

Role of Medicinal Herbs in Management of Oral Diseases – A Review

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Abstract: Oral diseases persist to be a major health problem around the world. Apart from dental caries and periodontal diseases which are the most important global oral health problems, other conditions like oral and pharyngeal cancers and oral tissue lesions are also of important concern. Oral health is essential to general well-being and is related to the quality of life that extends beyond the functioning of the craniofacial complex. In most developing countries, expenditure in oral health care is low; access to dental healthcare is limited and is generally restricted to emergency dental care or pain relief. Moreover, allopathic medicine is expensive these chemicals can alter oral microbiota and have undesirable side-effects such as vomiting, diarrhea and tooth staining. Hence, the search for alternative products continues and natural extracts isolated from plants used as traditional medicines are considered as good alternatives. This review discusses about the role of medicinal herbs in management of oral diseases.

Keywords: Ayurveda, medicinal herbs, oral diseases.

I. Introduction

Oral diseases are major health problems with oral cancer, dental caries and periodontal diseases among the most important global oral health problems.^{1,2} There is a well-established link between oral diseases and the activities of microbial species that form part of the micro biota of the oral cavity.² The global need for alternative prevention and treatment options and products for oral diseases that are safe, effective and economical comes from the rise in disease incidence (particularly in developing countries), increased resistance by pathogenic bacteria to currently used antibiotics and chemotherapeutics, opportunistic infections in immunocompromized individuals and financial considerations in developing countries.^{1,3} Moreover, allopathic medicine is too expensive and capital intensive for a developing country like India and has only limited success in the prevention of periodontal disease and in the treatment of a variety of oral diseases. Hence, the search for alternative products continues and plant extracts used in traditional medicine are considered as good alternatives to western medicine.^{4,5}

Ayurveda is a holistic system of medicine which evolved in India some 3000-5000 years ago, a system of traditional medicine native to the Indian subcontinent, now practiced in other parts of the world as a form of complementary alternative medicine (CAM). The botanicals in the Ayurvedic material medica have been proven to be safe and effective, through several hundred to several thousand years of use. Dental professionals should be aware regarding the safety and effectiveness of CAM.¹ This review discusses the role of medicinal herbs in management of oral diseases and highlights the examples of traditional medicinal plant extracts that have been proved to inhibit the growth of oral microbiota and prevents the oral diseases.

Ayurveda and concept of health

In Ayurveda, dental health (danta swasthya in Sanskrit) is held to be very individualistic, varying with each person's constitution (prakriti), and climatic changes resulting from solar, lunar and planetary influences (kala-parinama).⁶ Sushruta Samhita, the surgical compendium of Ayurveda, defines health as "the equilibrium of the three biological humors (doshas i .e vata, pitta and kapha.), the seven body tissues (dhatus), proper digestion and a state of pleasure or happiness of the soul, senses and the mind."^{1,6,7} A balance among the three doshas is necessary for health. When they go out of unbalanced, symptoms of sickness are observed in an individual.^{1,8}

Ayurveda and Oral Diseases

Ayurveda recommends some daily use therapeutic procedures for the prevention and maintenance of oral health. These include Dant Dhavani (Brushing), Jivha Lekhana (Tonguescraping) and Gandoosha (gargling) or oil pulling and tissue regeneration therapies.

1. **Dant Dhavni (Brushing) :** Ayurveda recommends chewing sticks in the morning as well as after every meal to prevent diseases. Ayurveda insists on the use of herbal brushes, approximately 9 inches long and the thickness of one's little finger. These herb sticks should be either 'kashaya' (astringent), 'katu (acid), or

'tikta' (bitter) in taste. The method of use is to crush one end, chew it, and eat it slowly.⁹ Toothbrushing is an activity carried out with a 'toothbrush' which is a special little brush designed for use on teeth.

Products and derivatives of the *Azadirachta indica* (Neem) tree have been used for medicinal, cosmetic, agricultural and other purposes due to its antifungal, antibacterial, antiviral, pest-control, sedative and more effects. The stems of neem tree should be healthy, soft, without leaves or knots and taken from a healthy tree. Chewing on these stems is believed to cause attrition and levelling of biting surfaces, facilitate salivary secretion and, possibly, help in plaque control, while some stems have an anti-bacterial action it is stated that people with the vata dosha dominance may develop atrophic and receding gums, and are recommended to use chewing sticks with bitter-sweet or astringent tastes, such as liquorice (*Glycyrrhiza glabra*) and black catechu or the cutch tree (*Acacia Catechu* Linn), respectively.¹⁰ Pitta dosha dominant individuals are recommended to use chewing sticks with a bitter taste such as the twigs from the neem and the arjuna tree (*Terminalia arjuna*). Those with the kapha dosha dominant are likely to have pale and hypertrophic gums and are asked to use chewing sticks with a pungent taste, citing the fever nut (*Caesalipinia bonduc*) and the common milkweed plant (*Calotropis procera*). Neem extracts can also be found in Ayurvedic and other toothpastes.^{10,11}

Another effective natural toothbrush prized since many centuries, the use of *Salvadora persica* twigs (Miswak, Peelu) has even been recommended by the World Health Organization for oral hygiene purposes. They have a number of medicinal properties such as being antiseptic, astringent, detergent and containing enzyme inhibitors and also contain some other ingredients, much fluoride and silica¹ as well as sulphur, vitamin C and flavonoids. It has also shown an analgesic effect to thermal stimuli which suggests its effectiveness in the management of dentinal hypersensitivity.^{1,4} Thin twigs of *Acacia nilotica* (Gum Arabica) have been used as a toothbrush in large parts of the Indian sub-continent.⁴

2. Gandusha (gargling) or Oil Pulling Therapy: Oil pulling is an ancient procedure in Ayurveda, which involved swishing oil in the mouth for oral health and systemic health benefits. In ayurveda text, Charaka Samhita, it is mentioned as Kavala or Gandusha. It has been used extensively as a traditional Indian folk remedy for many years to prevent decay, oral malodor, bleeding gums, dryness of throat, cracked lips and for strengthening teeth, gums and the jaw. It involves use of edible oils such as Coconut oil, Corn oil, Rice bran oil, Palm oil, Sesame oil, Sunflower oil, Soya bean oil.^{1,12-14}

Gandusha and Kavala Graha are two primary oral cleansing techniques; specialized therapy to treat as well as to prevent oral diseases. Gandusha involves filling the mouth completely with fluid so that gargling is impossible. In Gandusha, the oral cavity is filled completely with liquid medicine, held for about 3-5 minutes, and then released. In Kavala Graha, a comfortable amount of fluid is retained with the mouth closed for about 3 minutes, and then gargled.¹⁵

Mechanism of action

The oil acts as a cleanser. When it is put in the mouth and worked around the teeth and gums it "pulls" out bacteria and other debris. Oil pulling has a very powerful detoxifying effect. Toxins are pulled from the body. One of the initial cleansing symptom patients experience is an increased flow of mucous from throat and sinuses. Mucous drainage is one of the body's method of removing toxins.¹⁶

The sesame plant (*Sesamum indicum*) of the Pedaliaceae family has been considered a gift of nature to mankind for its nutritional qualities and desirable health effects. Sesame oil is considered to be the queen of oil seed crops because of its beneficiary effects. Sesame oil is found to be effective in reducing bacterial growth and adhesion. Toxins and bacteria from the body might be expelled through the tongue and trapped in the oil and removed from the body. It contains high amounts of unsaturated fatty acids such as linoleic acid and oleic acid. Sesame oil has been found to significantly reduced *S. mutans* counts in plaque and saliva of adolescents within 1 wee.¹⁷

Coconut oil contains 92% saturated acids, approximately 50% of which is lauric acid and studies revealed that the monolaurin, the monoglycerides of lauric acid from coconut oil had antimicrobial activity against various Gram-positive and Gram-negative organisms, including *Escherichia vulneris*, *Enterobacter* spp., *Helicobacter pylori*, *Staphylococcus aureus*, *Candida* spp., including *Candida albicans*, *Candida glabrata*, *Candida tropicalis*, *Candida parapsilosis*, *Candida stellatoidea* and *Candida krusei*, as well as enveloped viruses.¹⁸⁻²¹ Monolaurin and other medium chain monoglycerides had the capacity to alter bacterial cell walls, penetrate and disrupt cell membranes, inhibit enzymes involved in energy production and nutrient transfer, leading to the death of the bacteria.¹⁶

Ozonized Sunflower oil possess powerful antioxidant properties due to ozone itself and studies have shown antibacterial properties against *S. aureus*, *Escherichia coli*, *Pseudomonas aeruginosa*, *Enterococcus faecalis*, *Mycobacterium* spp., *Streptococcus pyogenes* and *C. albicans*.²²

Oil Pulling Therapy and Oral Health

Oil pulling therapy has been **found to** prevent dental caries, halitosis, bleeding gums, dental pain and sensitivity of teeth, oral dryness and prevents cracking of lips. Reseraches have revealed that the oil pulling therapy showed a reduction in the plaque index, modified gingival scores, and total colony count of aerobic microorganisms in the plaque of adolescents with plaque-induced gingivitis.^{1,12,23} These oral cleansing techniques can also benefit bad breath, dry face, dull senses, exhaustion, anorexia, loss of taste, impaired vision, sore throat, and all kapha related imbalances.¹²

Advantages

The technique is cheap, easy, readily available home remedy and without any side effects. It causes no staining, no taste alterations and allergic reactions and is claimed to cure about 30 systemic diseases ranging from headache, migraine to diabetes and asthma.^{1,12,16}

3. Tissue Regeneration therapy

In Ayurveda, amla is considered to be a potent rasayana (rejuvenator) and to be useful in stalling the degenerative and senescence process, to promote longevity, enhance digestion, to treat constipation, reduce fever, purify the blood, reduce cough, alleviate asthma, strengthen the heart, benefit the eyes, stimulate hair growth, enliven the body, and enhance the intellect.^{24,25}

Various parts of the plant are used to treat a range of diseases, but the most important is the fruit. The fruit is used either alone or in combination with other plants to treat many ailments such as common cold and fever; as a diuretic, laxative, liver tonic, refrigerant, stomachic, restorative, antipyretic, anti-inflammatory, hair tonic; to prevent peptic ulcer and dyspepsia, and as a digestive. It possesses antipyretic, analgesic, antitussive, antiatherogenic, adaptogenic, cardioprotective, gastroprotective, antianemia, antihypercholesterolemia, wound healing, antidiarrheal, antiatherosclerotic, hepatoprotective, nephroprotective, and neuroprotective properties.²⁴

In dentistry, amla mouth rinse two grams per day can be taken orally in capsules for long-term benefit to the teeth and gums. Herbs such as amla that support the healing and development of connective tissue when taken internally also benefit the gums. Bilberry fruit and hawthorn berry stabilize collagen, strengthening the gum tissue. Liquorice root promotes anti-cavity action, reduces plaque, and has an antibacterial effect. Herbs such as yellow dock root, alfalfa leaf, cinnamon bark and turmeric root are taken internally to strengthen Astidharu, for example, the skeleton and the joints, have proven to be good for long term health of teeth.^{25,26}

Turmeric, otherwise known as *Circuma longa*, is a member of the ginger family, Zingiberaceae. The Latin name is derived from the Persian word, .kirkum, which means saffron,. in reference to the rhizome's vibrant yellow-orange color. It is indigenous to southeast Asia, but has long been used and cultivated throughout India. It has various health benefits such as analgesic, antibacterial, anti-inflammatory, anti-tumor, anti-allergic, antioxidant, antiseptic, antispasmodic, appetizer, astringent, cardiovascular, carminative, cholagogue, digestive, and diuretic.^{27,28}

In dentistry, 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 dental pain 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 strengthens the teeth .Applying a paste made from 1 tablespoon (tsp)of turmeric with ½ tsp of salt and ½ tsp of mustard oil provides relief from gingivitis and periodontitis. It is advised to rub the teeth and gums with this paste twice daily. In dental practice, turmeric extract is used as a pit and fissure sealent and detection of dental plaque. It has been found to possess anticancer activity and has a important role in treatment of various potentially malignant disorders such as oral submucous fibrosis leukoplakia and oral lichen planus.²⁷⁻²⁹

Miscellaneous Medicinal Plant extracts

Allopathic medicine can alter oral microbiota and have side-effects such as diarrhoea, vomiting and tooth staining. Hence more research should be encouraged in future on role of natural medicinal herbs in treatment of diseases of oral cavity. Uses of medicinal plants are illustrated in table No.1^{1,2,4}

Safety of Herbal Remedies

Traditional medicines and practices can cause harmful, adverse reactions if the product or therapy is of poor quality, or it is taken inappropriately or in conjunction with other medicines. Increased patient awareness about safe usage is important, as well as more training, collaboration and communication among providers of traditional and other medicines. Ayurveda uses many metals in therapeutics, but that is only after due purification process strictly followed in accordance with authentic traditional methods. Lead, mercury, and arsenic intoxication have been associated with the use of ayurvedic herbal medicine products.³⁰ In future, more research work should be carried out regarding safety and efficacy of these herbal products.

II. Conclusion

Oral cancer, dental caries, and periodontal diseases are among the most important global oral health problems. Oral health influences the general quality of life and poor oral health is linked to chronic conditions and systemic diseases. The standard Western medicine has had only limited success in the prevention of periodontal disease and in the treatment of a variety of oral diseases, is expensive and associated with adverse effects. The use of plants and herbs for dental care is a very common indigenous system of medicine and it must be included in everyday life. The active principles of plants should be incorporated into modern oral health-care practices and dentists should be encouraged to use natural remedies in various oral health treatments. This will make dentistry much safer, affordable and more accessible for the lower socio-economic groups in society. In future, studies on efficacy of ayurvedic herbs should be carried out in developing countries like India to establish their therapeutic benefits either alone or in combination with conventional therapies.

Conflict Of Interest

Author of the manuscript declare no conflict of interest.

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Name	Role of Medicinal Herb
Asgand (withaniasomnifera)	Treatment of patients with dental anxiety
Babul (Acacia arabica wild)	Antibacterial activity against <i>P.gingivalis</i> , and <i>P.intermedia</i>
Cinnamon bark oil(Cinnamomum Zeylanicum)	Antibacterial
Clove bud Oil (Syzygium aromaticum)	Possesses compound known as eugenol, which acts a powerful antiseptic and analgesic agent, antibacterial action
Coptidis rhizome (Ranunculacea)	Activity against periodontopathogenic bacteria
Lemon (Citrus medica)	Due to high content of Vitamin-C, used to treat bleeding gums in scurvy
Thorn Apple (Datura stramonium)	Seeds mixed with butter are burnt and smoke is inhaled into the mouth
Drosera peltata leaves (Droseraceae)	Broad spectrum activity against <i>S. mutans</i> and <i>S.sobrinus</i>
Garlic (Allium Sativum, Liliaceae)	Activity against Gram negative oral pathogens (<i>P.gingivalis</i>). The extract allium inhibit trypsin like protease activity of <i>P. gingivalis</i> .
Haldi (curcuma longa linn)	Effectiveness in dental pain, periodontitis,, dental plaque detection, pit and fissure sealent, treatment of potentially malignant oral lesions, suppresses metastasis of melanoma cells, deactivates the tobacco containing carcinogens
Heel Khurda (Eleteriocardamomum Maton)	Extracts has been shown to have antibiotic property against oral infections
Hamamelis virginiana(hamamelidaceae)	Activity against Porphyromonas spp, Prevotella spp and Actinomyces odontolyticus
Katha(Acacia catechu willd)	It is helpful in wound healing, gingivitis, dental caries, tonsillitis, and halitosis, also has few pharmacological properties like Analgesic, Antibacterial, Anti-ulcer, and Antipyretic. The ethanolic bark extract of Acacia catechu willd was found to be bactericidal in action against cariogenic streptococcus sanguis, lactobacillus acidophilus and streptococcus mitis bacterial strains. These actions may be due to the presence of phytochemical constituents like Catechin, epigallocatechin, epigallocatechingallate, epicatechingallate, protocatechuic acid, poriferasterolacyglucosides, phloroglucin, lupenone, kaempferol, poriferasterolglucosides, dihydrokaempferol, Quercetin, Taxifolinetc
Pomegranate (Punica granatum)	It is very useful in bleeding gums caused due to scurvy
Bee glue or Propolis	Activity against <i>S. mutans</i> and <i>S.sobrinus</i> , strong inhibitor of water soluble glucan synthesis
Pistacia lentiscus, Mastic Gum (Anacardiaceae)	Remedy for oral malodor, antibacterial against <i>P.gingivalis</i> , Antibacterial activity against <i>S. mutans</i> have been demonstrated including inhibition of adherence and glycolysis
Piper cubeba (Piperaceae)	Ethanol extracts have antibacterial activity against range of cariogenic pathogens
Castor Oil Plant (Ricinus communis)	Tender shoots are used as tooth brushes in dental caries. Leaf juice is used to gargle in Pyorrhea
Tulsi leaves(ocimum sanctum)	Antibacterial , prevents dental plaque and bad breath
Nettle (Urtica dioica)	2-3 drops of root extract are applied to hollow tooth cavities to treat toothache
Ginger root (Zingiber officinale)	Paste of rhizomes is applied to the teeth to treat toothache and tooth decay

Table 1 – Shows clinical implications of various medicinal plant herbs in management of oral diseases