ABSTRACT

Herbs are staging a comeback and herbal ‘renaissance’ is happening all over the globe. The herbal products, today, symbolize safety, in contrast to the synthetics that are regarded as unsafe to humans and the environment. An herb, botanically speaking, is any plant that lacks the woody tissue which is characteristic of shrubs or trees. More specifically, herbs are plants which are used medicinally or for their flavor or scent. Herbs with medicinal properties are a useful and an effective source of treatment for various disease processes. Herbal extracts have been successfully used in dentistry as tooth cleaning and antimicrobial plaque agents. 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 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.

KEYWORDS- Bacterial plaque; Dental health; Gingivitis; Herbal medicine.

INTRODUCTION

Humans have sought cures for diseases in nature since ancient times; even recently, the use of herbal medicines in dietary supplements, energy drinks, multivitamins, massage, and weight loss products has gained popularity¹. These uses have broadened the field of herbal medicine and also increased its credibility.

Practitioners and consumers of complementary and alternative medicine (CAM) are no longer at the periphery of clinical practice². Herbal medicine is a popular form of CAM³. Herbs, botanically speaking, are any plants that lack the woody tissue characteristic of shrubs or trees. More specifically, herbs are plants used medicinally or for their flavor or scent⁴.

Herbs are used to cleanse the blood, warm and stimulate the body, increase surface circulation, increase elimination of wastes, reduce inflammation, and calm and soothe irritation. Herbs may be used internally as pills, syrups, and...
infusions, or externally as poultices, plasters, and liniments. Many drugs used in Western medical science called allopathic medicine have their origin in medicinal plants.

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. In the developed countries, 25% of the medical drugs are based on herbs and their derivatives.

Herbal extracts are effective because they interact with specific chemical receptors within the body and are in a pharmacodynamic sense, drugs themselves. Any discussion the health professional has with a patient about herbal supplements should be conducted with caution. The plant extracts affecting inflammation and bleeding are of significant interest to the dental professional. Therefore, factual knowledge is essential.

Dental fraternity has also witnessed impact of these herbal medicines as a regular constituent of dental medicine to dental problems in the form of toothpastes, gum paints to name a few. Also, herbal remedies have a long history of use for gum and tooth problems. In many traditional cultures, the use of herbal “chewing sticks” taken from plants, shrubs or trees with high antimicrobial activity are common. An herb may exhibit one or more following unique therapeutic properties like antibacterial, anti-inflammatory, astringents, anaesthetic, immune straighteners, anticariogenic, storage media for avulsed tooth, anti-plaque agents, root canal irrigants, and tooth whitener etc.

Since tooth brushing is the most basic process in oral care, indigenous people, the world over, use natural tooth brushes which are made from healing plants. These primitive twig ‘brushes’ actually work quite well and they provide natural-bristle, disposable brushes with healing ingredients which have already been incorporated right in the plants.

Today, more than 90% of school children and a large proportion of adults have dental caries in many parts of the world. This indicates the need for improved diagnostic and therapeutic procedures in dentistry, especially in children. On the other hand, misuse and overuse of antibiotics are increasing. Use of synthetic drugs, especially in children, can have adverse effects such as liver complications. A study conducted on irrigating solutions showed that chlorhexidine (CHX) causes tooth discoloration, creates a burning sensation in the mouth and results in loss of taste. Sodium hypochlorite can cause allergy and tissue toxicity and calcium hydroxide cannot efficiently remove bacteria from the dentinal tubules. Moreover, not all people have access to synthetic drugs and thus, they may use herbal medicines as alternatives.

There is an urgent need for a use of Evidence Based Herbal Medicine and the efficacy and safety of herbal remedies. This article aims to review the most commonly used herbs in dentistry.

### Bloodroot (Botanical name: Sanguinaria canadensis)

Alkaloids – principally sanguinarine – constitute the primary active compounds in bloodroot. These are used for gingivitis and periodontal disease and sometimes used in toothpaste or other oral hygiene products because they inhibit the growth of oral bacteria. Bloodroot tincture is sometimes included in cough relieving formulas, and 10 drops or less may be taken three times per day.

A recent report suggests that use of dental preparations containing blood root may be associated with leucoplakia – a condition characterized by white spots or patches in the mouth that is thought to be precancerous. Only small amounts of bloodroot should be taken, since amounts as small as 1 ml of tincture or 1 g can
cause nausea and vomiting. Long-term use or overdose of bloodroot can also cause stomach pain, diarrhoea, visual changes, paralysis, fainting, and collapse. Long-term oral intake of sanguinarine-contaminated cooking oils has been linked in India to glaucoma, oedema, heart disease, miscarriage, and diarrhoea.

**Caraway (Botanical name: Carum carvi)**

Caraway contains 3–7% volatile oil, with the main components divided into carvone (50–60%) and limonene (40%)10. Caraway may help in gingivitis or periodontal disease (as a mouth wash). The purified volatile oil should not be used by children under 2 years of age, as oil from caraway and other herbs in the Umbelliferae family can be irritating to the skin and mucous membranes.

**Clove (Syzygium aromaticum)**

The molecule named eugenol in clove essential oil has analgesic and antiseptic properties and particularly inhibits growth of nearly all disease-causing bacteria while leaving the beneficial bacteria unharmed. It has been used in dental fillings, and dental cements for many years for their topical analgesic properties. The eugenol and other constituents of clove, such as vanillin and iso-eugenol, have also been reported to have antimicrobial effect. Clove gel can provide dentists with an alternative to benzocaine for topical anaesthesia in their daily practice.

**Tea tree oil**

Tea tree oil’s major active component is terpinen-4-ol (30%–40%). This compound is responsible for its antibacterial and antifungal properties. Using tea tree oil orally is not recommended as it may cause possibly serious side effects such as confusion, loss of muscle control, or coma. In dentistry, tea tree oil has been used to destroy microorganisms in the mouth before dental surgery, removal of smear layer when used as a root canal irrigant and to relieve mouth soreness caused by dental procedures. In studies of patients who suffered from oral candidiasis, mouth rinses containing tea tree oil have shown some effectiveness in reducing symptoms.

**Coconut water**

Coconut water's unique nutritional profile makes an excellent oral rehydration, enhances immune function, possesses anti-aging properties, decreased swelling, relieve spasm, root canal irrigant (antiviral, antifungal and antimicrobial properties) and storage media for avulsed tooth. A new storage media, coconut water, in maintaining viable periodontal ligament (PDL) cells on avulsed teeth, may be a better alternative to Hank’s Balanced Salt Solution or milk in terms of maintaining PDL cell viability after avulsion and storage.

**Tulsi**

A literature review by Mahantesh et al (2011) elaborated the role of tulsi in the medicinal field, in addition stating that it has an effective antibacterial potential to conflict with the oral pathogens. Their components like ursolic acid and carvacrol are known to be responsible for the antimicrobial activity of tulsi. A review by Chirag Modi et al (2012) has determined that these plant extracts were more active against gram positive than against gram negative bacteria. A study done by Pooja Agarwal et al (2010) has demonstrated an antimicrobial activity of tulsi extract against Streptococcus mutans which is maximum at 4% concentration level.

**Liquorice Root (Glycyrrhiza glabra)**

Liquorice root contains glycyrrhizol A, a compound that has strong antimicrobial activity against cariogenic bacteria. Two pilot human studies indicate that a brief application of lollipop containing liquorice roots led to a marked reduction of cariogenic bacteria in the oral cavity. Further studies have to be done to show that liquorice compounds can be used as a cavity fighting component in mouthwash or toothpaste.
**Cinnamomum Zeylanicum**

Cinnamon extract irrigant shows better reduction in E. faecalis as compared to three percent of sodium hypochlorite and neem extract irrigant. The sugar sweetened cinnamon chewing gum may benefit halitosis by reducing volatile sulphur compounds producing anaerobes within the mouth. The Ethanolic extracts which are prepared from Tooth brush tree (Miswak) and Cinnamomum Zeylanicum (Ceylon cinnamon), by the soxhlet method showed variable antibacterial activity against periodontal pathobionts. Both Cinnamon and chlorhexidine used as an irrigant through Dental Unit Water lines (DUWL) effectively helped within the reduction of bacterial count in dental aerosols during Ultrasonic scaling.

**Phyllanthus emblica**

*Emblica officinalis* berry possesses varied medicinal properties including cytoprotective, antimicrobial, antioxidant, antiresorptive and anti-inflammatory activity. Locally delivered ten percent of *E. officinalis* gel used as an adjunct to Scaling and root planing (SRP) could also be simpler in reducing inflammation and periodontal destruction in patients with chronic periodontitis in compared with SRP alone. The Ethanolic extract of *Phyllanthus Emblica* performs significantly lower numbers of all strains of yeasts adhering to human buccal epithelial cells (BECs) and acrylic strips compared with Normal saline solution (NSS).

**Chamomile**

The flowers of chamomile contain 1–2% volatile oils. Other active constituents include the flavonoids, apigenin, luteolin, and quercetin. These active ingredients contribute to chamomile’s anti-inflammatory, antispasmodic, and smooth-muscle relaxing action, particularly in the gastrointestinal tract. Allergic reactions to chamomile have been reported. These reactions have included bronchial constriction with systemic use and allergic skin reactions with topical use.

**Echinacea (Common name: Purple coneflower)**

Echinacea is thought to support the immune system by activating white blood cells. The mouth wash of Echinacea is effective in gingivitis and periodontal disease in combination with sage, peppermint oil, menthol and chamomile.

**Myrrh (Botanical name: Commiphora molm)**

The three main constituents of myrrh are the resin, the gum, and the volatile oil. The resin has reportedly been shown to kill various microbes and to stimulate macrophages. Myrrh also has astringent properties and has a soothing effect on inflamed tissues in the mouth and throat. Studies continue on the potential anticancer and pain-relieving actions of myrrh resin. Myrrh is used for topical treatment of mild inflammations of the oral and pharyngeal mucosa. It is also used as a gargle to treat pharyngitis and tonsillitis and as a mouthwash for gingivitis and ulcers. Topical use is approved for the treatment of small wounds, for nasal congestion from the common cold, and for local application as an anodyne to treat infections of the buccal cavity and/or the oropharynx.

**Rosemary (Botanical name: Rosmarinus officinalis)**

This volatile oil, including eucalyptol (cineole), is considered a potent antibacterial agent, it is effective in chronic candidiasis. Rosmarinic acid has antioxidant activity and another ingredient of rosemary, known as carnosol, has been shown to inhibit cancer formation in animal studies. The oil possesses antibacterial and antifungal properties, and antimicrobial activity has been documented towards molds, Gram-positive and Gram-negative bacteria including *Staphylococcus aureus*, *Staphylococcus albus*, *Vibrio cholerae* and *Escherichia coli*. Frequent use of rosemary could, in theory, promote the development of iron deficiency in susceptible individuals.
Sage (Botanical name: *Salvia officinalis*)

The volatile oil of sage contains the constituent alpha and beta-thujone, camphor, and cineole. It also contains rosmarinic acid, tannins and flavonoids. In modern European herbal medicine, a gargle of sage tea is commonly recommended to treat a sore throat, inflammation in the mouth, and gingivitis. Sage oil has antibacterial, antifungal, and antiviral activity which may partially explain the effectiveness of sage for these indications.

Aloe vera

Aloe vera gel formula is nontoxic, bactericidal, veridical, and fungicidal against a broad range of microorganisms, and a stimulator of cellular life extension.

There are eight main uses of Aloe Vera in dental practice:

- Applications directly to the the sites of periodontal surgery
- Applications to the gum tissues when they have been traumatized or scratched by toothbrush dentifrice abrasion, sharp foods, dental floss, and toothpick injuries
- Relief of chemical burns are relieved quickly from accidents with aspirin
- Extraction sites respond more comfortably and dry sockets do not develop when aloe vera is applied
- Acute mouth lesions are improved by direct application such as on herpetic viral lesions, aphthous ulcers, canker sores, and cracks occurring at the corners of lips. Gum abscesses are also soothed by the applications
- Other oral diseases, chronic in nature, respond to applications such as lichen planus and benign pemphigus and gingival problems associated with AIDS and leukaemia. Migratory glossitis, geographic tongue and burning mouth syndrome are improved.

- Denture patients with sore ridges and ill-fitting dentures can benefit as fungal and bacterial contamination is reduced as is the irritation from inflammation
- Aloe vera can also be used around dental implants to control inflammation from bacteria contamination.

Miswak (*Salvadora persica*)

The chewing stick (miswak) is used for oral hygiene in many parts of the world. In addition to the mechanical removal of plaque, an antibacterial effect has also been postulated. Fatemah et al (2010) showed that rate of caries decreases after using miswak and this can be due to antimicrobial effects. Almas et al (2004) in a study investigated the antimicrobial effects of miswak compared with toothbrush and their results showed that in miswak users there was a significant decrease in streptococcus.

Babool (*Acacia nilotica*)

Babool has been used for dental problems and used as a great astringent and is equally useful as dentifrice, anti-hemorrhagic agent. The extracts of babul can reduce the ability of some streptococci to colonize tooth surfaces. Mohan lal saini et al (2008) performed a comparative study on the microbial activity of acacia species and found that *A. nilotica* exhibited the highest activity against staphylococcus aureus and salmonella Typhi. Banso A et al (2008) assessed that the minimal bactericidal concentration of stem bark extract of the plant against different bacteria ranged from 35-60 mg/ml.

Cranberry (*Vaccinium oxycoccus*)

Cranberry has been recognized for its beneficial effects on human health. Cranberry constituents
prevent adhesion of oral pathogens to tooth surface\textsuperscript{63}. Yamanaka and colleagues assessed the effect of cranberry juice on the ability of several oral species of streptococcus to adhere to hydroxyapatite pellets that had been pretreated with saliva. When the bacteria were exposed to cranberry juice, their adhesion to the pellets decreased significantly\textsuperscript{64}.

**Neem (Azadirachta indica)**

Neem has been extensively used in ayurveda, unani and homeopathic medicine\textsuperscript{65}. Neem is considered as a resourceful medicinal plant having a wide spectrum of biological activity. Each of its components has several actions such as its fluoride content is known to exhibit maximum antimicrobial activity against *Streptococcus mutans*. Tannins exert an astringent effect and form a coat over the enamel, thus protecting against tooth decay. The use of neem twigs as toothbrush has been endorsed by the dentists to prevent caries\textsuperscript{65,66}.

The inhibitory effects of neem upon bacterial growth, adhesion on hydroxyapatite on tooth surface, and production of insoluble glucan suggests that neem stick extracts can reduce the ability of some streptococci to colonize tooth surfaces, and useful as anti caries products\textsuperscript{66}.

**CONCLUSION**

Herbs have the potential to be developed into agents that can be used as preventive or curative agents for dental caries and also as antimicrobial plaque agents, antiseptics, antioxidants, antimicrobials, antifungal and analgesics.

Due to the side effects and disadvantages of synthetic drugs, the use of medicinal plants is increasing considering their low cost, availability and biocompatibility. Further studies on types of suitable medicinal plants, their use and dosage are required especially in children to know more about their toxicity and possible side effects.

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