Role of Ayurveda in management of oral health

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ABSTRACT

Oral diseases continue to be a major health problem world-wide. Oral health is integral to general well-being and relates to the quality-of-life that extends beyond the functions of the craniofacial complex. 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. Hence, the search for alternative products continues and natural phytochemicals isolated from plants used in traditional medicine are considered to be good alternatives to synthetic chemicals. The botanicals in the Ayurvedic material medica have been proven to be safe and effective, through several hundred to several thousand years of use. The exploration of botanicals used in traditional medicine may lead to the development of novel preventive or therapeutic strategies for oral health. The present scientific evidence based review is focused on the possible role of Ayurveda in the management of various orofacial disorders.

Key words: Ayurveda, dentistry, oral health, orofacial disorders

INTRODUCTION

Oral diseases continue to be a major health problem world-wide.[1] Dental caries and periodontal diseases are among the most important global oral health problems, although other conditions like oral and pharyngeal cancers and oral tissue lesions are also of significant concern.[2] Oral health is integral to general well-being and relates to the quality-of-life that extends beyond the functions of the craniofacial complex. The link between oral diseases and the activities of microbial species that form part of the micro biota of the oral cavity is well-established.[3] 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 immunocompromised individuals and financial considerations in developing countries.[4,5] Despite several chemical agents being commercially available, these can alter oral micro biota and have undesirable side-effects such as vomiting, diarrhea and tooth staining.[6,7] Furthermore, 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. Hence, the search for alternative products continues and natural phytochemicals isolated from plants used in traditional medicine are considered as good alternatives to synthetic chemicals.[8]

Ayurveda is the ancient Indian system of health-care and longevity. It involves a holistic view of man, his health and illness. Ayurvedic treatment is aimed at patient as an organic whole and treatment consists of salubrious use of drugs, diets and certain practices.[9] Currently, Ayurveda is widely practiced in the Hindustan peninsula (India and the neighboring countries) and in recent years, has attracted much attention in economically developed countries such as those in Europe and in the United States and Japan.[10] There are approximately 1250 Indian medicinal plants[11] that are used in formulating beneficial measures according to Ayurvedic or other ethnicity. This 5000-year-old system of medicine recommends treatments with specific herbs and minerals to cure various diseases. The botanicals in the Ayurvedic material medica have been proven to be safe and effective, through several hundred to several thousand years of use.[12] The exploration of botanicals used in traditional medicine, may lead to the development of novel preventive or therapeutic strategies for oral health.[13] As most of the oral diseases are due to bacterial infections and it has been well-documented that medicinal plants confer considerable anti-bacterial activity against various microorganisms including bacteria's responsible for dental caries.[14]

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The dentist needs to be more informed regarding the use, safety and effectiveness of the various traditional medicines and over-the-counter products. As this is hardly explored part for the field of dentistry, there is a need for integration of professional dental treatment modalities and complementary alternative medical (CAM) systems to provide the best and unique from each system to patients as a complementary therapy and an alternative choice of treatment.[15] Considering the importance of various traditional or CAM systems, the present scientific evidence based review of literature is focused on the possible role of Ayurveda in the management of various orofacial disorders.

MATERIALS AND METHODS

In this review of the literature, we only considered those studies that include individual plants or mixtures of plants consistent with the philosophy of Ayurveda. The databases searched for the current review were Medline, Natural Products Alert Database, and related databases, such as AYUSH Research Portal, National Library of Ayurveda Medicine, Systematic Reviews in Ayurveda, Ayurveda Database, Web of Science, Indus Medicus and Google Scholar; by consulting existing bibliographies; by using both forward and backward reference chaining techniques; and by tracking recent activities in the field of Ayurveda, which is primarily concerned with prevention and management of orofacial disorders. In addition, we also collected literature on traditional medicine and searched some Indian journals not included in Medline. References that were primarily anecdotal or that were only peripherally related to the topic were excluded.

Ayurveda and the concept of health

Sushruta Samhita, the surgical compendium of Ayurveda, defines health as "the equilibrium of the three biological humors (*doshas*), the seven body tissues (*dhatus*), proper digestion and a state of pleasure or happiness of the soul, senses and the mind."[16]

A balance among the three *doshas* is necessary for health. Together, the three *doshas* govern all metabolic activities. When their actions in our mind-body constitution are balanced, we experience psychological and physical wellness. When they go slightly out of balance, we may feel uneasy. When they are more obviously unbalanced, symptoms of sickness can be observed and experienced.[17,18]

Ayurveda and orofacial diseases

According to the *Shalyatantra* and *Shalakyatantra* (one of the branches of Ayurveda), 65 varieties of oral diseases can arise in seven anatomic locations-eight on the lips, 15 on the alveolar margin, eight in connection with the teeth, five on the tongue, nine on the palate, 17 in the oropharynx and three in a generalized form.[19]

For the treatment of these diseases Ayurveda advocates procedures such as oral cleansing, extractions, excisions, flap surgeries etc., Along with the treatment of orofacial diseases, Ayurveda recommends some daily use therapeutic procedures for the prevention of and maintenance of oral health. These include: *Dant Dhavani* (Brushing), *Jivha Lekhana* (Tongue scrapping) and *Gandoosha* (gargling) or oil pulling and tissue regeneration therapies. Some of the scientifically proven beneficial effects of these procedures are described below:

- *Dant Dhavani* (brushing): *Avurveda* recommends chewing sticks in the morning as well as after every meal to prevent diseases. Ayurveda insists on the use of herbal brushes, approximately nine inches long and the thickness of one's little finger. These herb sticks should be either "*kashaya*" (astringent), "*katu*" (acrid) or "*tikta*" (bitter) in taste. The method of use is to crush one end, chew it and eat it slowly.[20] The *neem* (*margosa* or *Azadirachta indica*) is a famous herbal chewing stick. Fresh stems of *liquorice* (*Glycyrrhiza glabra*), *black catechu* or the *cutch tree* (*Acacia Catechu* Linn.),[21] *Arjuna* tree (*Termmalia arjuna*), *fever nut* (*Caesalipinia bouduc*) and *milkweed plant* (*Calotropis procera*)[22] can also be used for brushing. Chewing on these stems is believed to cause attrition and leveling of biting surfaces, facilitate salivary secretion and possibly, help in plaque control while some stems have an anti-bacterial action.[22] Present-day research has shown that all the chewing sticks described in ancient *Avurveda* texts (Circa 200 BC) have medicinal and anti-cariogenic properties.[23]
- *Jivha Lekhana* (tongue scrapping): It is ideal to use gold, silver, copper, stainless steel for the scrapping of the tongue. Tongue scrapping stimulates the reflex points of the tongue. Removes bad odor (halitosis). Improves the sense of taste, stimulate the secretion of digestive enzymes. Removes millions of bacteria growth (approximately 500 varieties) Clinical evidence also shows that use of tongue scrapers on a regular basis, has a significant Improvement on eliminating anaerobic bacteria and decreases bad odor.[24]
- *Gandusha* (gargling) or oil pulling: Oil pulling is an ancient Ayurveda procedure that involves swishing oil in the mouth for oral and systemic health benefits. It is mentioned in the *Avurvedic* text *Charaka Samhita* where it is called *Kavala* or *Gandusha* and is claimed to cure about 30 systemic diseases ranging from headache, migraine to diabetes and asthma. Oil pulling 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.[25,26] Oil pulling therapy can be done using oils like sunflower oil or *sesame* oil.[27] Oil pulling therapy is very effective against plaque induced gingivitis both in the clinical and microbiological assessment.[28,29]
- Tissue regeneration therapies: In *Avurveda*, the well-known herb, *Amla* (*Phyllanthus emblica*) is considered a general rebuilder of oral health. *Amla* works well as

a mouth rinse as a decoction. One to two grams per day can be taken orally in capsules for the long-term benefit to the teeth and gums. *Amla* supports the healing and development of connective tissue when taken internally.[30] Regular use of *Bilberry* and *hawthorn berry* fruits stabilize collagen and strengthens the gum tissue.[31] *Liquorice* root promotes anti-cavity action, reduces plaque and has an anti-bacterial effect.[30] 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.[31]

Ayurvedic herbs with various oral health related properties

Ayurvedic medications have stood the test of time and since time immemorial been used for various ailments. Recently, there is renewed interest in use of various Ayurvedic drugs for oral and dental health. Various plants and natural products have been used for their pharmacological applications viz. antiulcer genic, wound healing, anti-inflammatory, antimicrobial, antioxidant properties etc.[31-33] In this section, we have tried to review the recent studies undertaken to use of natural products for oral diseases and also have looked into the multitude prospects and perspectives of Ayurveda in the management of orofacial diseases. Various clinical implications of commonly used Ayurvedic herbs in the management of orofacial diseases are summarized in Table 1.

CONCLUSION

Oral diseases are one of the most important problems in public health and are on the rise in developing countries. Most of the oral diseases are caused due to the bacterial infections. The anti-bacterial activity of medicinal plants are due to the presence of potential bioactive compounds, which help to reduce bacterial load in the oral cavity and thus prevent the formation of plaque, dental caries and ulcers. Use of indigenous plants in oral health and hygiene has a long history in different parts of the world. Therefore, this knowledge is likely to vanish soon as many of these ethno-phytotherapeutic remedies are followed only by a few in rural areas. New generation is ignorant of this traditional knowledge. Because of younger generation's lack of knowledge on the identification, collection, preservation and processing of the plant species for medicinal use it is therefore very crucial to conserve these ethno-cultural practices before they are lost definitively.

In this paper, an attempt has been made to review various herbal plants mentioned in Ayurveda that can be used as an adjunct for the maintenance of oral health. The literature showed that there are numerous Ayurvedic drugs, which can be used in prevention as well as management of oral diseases. Many Ayurvedic herbal plants, which are reviewed, possess antimicrobial, anti-inflammatory, analgesic, antiulcer genic activities when screened according to the modern parameters. However, among them very negligible amount of herbals

Table 1: Plants with their oral health related indications

Plants and their scientific use for oral health
Amala (*Emblica officinalis*): It has an antioxidant as well as astringent property which has been proven to be effective in the treatment of toothache, gingival inflammations,[34] *apthous stomatitis*[35] and other types of mouth ulcers
Anar/Dalima (*punica granatum*): Topical applications of *pomegranate* preparations have been found to be particularly effective for controlling oral inflammation as well as bacterial and fungal counts in periodontal disease[36-38] and *Candida*-associated denture stomatitis.[39] The *ellagitannin, punicalagin*, is thought to be responsible for *pomegranate's* antibacterial activity[36]
Launga/Clove (*Syzygium aromaticum*): *Clove* oil is commonly used to relief pain of dental caries. *Eugenol* is considered as an active component (including *beta caryophyllene*).[40] *Eugenol* is also widely used in conjunction with root canal therapy, temporary fillings and general gum pain, dental abscesses and in other gum diseases[41]
Datiwan (*Alucita bidentata*): *Datiwan's* stem and leaves are mainly used. The root juice is used in Nepal for the treatment of toothache. The stem of the plant is used as a toothbrush and is said to be good in the treatment of pyorrhea[31]
Gotu kola (*Centella asiatica*): It is effective in the treatment of mouth ulcers. It is known to heal wounds and promote connective tissue growth. *Asiaticoide* and *hypaphorine* are believed to be responsible for this action.[42] According to Sastravaha *et al.*, *Centella asiatica* showed a significant improvements in decreasing plaque, periodontal pocket depth and attachment level at 3 months[43]
Grita Kumari (*Aloe vera*): It has unexpectedly shown an interesting property of dentin formation. Jittapiromsak *et al.* investigated the effect of *acemannan* (extracted polysaccharide of *aloe vera*) on dentin formation. In this, PDPCs were treated with *acemannan*. The results revealed that *acemannan* significantly increased pulp cell proliferation, BMP-2, ALPase activity, DSP expression and mineralization. The *acemannan*-treated group also exhibited a complete homogeneous calcified dentin bridge and good pulp tissue organization; the data suggested that *acemannan* promotes dentin formation by stimulating PDPCs proliferation, differentiation, extracellular matrix formation and mineralization[44]
Guduchi (*Tinospora cordifolia*): It has an anti-inflammatory, antioxidant, immune-modulator, properties. A significant difference was observed in a study with respect to improvement in salivary flow and in reduction in severity of mucositis in radiotherapy patients thus proving the role of *guduchi* as a radioprotector[45]
Jasmine (*Jasminum grandiflorum*): The leaves are used in the treatment of odontalgia, fixing loose teeth, ulcerative stomatitis and oral wounds. The leaves also possess a potential antiulcer activity, which may be attributed to its antioxidant mechanism of action. Thus may be tried in the treatment oral ulcers[46]
Kantakari (*Solanum xanthocarpum*): *Dhoopana* with seeds of *kantakari* has been used for treatment of dental caries. This anti caries activity is attributed to the chemical constituents such as *solanocarpine, carpesterol, solanocarpidine, solasodine, solasonine* and *solamargine*[40]
Nimbu (*Lemon*): Lemon solution is a natural source of citric acid (Ph 1.68) with lower acidity. Because of its wide anti-bacterial efficiency (including *Enterococcus faecalis*), a freshly prepared *lemon* solution is recommended as a root canal medicament[47]

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Amra/Mango (*Magnifera indica*): *Mango* leaf contains ascorbic and phenolic acids. Studies have shown that mango leaves possess anti-bacterial properties against anaerobic dental microflora such as *Prevotella intermedia* and *Porphyromonas gingivalis* and can be effectively used as adjunct for maintenance of oral hygiene[48]
Mukhjali (*Drosera peltata*): Leaves are traditionally used for the treatment of dental caries, Didry *et al.*, showed that chloroform extracts of the aerial plant parts showed broad spectrum activity against numerous bacteria of the oral cavity, with greatest activity against *S. mutans* and *S. sobrinus*.[49] plumbagin was identified as the active component of this extract
Neem (*Azadirachta indica*): Anti-bacterial, antifungal, antiviral, antioxidant, anti-inflammatory, analgesic, immunostimulant properties of *neem* are well-established.[50] Anti-plaque activity of *neem* stick was demonstrated by Bandyopadhyay *et al.* It has both mechanical as well as chemotherapeutic antiplaque agents. Presence of *gallotannins* during the early stages of plaque formation could effectively reduce number of bacteria responsible for periodontitis.[51] Furthermore, the mouth rinse prepared from *neem* leaves has shown efficacy in treatment of periodontitis[52]
Nilgiri (*Eucalyptus globulus*): *Eucalyptus* extract containing chewing gum showed a significant positive effect on plague accumulation, gingival index, bleeding on probing and periodontal depth probing.[53] *Eucalyptus* containing *macrocarpals* have also shown anti-bacterial activity against cariogenic bacteria.[52,53] It also displaces saliva into the alkaline range[54]
Orange: Orange oil is mainly composed of *dlimonene*, some long chain aliphatic hydrocarbon alcohols and aldehydes like *octanal*. It is suggested to use in gutta-percha softening and in dissolving endodontic sealers[3]
Rumi mastagi/mastic gum (*Pistacia lentiscus*): Used as a remedy for oral malodor. It has shown great activity against *Porphyromonas gingivalis* by using disc diffusion assays[56]
Tila/Sesame (*Sesamum indicum*): Ashokan *et al.* found that the oil pulling therapy done by using *sesame* oil, significantly reduces the plaque index, modified gingival scores and total colony count of aerobic microorganisms in the plaque of adolescents with plaque-induced gingivitis[27]
Triphala: It contains the dried fruits of three medicinal plants *Terminalia chebula, Terminalia belerica* and *Phyllanthus embelica*.[57] It has shown a very promising anti-caries[58] and anti-plaque properties, it is also used for strengthening the gums[59] as a root canal irrigant[60]
Tulsi (*Ocimum sanctum*): *Studies have shown that* 4% *Tulsi* extract mouth rinse effectively reduces the salivary *Streptococcus mutans* counts[61]
Harita/Turmeric (*Curcuma longa linn.*): There are many uses of *turmeric* in dentistry. The active component is *curcumin*. *Turmeric* can be used in relief of pain, gingivitis, periodontitis, as colorant in pit and fissure sealant, in dental plaque detection,[62,63] etc., It is suggested that *turmeric* extracts can be extensively used in the treatment of potentially malignant lesions in oral cavity.[64] It effectively inhibits metastasis of melanoma cells and may be especially useful in deactivating the carcinogens in cigarette smoke and chewing tobacco[65,66]

PDPC=Primary human dental pulp cells, BMP-2=Bone morphogenetic protein 2, DSP=Dentin sialoprotein

extracts are used in clinical practice and the rest of others are not practiced because of their unknown toxicological effects. The clinical studies should be encouraged to assess the efficacy as well as toxicity of herbal drugs.

The traditional knowledge of Ayurveda should be integrated with the modern dentistry. For this, 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.

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