

# Herbal panacea: The need for today in dentistry

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## Abstract

Among ancient civilizations, India has been known to be a rich repository of medicinal plants. Herbal extracts have been used in traditional medicine for several thousand years. Some plants contain phytochemicals that have effects on the body. The use of phytotherapy is staging a comeback and an era of herbal renaissance is being revolutionized all over the globe. Herbs are a class of plants that are devoid of the woody tissue characteristic of shrubs or trees and have been known for their aromatic, flavoring, and medicinal values over the past centuries. Since the birth of contemporary practices, many have turned away from herbal therapies in favor of synthetic drugs. But these synthetic medicines can alter microbiota and have several side effects. However, the blind dependence on synthetics is over and people are returning to the naturals with the hope of safety and security. Hence, the search for alternative natural products continue. This review includes a few herbs, which can be used in dentistry as alternatives to allopathic medicines.

**Key words:** *Flavonoids, herbs, irrigant, polyphenols*

## INTRODUCTION

In Indian culture, the knowledge regarding medicinal plants has been assimilated in the due course of many centuries. The *Rigveda* has been source of evidence of 67 medicinal plants; 81 species of medicinal plants have been recorded in the *Yajurveda*, 290 species of medicinal plants have been described in the *Atharvaveda*, 1,100 species of medicinal plants have been described in the *Charak Samhita*, and the *Sushruta Samhita* has been the source of 1,270 species of medicinal plants and these descriptions form the basis of the classical formulations till date.<sup>[1-3]</sup>

A majority of the countries and populations around the globe have a predominance of therapeutic chemicals used as a primary form of medicine from

herbs or herbal derivatives. It has been revealed by epidemiological research that as much as 70–80% or more of the global population uses complementary and alternative medicine (CAM) care, with the majority reliant on herbs and plants.<sup>[4]</sup>

The use of herbs as dietary supplements and as a treatment modality in dentistry is an emerging trend. A few of them possess antibacterial, antimycosal, and antiviral properties. When used in appropriate concentrations, herbal drugs do not interrupt or alter the natural flora. Herbal derivatives form an important constituent of toothpastes wherein they inhibit plaque formation and bacterial adherence to the pellicle, which can be attributed to their antibacterial properties. Plants such as miswak have been used as

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chewing sticks in many parts of the world in various cultures with different names. Some other plant parts are also used to maintain oral hygiene such as eucalyptus leaves, which are used to mask bad mouth odor in the mouth; onion and lime juices are used as gargles as well as to relieve toothache. The other dental treatment modalities, which make use of anti-inflammatory and antibacterial properties of the herbal parts include aerosols, gels, various mouth-rinsing solutions, and medicaments such as infusions or decoctions.<sup>[5,6]</sup>

Herbal extracts are effective because they interact with specific chemical receptors within the body and are in a pharmacodynamic sense, drugs themselves. They can vary in potency. Therefore, care must be taken in selecting herbs, with consideration about the effect of herbs in oral tissues, the mechanism of action, and side effects.<sup>[2]</sup> For this, one must have adequate knowledge regarding the same. Thus, an attempt is made here to review some of the common herbs used in dentistry.

## ALOE VERA

The *Aloe vera* constitutes the gelatinous mass of one of the homegrown plants belonging to the family Liliaceae, also called *Aloe barbadensis* Mill. It has two parts—the aloe vera gel is produced by the parenchymal tissue, which makes up the inner part of the *Aloe vera* leaves and the other part is a group of specialized cells called pericyclic tubules. The gel is a good source of vitamins, minerals, enzymes, sugars, lignin, saponins, salicylic acids, and amino acids. The aloin and aloe-emodin are the active constituents of the gel. The antibacterial efficacy of *Aloe vera* is attributed to its property of inhibiting protein synthesis in bacterial cells. It also has moisturizing actions, wound healing, and anti-inflammatory effects. *S. pyogenes* and *S. faecalis* have been inhibited by aloe vera gel. It is bactericidal against *Pseudomonas aeruginosa*. It has been used to apply to the sites of periodontal surgery, the gum tissues when they have been traumatized or scratched and for relief from accidental burns with aspirin. Acute mouth lesions are improved by the direct application such as on herpetic viral lesions, aphthous ulcers, and canker sores. Denture patients with sore ridges and ill-fitting dentures can benefit as fungal contamination and bacterial contamination are reduced as is the irritation from inflammation. The anti-inflammatory property of *Aloe vera* can be used to control inflammation around dental implants caused by bacterial contamination.<sup>[2,7,8]</sup>

## CRANBERRY

Cranberry or *Vaccinium macrocarpon* is a shrub available in markets mainly as fresh juice, dried fruit, and

encapsulated powder. The therapeutic use of cranberry can be traced back to the 17<sup>th</sup> century, when it was used mainly as a remedy to solve stomach and liver problems and also to relieve scurvy. Cranberry extracts are a rich source of polyphenols and flavonoids. These are thought to prevent dental caries by inhibiting the colonization of dental structures and inhibiting the production of acids by cariogenic bacteria such as *Streptococcus mutans*. They inhibit the activity of proteolytic enzymes, which are responsible for periodontal destruction and thus, reduce the inflammatory processes. It also inhibits coaggregation of periodontal pathogens and adherence of *Porphyromonas gingivalis*.<sup>[9,10]</sup> A study conducted by Weiss *et al.* showed that cranberry-containing mouthwash reduced the salivary *Streptococcus mutans* count as well as the total bacterial count significantly. The cranberry constituent also inhibited the adhesion of *Streptococcus sobrinus* to saliva-coated hydroxyapatite *in vitro*.<sup>[11]</sup>

## CHAMOMILE

Chamomile belongs to the family Asteraceae/Compositae and is available mainly in two forms, *viz.*, German chamomile (*Chamomilla recutita*) and Roman chamomile (*Chamaemelum nobile*). German Chamomile is the most commonly used variety; it is native to Europe and western Asia and is commonly available as table tea. The use of German chamomile (*Marticaria recutita* L.) dates back to centuries ago when it was utilized for its anti-inflammatory, analgesic, antimicrobial, antispasmodic, and sedative properties. It is, in fact, the flower of the chamomile plant, which contains a wide variety of active chemical components such as flavonoids, apigenin, luteolin, and quercetin, which are thought to be responsible for many of its medicinal applications. Chamomile, when used as a constituent of mouthwash, was effective in reducing infections of the gingivae and oral cavity. It was also incorporated in some toothpastes. Chamomile was also effective in removing the smear layer significantly when compared to distilled water and tea tree oil.<sup>[2,12,13]</sup>

Chamomile mouthwash has been shown to relieve mucositis; also, it has helped to prevent, delay, or lessen the occurrence of the lesion.<sup>[14]</sup>

## TEA TREE OIL

*Melaleuca alternifolia* is commonly known as tea tree oil, which is a native plant of Australia. Its antibacterial and antifungal properties can be attributed to its active constituent terpinen-4-ol (typically 30–40%). It is useful for treating throat irritation, stings, burns, wounds,

and skin infections of all kinds. It is also used as a mild solvent.<sup>[15]</sup>

Tea tree oil gel in the form of local drug delivery has been shown to augment the effects of conventional periodontal therapy in chronic periodontitis patients. It also emphasizes the importance of monitoring gingival crevicular fluid levels of pentraxin-3 (PTX3), which is one of the markers of periodontal tissue healing.<sup>[16]</sup>

### ARCTIUM LAPPA

*Arctium lappa* is a native plant of Japan and widely used as popular medicine all over the world. It possesses a wide rray of beneficial properties such as antibacterial, antifungal, diuretic, antioxidant, and anxiolytic actions, platelet antiaggregating effect, and human immunodeficiency virus (HIV)-inhibitory action. The antimicrobial efficacy of *Arctium lappa* is used to treat endodontic infections in dentistry.<sup>[17]</sup> An *in vitro* study showed that *Arctium lappa* exhibited antimicrobial potential against tested pathogens such as *Staphylococcus aureus*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Bacillus subtilis*, and *Candida albicans*. Thus, it opens new vistas for its use as an intracanal medicament.<sup>[18]</sup>

### MORINDA CITRIFOLIA

*Morinda citrifolia*s, commercially known as noni and Morinda citrifolia juice (MCJ), is known by a variety of names such as as great morinda, Indian mulberry, nunaakai (Tamil Nadu, India), dog dumpling (Barbados), mengkudu (Indonesia and Malaysia), Kumudu (Balinese), pace (Javanese), beach mulberry, and cheese fruit. It has been suggested that it be used as an endodontic irrigant due to its antimicrobial properties. It owes the antibacterial property to the component l-asperuloside and alizarin. MCJ has a wide range of actions such as antibacterial, antiviral, antifungal, antitumor, anthelmintic, analgesic, hypotensive, anti-inflammatory, and immune-enhancing effects. It can also be used as an endodontic irrigant as it helped in removal of smear layer.<sup>[17,19]</sup> It has been suggested that noni possesses a certain anticancer activity as it prevents the carcinogen-DNA adduct formation. The oxidative damage produced by the reactive oxygen species and free radicals in the process of carcinogenesis is reduced owing to its antioxidant property.<sup>[20]</sup>

### PROPOLIS

Propolis refers to red or brown resinous substance that honey bees collect from tree buds and is used to fill the crevices of the hive and varnish honey combs.

It is sticky at room temperature but hardens and becomes brittle at a low temperature. It is a source of amino acids, minerals, vitamins A, B complex, and E, and the highly active biochemical substance known as bioflavenoids (vitamin P), phenols, and aromatic compounds. Flavonoids have been attributed a wide range of properties such as antibacterial, antifungal, antiviral, antioxidant, and anti-inflammatory properties. The caffeic acid phenethyl ester (CAPE) present in propolis contributes for its anti-inflammatory property. Propolis is incorporated in a variety of forms such as mouthrinses, toothpastes, lozenges, wine, cake, powder, jelly, tablets, soaps, and others. It has also been used a treatment modality in the management of dental caries, endodontic as well as periodontal infections, vital pulp therapy, in the treatment of oral lesions, and repair of surgical wounds. The antimicrobial activity of propolis with Ca(OH)<sub>2</sub> as intracanal medicament against *Enterococcus faecalis* found that propolis was effective in eliminating the microorganisms. Though propolis has shown very promising results, the clinician should be cautious while using this material due to its allergic reactions shown in some patients.<sup>[17,21]</sup>

### TRIPHALA AND GREEN TEA POLYPHENOLS

Triphala, as the name suggests, consists of three medicinal herbs in equal parts, namely, *Terminalia bellirica*, *Terminalia chebula*, and *Embllica officinalis*. It is one of the ancient Ayurvedic formulations known for its laxative properties. It contains tannins, quinones, flavonoids, gallic acid, and vitamin C. It has free radical scavenging property and antimicrobial activity. It effectively inhibits biofilm formation and has better antioxidant activity, which is exhibited by this extract and could protect the gum cells effectively from free radicals than commercial toothpastes. Thus, triphala can be used as an effective antiplaque agent. It may aid in the removal of smear layer, thereby acting as a chelating agent and is also found to be an alternative to sodium hypochlorite for root canal irrigation.<sup>[17,22,23]</sup>

Green tea is prepared from the leaves of the plant *Camellia sinensis*. It is a traditional drink of Japan and China. Green tea has a rich supply of polyphenols, flavonoids, and catechins. The literature has revealed that green tea polyphenols (GTPs) possess antioxidant, anticariogenic, anti-inflammatory, thermogenic, probiotic, and antimicrobial properties. Owing to its antioxidant properties, it has been used as an antiplaque agent to prevent biofilm formation. It also contains fluoride naturally, which has an anticariogenic effect.<sup>[17]</sup>

Summary of the herbs		
Herbs	Mechanism of action/properties	Uses
<i>Aloe vera</i>	Inhibiting protein synthesis in bacterial cells, anti-inflammatory	Used to apply to the sites of periodontal surgery, herpetic viral lesions, aphthous ulcers, and canker sores Used to control inflammation around dental implants caused by bacterial contamination
Cranberry	Inhibits Colonization of dental structures, production of acids by cariogenic bacteria, activity of proteolytic enzymes, coaggregation of periodontal pathogens	Prevent dental caries Ant-inflammatory As a mouthwash
Chamomile	Anti-inflammatory, analgesic, antimicrobial, antispasmodic	Used as a constituent of mouthwash and some toothpastes Effective in removing the smear layer
Tea tree oil	Antibacterial and antifungal	Treating throat irritation, stings, burns, wounds, and skin infections of all kinds Treatment of chronic periodontitis
<i>Arctium lappa</i>	Antibacterial, antifungal, antioxidant, platelet antiaggregating effect, and HIV-inhibitory action	Used as an intracanal medicament to treat endodontic infections
Morinda citrifolia	Antibacterial, antiviral, antifungal, antitumor, anthelmintic, analgesic, hypotensive, anti-inflammatory	Used as an endodontic irrigant
Triphala	Free radical scavenging property, antimicrobial activity	Antiplaque agent Root canal irrigation
Green tea	Antioxidant, anti-inflammatory, antimicrobial properties	Antiplaque agent Anticariogenic

Summarized table of all the herbs

## PSIDIUM GUAJAVA AND PUNICA GRANATUM

*Psidium guajava* L., commonly called as guava, belongs to the family Myrtaceae and is a native plant of South America. Its important constituents are vitamins, tannins, phenolic compounds, flavonoids, sesquiterpene alcohols, and triterpenoid acids. It has been suggested by some of the authors that the guava pulp has a rich supply of carotenoids (beta-carotene, lycopene, and beta-cryptoxanthin), vitamin C, and polyphenols. It has been known for long for its anti-inflammatory, antioxidant, antidiarrheal, and antimutagenic properties. Guajaverin, an active ingredient extracted from the leaves of guava, has been shown to inhibit the growth of *S. mutans* and *S. aureus*, thus proving its antiplaque potential.<sup>[24,25]</sup>

*Punica granatum*, commonly called pomegranate, is a fruit belonging to the family Punicaceae. Pomegranate juice has atherosclerotic, antiaging, antihypertensive and antioxidant potential. This can be attributed to the variety of important compounds present such as anthocyanins, glucose, ascorbic acid, ellagic acid, gallic acid, caffeic acid, catechin, epigallocatechin, quercetin, rutin, iron and amino acids. The flavonoids present in the pomegranate juice have shown antibacterial action against microorganisms causing gingivitis. The antibacterial efficacy of pomegranate mouthwash against periodontal pathogens such as *A. actinomycetemcomitans* (Aa), *P. gingivalis* (Pg), and *P. intermedia* (Pi) have been proved by a study. A 10%

topical pomegranate gel has been shown to relieve pain from recurrent aphthous stomatitis and reduce time for complete healing of ulcers.<sup>[26]</sup>

## CONCLUSION

Restoring and maintaining good health of the oral cavity is critical to our overall quest for well-being. These days, people are inclining more toward herbal products as they have minimal side effects. Apart from healing and reducing the microbial count in the oral cavity, it helps in strengthening the immunity. However, these medicines are limited to rural areas and so it is necessary to conduct extensive research into these traditional medicines.

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## Conflicts of interest

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