



ISSN (E): 2320-3862  
ISSN (P): 2394-0530  
NAAS Rating 2017: 3.53  
JMPS 2017; 5(5): 196-199  
© 2017 JMPS  
Received: 26-07-2017  
Accepted: 27-08-2017

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## Dental herbalism: A review

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### Abstract

An herb, botanically speaking, is any plant that lacks the woody tissue characteristic of shrubs or trees. More specifically, herbs are plants used medicinally or for their flavor or scent. Herbs with medicinal properties are a useful and effective source of treatment for various disease processes. Many drugs used in Western medical science-called allopathic medicine-have their origin in medicinal plants. Several popular conventional drugs on the market are derived from herbs. These include aspirin (from white willow bark), digitalis (from foxglove) and Sudafed (modeled after a component in the plant ephedra). Herbal products can vary in their potency. Therefore, care must be taken in selecting herbs; even so, herbal medicines have dramatically fewer side effects and are safer to use than conventional medications. Herbal extracts have been used in dentistry for reducing inflammation, as antimicrobial plaque agents, for preventing release of histamine and 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, thereby improving immunity. The herbs described in this article are *Aloe vera*, Bloodroot, Clove Oil, Cranberry, Garlic, Ginger, Liquorice, Momordica Charantia, Neem, Turmeric, *Salvadora persica*. Herbs may be good alternatives to current treatments for oral health problems but it is clear that we need more research.

**Keywords:** Herbs, dentistry, medicinal

### Introduction

Use of the plants having medicinal property has a wide use in human history which resulted into works of Hippocrates and Galen and the great Ayurveda of the Indian subcontinent, Traditional Chinese medical system, Islamic medical system over two millennia and many other cultural traditions that were often hybrids of the various mentioned systems of medicine.<sup>1</sup> In India, the drug development from ethno-medicine has a strong historical base, where from the ancient literature on Indian system of medicine several documents on therapeutics can be derived. The classical Indian text like Rig-Veda, Athurveda, Charak Samhita and Sushruta Samhita are the evidences of the use of plants by our ancestors<sup>[1]</sup>.

Oral hygiene is an integral part of health of a person. There are many antimicrobial compounds that have been studied thus far for maintaining oral hygiene<sup>[1]</sup>. The most important of these compounds are herbal extracts, metallic salts and phenol compounds. Each of these three groups has demonstrated positive results in clinical and laboratory studies. Herbal extracts have received special attention because of being non-chemical and non-synthetic, and they have been long used in traditional medicine.<sup>2</sup> Herbs are one of the remedial agents which god has created for affiliated humans. Plant herbs are highly effective as antibacterial agents because of their ability to penetrate and cause damage to the walls of both gram positive and gram negative bacteria. This finally, will lead to the destruction of the bacteria cells<sup>[3]</sup>.

In spite of the tremendous progress in the development of medical science, plants continue to be an important source of drugs in many countries around the world. Medicinal plant based drug owe the advantage of being simple, effective and exhibit broad spectrum activity. Medicinal plant products when compare to their synthetic counterparts minimize the adverse side effects. The relationship between man and plants has been very close throughout the development of human culture in India around more than 5000 years ago<sup>[1]</sup>. The products derived from medicinal plants such as tulsi, neem, amla, dhatura, etc have abundant source of phytochemicals, many of which have become the basis for the development of new leading chemicals for pharmaceuticals<sup>[4]</sup>. According to WHO, as many as 80% of the worlds people depends on the traditional medicine (herbal) for their primary health care needs<sup>[5]</sup>.

For the last couple of years, there has been a global trend in the renewal of interest in a traditional system of treatments. Ethnomedicinal plant studies have become of particular interest and have become increasingly more valuable in the development of health care and conservation programs in different parts of the world. The WHO has recognized the role of traditional medicine in the primary health care system in developing countries; medicinal plants continue to be a main source of medication. It has been estimated that approximately 88% of the inhabitants of underdeveloped countries rely mainly on traditional medicine for their primary form of medicinal health care [6]. Thus an attempt has been made to highlight the importance of some medicinal varieties that plays a vital role in prevention and cure of oral diseases.

### Ethnomedicinal Flora

Ethnomedicine is a study or comparison of the traditional medicine practiced by various ethnic groups, and especially by indigenous peoples. The word ethnomedicine is sometimes used as a synonym for traditional medicine. Ethnomedical research is interdisciplinary; in its study of traditional medicines, it applies the methods of ethnobotany and medical anthropology. Often, the medicine traditions it studies are preserved only by oral tradition and an extract is a substance made by extracting a part of raw material, often by using a solvent such as ethanol or water. Extracts may be sold as tinctures or in powder form. The most important of ethnoplants that can be used in dentistry are:

#### *Aloe vera*

The chemical constituents in *Aloe vera* are Anthraquinones, Saccharides, Prostaglandins and fatty acids. Others: Enzymes, amino acids, vitamins, minerals. Other compounds: Cholesterol, triglycerides, steroids, uric acid, lignins, beta-sitosterol, gibberellin, salicylic acid. It is analgesic, antibacterial, antiviral, antifungal, antioxidant immune modulating, antiseptic, anti-inflammatory. *Aloe vera* is used in the sites of periodontal surgery, toothpick injuries, chemical burns, aphthous ulcers, gum abscesses, dry socket, lichen planus, benign pemphigus and gingival problems associated with AIDS, leukemia, migratory glossitis, geographic tongue and burning mouth syndrome, denture sore mouth, candidiasis, desquamative gingivitis, vesiculobullous diseases, acute monocytic leukemia, xerostomia [7]. The antimicrobial effect of a dentifrice containing *Aloevera* has been demonstrated in an *in vitro* study, in which this phytotherapeutic agent inhibited the growth of diverse oral microorganisms, such as *S. mutans*, *S. sanguis*, *A. viscosus* and *C.albicans*.<sup>8</sup> The only study available evaluating the clinical effects of *Aloe vera* showed a significant reduction of gingivitis and plaque accumulation after use of a mouth rinse containing this natural product [9].

#### Bloodroot

- The principal chemical constituent is sanguinarine. It has antibacterial, anti-inflammatory, antifungal property. Mainly used for gingivitis and periodontal disease, remineralization of enamel lesions, acute sore throat. Chemically, sanguinarine is a benzophenanthridine alkaloid derived from the alcoholic extraction of powdered rhizomes of the bloodroot plant. Elley in 1999, shown that sanguinarine at a concentration of 16 microgram per milliliter completely inhibited 98% of microbial isolates from human dental plaque and that sanguinarine and zinc act synergistically in suppressing the growth of various oral strains of streptococci [2].

#### Clove Oil

Clove consists of essential oil, eugenol, eugenol acetate and  $\beta$ -caryophyllene. It has analgesic, antibacterial, antiviral, anti-inflammatory, antioxidant property. It has been used to relieve toothache, in periodontitis, as an anesthetic and also to treat bleeding gums. Avicenna, teacher of Hippocrates (the Father of Medicine), treated rotting teeth and gums with pills of clove oil. Since the 19th century, the germ-killing molecules in clove oil have functioned for root canal treatment and other more serious dentistry. Clove gel can provide dentists with an alternative to benzocaine for topical anaesthesia in their daily practice, especially for use with children and in areas where cost and availability limit access to pharmaceutical topical anaesthetics [10].

#### Cranberry

Cranberries contain numerous biologically active compounds including flavonoids, phenolic acids, anthocyanins, condensed tannins, and other components presence of antioxidants flavonoids thought to have antimicrobial activity. Researchers from the University of Rochester School of Medicine and Dentistry, and Rutgers University, New York, found that many of these substances can not only inhibit the enzymes associated with the formation of the dental plaque polysaccharide matrix film, but can stop the bacteria sticking to surfaces, ensuring that plaque is never given the chance to form. The compounds also prevent acid formation and reduce the acid tolerance of the bacteria that cause decay hence preventing prevent tooth decay and gum disease [10].

#### Garlic

Garlic consists of alliin, ajoene, diallyl sulfide, dithiin, S-acetylcysteine, and enzymes, B vitamins, proteins, minerals. It has got antibacterial, antiviral, and antifungal, antiseptic, bacteriostatic, antihelminthic effects. Studies have been done using garlic to treat dental caries and periodontitis. Garlic extract is effective against *S. mutans* when tested both *in vitro* and *in vivo*. As *S. mutans* is one of the primary etiological organisms in dental caries development, and in this study garlic extract has been shown to be effective against *S. mutans*, garlic extract mouth rinse might be used as an effective remedy in the prevention of dental caries [12]. Reports have shown adverse effects such as allergic reactions such as contact dermatitis and asthmatic attacks, increased bacterial attachment to orthodontic wires [13, 14, 15].

#### Ginger

It has antibacterial, anti-inflammatory, analgesic property. It is used to relieve toothache, as a sialogog, in the treatment of oral thrush. Ginger has a long history of medicinal use dating back 2500 years. Ginger has been traditionally used from time immemorial for varied human ailments in different parts of the globe, to aid digestion and treat stomach upset, diarrhoea, and nausea. Some pungent constituents present in ginger and other zingiberaceous plants have potent antioxidant and anti-inflammatory activities, and some of them exhibit cancer preventive activity in experimental carcinogenesis [16].

#### Liquorice

It had antimicrobial, anti-inflammatory and antiviral activity and used in dental caries. Hu *et al.* in 2011 conducted two pilot studies which indicated that a brief application of liquorice roots extract lollipops led to a marked reduction of cariogenic bacteria in oral cavity among most human subjects tested [17].

### **Momordica charantia**

*Momordica charantia*, known as bitter melon, bitter gourd, bitter squash, or balsam-pear, is a tropical and subtropical vine of the family Cucurbitaceae, widely grown in Asia, Africa, and the Caribbean for its edible fruit. Its many varieties differ substantially in the shape and bitterness of the fruit. It is the aerial part of the plant is used in Cameroon as an adjuvant in tooth extraction, post extraction management of extraction socket and also for tooth bleaching. The leave extracts is widely used for toothache and post extraction dressing by traditional healers [18]. Its antibacterial activity has been demonstrated against bacillus subtilis, Escherichia coli, pseudomonas aeruginosa and staphylococcus aureus which form part of the natural and pathogenic oral flora [19].

### **Neem**

Neem consists of genin, sodium nimbin, salannin, nimbin, azadirachtin, nimbidol, quercetin and nimbidiol. Neem leaves contain fiber, carbohydrates and at least 10 amino acid proteins, calcium, carotenoids, fluoride. Neem has antiviral, antifungal, antimicrobial, antibacterial, antipyretic, anti-inflammatory, antitumor, analgesic, antihelminthic, anticariogenic, antioxidant activity. Studies have shown that neem is used in the treatment of dental caries, gingivitis, and periodontitis [20, 21].

### **Turmeric**

Turmeric can be used in following ways offer relief from dental problems [22].

- Rinsing the mouth with turmeric water (boil 5 g of turmeric powder, two cloves, and two dried leaves of

guava in 200 g water) gives instant relief.

- Massaging the aching teeth with roasted, ground turmeric eliminates pain and swelling.
- Applying the powder of burnt turmeric pieces and bishop's weed seed on teeth and cleaning them makes the gums and teeth strong.
- Applying a paste made from 1 tsp of turmeric with ½ tsp of salt and ½ tsp of mustard oil provides relief from gingivitis and periodontitis. Rub the teeth and gums with this paste twice daily.

### **Salvadora persica**

It is claimed that the vitamin C and sit sterol content of this plant have great roles in strengthening the gum capillaries and preventing gum inflammation. Calcium salts and fluoride are quite effective in preventing dental caries. Moreover, the silica and calcium salts in the plant act as grinder and detergent. Trim ethylamine is known to be effective in reducing surface adhesion and also in decreasing plaque accumulation. Tannins, tannic acid, Sulfated compounds and benzyl isothiocyanate, are reported to have antimicrobial effects and help the healing of gum inflammation. Mohammed *et al.* in 2006 observed that miswak was as effective as a toothbrush for reducing plaque on Buccal surfaces of teeth both experimentally and clinically [23]. Pourselami *et al.* in 2007 concluded that miswak extract can be used in mouth rinses and toothpastes for control dental plaque and caries [24]. El-Tatari *et al.* 2011 showed that miswak extract could be a promised natural material as an additive to glass ionomer cements [25].

**Table 1:** List of useful plant parts and their active constituents

Plant	Generic name	Useful part	Active constituents	Properties
Aloe	<i>Emblcia officinalis</i>	Fruit	Vitamin c	Anti-inflammatory. Used to treat aphthous ulcers, dry socket, xerostomia.
Babool	<i>Acacia arabica</i>	Bark	Tannins	Astringent. Used to treat spongy gums, aphthous stomatitis.
Bloodroot	<i>Sanguinaria canadensis</i>	Root	Alkaloids	Astringent. Used to treat swollen gums, remineralization of enamel lesions.
Clove	<i>Syzygium aromaticum</i>	Flower buds	Tannins	Antiseptic, Analgesic. Used to treat toothache, bleeding gums.
Cranberry	<i>Vaccinium macrocarpon</i>	Fruits	Flavanoids	Anti-oxidant. Used to treat tooth decay, gum diseases.
Eucalyptus	<i>Eucalyptus globosus</i>	Leaves	Volatile oils	Anti-inflammatory. Used to treat sore and inflamed gums.
Green tea	<i>Camellia sinensis</i>	Leaves	Polyphenols	Antibacterial. Used to treat periodontal diseases.
Liquorice	<i>Glycyrrhiza glabra</i>	Root	Flavanoids	Anti-inflammatory. Used to treat dental caries.
Myrrh	<i>Cimmiphoramolol</i>	Stem	Resin, gums	Antibacterial, analgesic. Used to treat gingivitis, oral ulcers, stomatitis.
Neem	<i>Azadirachta indica</i>	Leaves	Terpenoids	Antioxidant. Used to treat dental caries, gingivitis, periodontitis.
Raspberry	<i>Rubus idaeus</i>	Leaves	Tannins	Anti-inflammatory. Used to treat swollen gums.
Tulsi	<i>Ocimum sanctum</i>	Leaves	Luteolin	Anti-inflammatory. Used to treat ulcers, periodontitis.
Turmeric	<i>Curcuma longa</i>	Dried fruits	Tannins	Anti-inflammatory. Used to treat oral pain and swelling.

### **Conclusion**

As our lifestyle is completely getting dependent on technology, we are moving away from nature but we cannot escape from nature because we are part of nature. As herbs are natural product they are free from side effects, they are comparatively safe, eco friendly and locally available. There is great need to promote them to save the human lives.

Today, these herbal products are symbol of safety in contrast to synthetic drugs; that are regarded as unsafe to human beings and environment. Although herbs have been proved for their medicinal, flavoring and aromatic qualities for centuries, the synthetic products of the modern age surpassed their importance for a while. However the blind dependence on synthetics is over and people are returning to with hope of

safety and security. We stand in the 21st century; we must challenge ourselves to critically examine the ingrained beliefs, habits and old institutions of health care. What has worked should be kept and what has not should be discarded or improved and optimal health care that is effective, safe, accessible and affordable should become the priority of every country's health care system. It's time to promote them globally.

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