oil eugenol. Eugenol is a phenolic compound and a potent anti-inflammatory, as well as antimicrobial agent. Main mechanism of action of clove oil is cell membrane damage, which results in cell death and lack of proliferation. With the known inhibitory action on *S. mutans*, clove oil has also been studied for its antibacterial effect on other enteropathogens [7].

### Oral/Dental uses

More traditional use of clove oil is for pain relief. Holding a clove seed in the mouth next to an aching tooth is an age-old home remedy. The mechanism of action for pain relief appears to be linked to the activation of calcium and chloride channels in ganglion cells. Additional research indicates inhibition of prostaglandin synthesis, cyclooxygenase, and lipoxygenase, which are all known to increase pain perception [8].

### Coriander:(*Coriandrum sativum*)

The health benefits of coriander include its use in the treatment of skin inflammation, high cholesterol levels, diarrhea, mouth ulcers, anemia, indigestion, menstrual disorders, smallpox, conjunctivitis, skin disorders, and blood sugar disorders, while also benefiting eye care. Hypolipidemic effect of coriander seeds (mechanism of action): The spice had a significant hypolipidemic action. The levels of total cholesterol and triglycerides decreased significantly in the tissues of the animals of the experimental group which received coriander seeds [9].

### Oral/Dental Uses

Citronellol, a component of essential oils in coriander, is an excellent antiseptic. Additionally, other components have antimicrobial and healing effects which keep wounds and ulcers in the mouth from worsening. They help speed up the healing process of ulcers and also prevent badbreath [10]. The essential oils from *C. sativum* have been proven to have a strong antifungal effect against *Candida* species [11].

## Herbs

### Green Tea:(*Camellia sinensis*)

Green tea is the healthiest beverage on the planet. It is loaded with antioxidants and nutrients that have powerful effects on the body. Green tea contains less caffeine than coffee, but enough to produce an effect. It also contains the amino acid L-theanine, which can work synergistically with caffeine to improve brain function. Green tea has been shown to boost the metabolic rate and increase fat burning in the short term. Green tea has powerful antioxidants that may protect against cancer. Multiple studies show that green

tea drinkers have a lower risk of various types of cancer [12]. The bioactive compounds in green tea can have various protective effects on the brain. They may reduce the risk of both Alzheimer's and Parkinson's, the two most common neurodegenerative disorders. Some controlled trials show that green tea can cause mild reductions in blood sugar levels. It may also lower the risk of developing type II diabetes. Green tea has been shown to lower total and LDL cholesterol, as well as protect the LDL particles from oxidation. Observational studies show that green tea drinkers have a lower risk of cardiovascular disease. Green tea polyphenols can induce cell cycle arrest or apoptosis by activating p53 and its targets p21 and Bax. Studies show that EGCG (Epigallocatechin-3-gallate) induces apoptosis by activating p73 dependent expression of a subset of p53 target genes including p21, cyclin G1, mouse double minute (MDM) 2, WIG1, and PIG1. The target genes that are negatively regulated by EGCG include Bcl2, Bcl-xl, cyclin D1, matrix metalloproteinases (MMPs), and vascular endothelial growth factor (VEGF). VEGF has been identified as a promising target for chemoprevention [13].

### Mechanism of Action

The endoplasmic reticulum and mitochondria release oxygen. This oxygen gets converted into hydrogen peroxide, which in turn releases reactive oxygen species molecules. These reactive oxygen species molecules can lead to damage of DNA, RNA, oxidize proteins (enzymes, histones), oxidize lipids and can also activate cell suicide [14]. Intake of green tea can stop all these degenerative changes by inhibiting the action of the reactive oxygen species molecule.

**I. Oral/Dental Uses:** Studies show that the catechins in green tea can inhibit the growth of *Streptococcus mutans*. Green tea consumption is associated with improved dental health and a lower risk of caries [15]. Multiple studies also show that green tea can reduce bad breath. Green tea extract help slowed the progression to oral cancer [16].

### Neem:(*Azadirachta indica*)

The important health benefits of neem include its ability to treat dandruff, soothe irritation, protect the skin, boost the immune system, reduce inflammation, speed wound healing, treat gastric conditions, slow the aging process, improve the health of hair and scalp, maintain sexual organ health, and treat various forms of cancer and diabetes.

**I. Oral/Dental Uses:** Neem is very popular as an ingredient in oral health products in the Indian subcontinent. Its antibacterial qualities make it ideal for eliminating the bacteria beneath the gums that cause periodontal disease and halitosis (badbreath). Neem is a popular ingredient in mouthwashes and toothbrushes [17]. Neem offers a good remedy for curing mouth ulcers, tooth decay and acts as a pain reliever in toothache problems. Ethanol and aqueous extract of Neem leaf showed significant anti-candidal effect against *C. albicans*. Neem extract showed antimicrobial activity against *S. mutans*, *S. salivarius*, *S. sanguis* and *S. mitis*. A combination of chewing sticks is found to be beneficial in eradicating the dental caries-causing organism. Chloroform extract of Neem leaf inhibited *Streptococcus mutans* and *Streptococcus salivarius* and provides an aid for treating dental caries [18]. It reduc-

es the ability of streptococci to colonize tooth surfaces. Neem oil shows significant antibacterial activity and has been suggested for use in treating dental plaque. Mucoadhesive dental gel containing *Azadirachta indica* is found to be beneficial in reducing the plaque index and salivary bacterial count comparatively better than chlorhexidine gluconate mouthwash [19]. Its antioxidant and antimicrobial properties makes it a potential agent for root canal irrigation as an alternative to sodium hypochlorite.

### **Turmeric:(*Curcuma longa*)**

Turmeric contains curcumin, a substance with powerful anti-inflammatory and antioxidant properties. Most studies used turmeric extracts that are standardized to include large amounts of curcumin [20]. Chronic inflammation is known to be a contributor to many common Western diseases. Curcumin can inhibit many molecules known to play major roles in inflammation. Curcumin has powerful antioxidant effects. It neutralizes free radicals on its own, then stimulates the body's own antioxidant enzymes. Curcumin leads to several changes on the molecular level that may help prevent and perhaps even treat cancer [21]. A study in 60 depressed patients showed that curcumin was as effective as prozac in alleviating the symptoms of depression [22].

### **Mechanism of Action**

The anti-inflammatory and antioxidant properties of curcumin are responsible for its chemopreventive action [23]. The anti-inflammatory and antioxidant activities of curcumin have been observed in *in vitro* studies that showed the inhibition of lipoxygenase and cyclo-oxygenase (COX) activities that can induce inflammation [24]. It has been seen that curcumin lowers the activity of STE (smokeless tobacco extract)- or NNK (nicotine derived nitrosamine ketone)-induced NF- $\kappa$ B (nuclear factor kappa-light-chain-enhancer of activated B cells) and COX-2 in oral premalignant and cancer cells [25]. Turmeric acts by increasing the number of micronuclei in the circulating lymphocytes and by acting as an excellent scavenger of free radicals.

**A. Oral/Dental Uses:** Massaging the aching teeth with roasted, ground turmeric eliminates pain and swelling. Applying a paste made from 1 tsp of turmeric with  $\frac{1}{2}$  tsp of salt and  $\frac{1}{2}$  tsp of mustard oil provides relief from gingivitis and periodontitis [26]. 1% curcumin solution can cause better resolution of inflammatory signs than chlorhexidine and saline irrigation as a subgingival irrigant [27]. Its role in the treatment of various precancerous lesions and conditions like oral submucous fibrosis, leukoplakia, and lichen planus has also been studied. The local symptoms of burning sensation and pain were reduced and partial reversal of opening of the mouth was also observed [28]. A study conducted in Uttar Pradesh, India has revealed increased mouth opening and relief from burning sensation of mouth on administration of commercially available turmeric, Turmix tablet containing curcumin 300 mg and piperine 5 mg given orally thrice daily for one month [29].

**B. Aloe vera:(*Aloe barbadensis* Mill.):** It strengthens the immune system, delays the aging process, cures dermatitis, alleviates menstrual problems, reduces arthritis pain, and heals wounds.

It also cures nausea, eliminates ulcers, lowers blood sugar levels, prevents diabetes, reduces oxidative stress, inhibits cancerous growth, heals the side effects of radiotherapy treatments, promotes hair growth, and soothes acid reflux symptoms.

**C. Oral/Dental Uses:** Dental and gum diseases can also be cured by aloe vera. Aloe vera juice can also help in keeping gums healthy. Just gargle the liquid around your mouth before swallowing. Also, try to increase your intake of vitamin D. Both these measures will be enough to get your gums back in shape within a few months. Aloe vera helps reducing the risk of tooth decay. It can also be applied to the gum tissues when they have been traumatized or scratched. Aloe vera kills harmful bacteria and fungus while promoting healthy digestion. It also helps protect the soft tissues of the oral cavity, reducing the likelihood of bad breath. Aloe helps relieve chemical burns quickly. Using aloe vera oral care products can reduce the risks of developing dangerous oral diseases. Aloe vera can also be used around dental implants to control inflammation from bacteria contamination. It can also aid denture patients with sore ridges to reduce the inflammatory irritations and other dental problems. Mouthrinses and dentifrices containing aloe vera have shown a remarkable reduction in gingivitis and plaque accumulation after its use [30]. Studies have proved the use of aloe vera gel as a subgingival administrator in the treatment of periodontal pockets [31]. The sore areas of the oral mucosa which are covered by dentures can be treated with aloe gels as it is also a good antifungal agent. Aloe vera gel reportedly inhibited the growth of *Candida albicans*, which is the most common candida species in the oral cavity [32]. Studies carried out prove the anti-microbial activity of dentifrice containing aloe vera have shown inhibition in the growth of organisms such as *S. viscosus*, *S. mutans*, *S. sanguis* and *C. albicans* [33]. Aloe vera gel is been used as a lubricant and a sedative dressing during biomechanical preparation in root canal treatment [34]. Lichen planus a dermatological disease affecting the oral cavity is successfully treated with aloe vera gel. A study which was performed in 2010 to prove the efficacy of topical aloe vera in treatment of lichen planus in comparison with placebo showed a statistically significant result [35].

### **Tulsi:(*Ocimum sanctum*)**

The health benefits of holy basil, also known as tulsi, include oral care, relief from respiratory disorders, as well as treatment of fever, asthma, lung disorders, heart diseases, and stress.

**A. Oral/Dental Uses:** Tulsi is an excellent mouth freshener and an oral disinfectant and its freshness last for a very long time. Holy Basil destroys more than 99% of germs and bacteria in the mouth and this effect can last all day. It also cures ulcers in the mouth. Finally, it is known to inhibit the growth of oral cancer which can be caused by chewing tobacco. Holy basil destroys the bacteria that are responsible for dental cavities, plaque, tartar, and badbreath, while also protecting the teeth. It also has astringent properties which make the gums hold the teeth tighter, thereby keeping them from falling. Therapeutic property of Tulsi can be utilized for treating common oral pre - cancerous lesions and

conditions. Immunologically mediated mucosal condition like pemphigus can also be treated by the immunomodulating property of *Ocimum sanctum* [37]. It also possess potent anti – ulcerogenic as well as ulcer healing properties [37].

**B. Nutmeg:(*Myristicafragrans*):** Nutmeg is a popular spice having a long list of health benefits, including its ability to relieve pain, soothe indigestion, and improve cognitive function. It extends its ability to detoxify the body, boost skinquality, alleviate oral conditions, and reduce insomnia. Nutmeg strengthens the immune system, prevents leukemia, and improves blood circulation as well.

**C. Oral/Dental Uses:** The active antibacterial components present in it fight conditions like halitosis, also known as bad-breath. It kills the bacteria that causes this embarrassing condition and boosts the immunity of your gums and teeth [38].

### White oak bark powder:(*Quercus alba*)

The bark of the white oak has been put to great use as an herbal medicine for many centuries and as is the case with many herbal remedies, there is growing scientific interest in the abilities of white oak bark to treat a variety of illnesses.

**A. Oral/Dental Uses:** The antiseptic and antibacterial qualities of this herbal remedy can ease swollen gums and oral sores and cuts. When used as a mouthwash it can also help prevent and heal gingivitis [39].

### Conclusion

The use of herbal medicines continues to expand rapidly across the world. Many people take herbal medicines or herbal products now for their health care in different national healthcare settings. Herbal extracts have been used in dentistry as anti – inflammatory, antimicrobial, anti – plaque agents, as antiseptics, antioxidants, antimicrobials, antifungals, antibacterials, antivirals and analgesics. They also aid in healing and are effective in controlling microbial plaque in gingivitis and periodontitis and thereby improving immunity.

Spices not only have application in culinary art to impart flavor to food, but also have medicinal properties and are used in treatment of various diseases. Researches done on the phytochemicals present in these spices have shown their action against oral microorganisms like *S. mutans*, *C. Albicans* and various periodontal pathogens. Further research is necessary to incorporate these chemicals in oral health care products.

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