

## Ayurvedic dentistry: An unsung past to a bright future

Anzil KS Ali<sup>1</sup>, Rajani ER<sup>2</sup>, Shuhaib A Rahman<sup>3</sup>, Kiran M<sup>4</sup>, Krishnaveni L<sup>5</sup>, Licy maria P<sup>6</sup>

From, <sup>1,4</sup>Reader, <sup>2</sup>Lecturer, <sup>3</sup>Senior Lecturer, <sup>5,6</sup>Intern, Department of Public Health Dentistry, <sup>1,2,3</sup>Royal Dental College, <sup>4,5,6</sup>St.Gregorios Dental College, Kerala, India.

**Correspondence to:** Dr. Anzil KS Ali, Department of Public Health Dentistry, Royal Dental College, Chalissery, Palakkad, Kerala - 679536, India. Email ID: [anzilksali@gmail.com](mailto:anzilksali@gmail.com)

Received – 17 October 2020

Initial Review – 25 October 2020

Accepted – 04 November 2020

### ABSTRACT

Ayurvedic material has been proven to be safe and effective through ages, and numerous Indian medicinal plants are being used in articulating beneficial measures. Dental fraternity has witnessed the footprints of these herbal products in the form of toothpastes, mouthwashes, gumpaints, root canal irrigants etc. Ayurveda also recommends the daily use of therapeutic procedures and preventive measures such as dant dhavani, jivha lekhana and gandoosha or oil pulling. Herbs exhibit unique therapeutic properties like antibacterial, antiinflammatory, astringents, anticariogenic and as tooth whiteners. Various studies have been conducted in the past to evaluate the efficacy of these herbs in dentistry and have shown favorable results. The present review article focuses on the benefits of the common medicinal herbs used in dentistry.

**Key words:** ayurveda, dentistry, herbs, oral health, traditional medicine.

**A**yurveda means living in harmony with the nature. It is a holistic medicine system developed in India centuries ago, now being practiced as Alternative Medicine worldwide. This is one of the earliest systems of medicine and is a rich reservoir for Dentistry. It uses natural resources to achieve the state of well-being and is becoming important in the developing world [1,2]. The primitive literature, Sushruta Samhita and Charaka Samhita, recorded the practice of the Indian system of medicine during the Vedic period in India [3,4]. The body structure is divided based on the supremacy of any of three physical humors (dosha). Discrepancy in any one of these doshas determines health care in Ayurveda and dental health [5]. Various herbs and medicinal plants in Ayurveda are used as an adjunct for oral health care, which has shown to be safe and effective through ages.

According to World Health Organization (WHO), over three-quarters of the world's population rely on plants and their extracts for healthcare needs [6]. Herbs are used as antibacterial agents because of their ability to penetrate and cause damage to the cell walls of both Gram positive

and Gram negative bacteria leading to the destruction of the bacterial cells [7,8]. Due to the beneficial properties of herbal products such as antibacterial, antiinflammatory, astringents, anesthetic, anti-cariogenic effect, dentistry has witnessed the footprint of these herbal products in the form of toothpastes, gum paints, mouthwashes, root canal irrigants, storage media for avulsed tooth, tooth whiteners, etc. The commonly used herbs in Dentistry are Amla, Triphala, Aloe Vera, Neem, Tulsi, turmeric, which has antibacterial and antiplaque properties[9]. Ayurveda also advocates regular use of therapeutic procedures such as Dant dhavani, Jivha lekhana, Gandoosha or oil pulling and tissue regeneration therapies as an alternative treatment of orofacial diseases [1,8].

#### HERBS IN DENTISTRY

##### Ginger (*Zingiber officinalis*)

It has antibacterial, antiinflammatory, analgesic properties. It is used to alleviate toothache, as a sialogogue, and in the treatment of oral thrush. It is contraindicated in pregnancy

and patients with biliary disease. Ginger may reduce the toxic effects of the chemotherapeutic agent cyclophosphamide [10]. Also, as ginger can hamper blood clotting, it should be used carefully in patients on anticoagulant therapies such as coumarin or heparin [2].

### **Aloevera**

It has analgesic, antibacterial, antiviral, antifungal, antioxidant, immune modulating, antiseptic and anti-inflammatory properties. The antimicrobial effects of aloe vera have been attributed to the plant's natural anthraquinones, which in relatively small concentrations provide analgesic, antibacterial, antifungal, and antiviral activities; however, higher concentrations could be toxic [8]. It also contains antiseptic agents such as lupeol, salicylic acid, urea nitrogen, cinnamonic acid, phenols and sulfur which have inhibitory action on fungi, bacteria and viruses. When Aloe vera is combined with other antimicrobials, it enhances the wound healing faster than with the antimicrobial alone, possibly due to its moisturizing capability.

Aloevera interacts with Glucomannan, a mannose rich polysaccharide and Gibberellins, a growth hormone with receptors of growth factor on the fibroblast, which results in increased collagen synthesis resulting in accelerated wound contraction. It also selectively modulates cells of the immune system [9]. It is termed as a plant of immortality with its various clinical applications. Aloe vera gel and pastes are 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 and xerostomia [5,7].

### **Amla (*Emblica officinalis*)**

In Ayurveda, amla is considered as a general builder of the oral health. Amla extract is good for teeth and gums, reduces cavities and plaque buildup. It also helps in healing of infected tissues. Vitamin-C present in amla acts as a cofactor in the conversion of proline into hydroxyproline, which is one of the essential constituents of connective tissue [4].

### **Licorice (*Glycyrrhiza glabra*)**

It is commonly known as mulathi in Hindi. The root of licorice has anti-inflammatory, antiviral, antimicrobial, anticancerous, immunomodulatory, cardioprotective and hepatoprotective properties. Licorice root extract contains glycyrrhizol A, a compound that has strong antimicrobial action against cariogenic bacteria [5].

### **Triphala**

Triphala is a medicinal plant known as Kadukka in Tamil. It is a combination of three tropical fruits' preparation made from equal proportions of Terminalia chebula, Terminalia bellerica and Emblica officinalis. It has antioxidant, antimicrobial and antifungal properties and is used in dental caries, bleeding and ulcerated gingiva. The gallic acid components present in triphala exhibits the anticandidal action [8,11]. Low concentrations of Triphala has been shown to inhibit the growth of Streptococcus mutans and Lactobacillus. The free radical scavenging property protects the gingival cells and teeth efficiently from free radicals produced by the microorganisms. The components present in the plants also aids in the removal of the smear layer, thereby acting as a chelating agent. It can also be used as an alternative for sodium hypochlorite during root canal irrigation [7]. The free radical scavenging property of Triphala not only protects the gum cells effectively from free radicals, but also acts as an anticarcinogenic agent by inhibiting the increase in red blood cells [8,11].

### **Clove Oil (*Syzygium aromaticum*)**

It has analgesic, antibacterial, antiviral, anti-inflammatory and antioxidant properties. In dentistry, it is used in conjunction with root canal therapy, during temporary fillings, as a mild anesthetic, an antibacterial agent, and an anti-fungal agent [8,11]. It is also used as an analgesic during toothache, gingivitis and periodontitis [2,12]. It is available as a tincture (1:5, 25% ethanol), lozenges and mouthwash; however, must be used cautiously in children, pregnant and lactating women.

### **Pomegranate/Jurenka**

It has a role in controlling *Candida*-associated denture stomatitis and oral inflammation [8,11].

### Garlic (*Allium sativum*)

It has antibacterial, antifungal and antiviral effects. Previous studies have shown that the efficacy of garlic juices as a mouthwash in reducing the amount of oral bacteria was higher than chlorhexidine and mouthwash containing 10% garlic in quarter Ringer solution produced a radical reduction in the number of oral bacteria [12]. Fresh garlic prevents the inception of oral carcinoma by the apoptotic effect of. It scavenges the free radicals and increases the enzymes such as glutathione S-transferase and catalase, inhibiting cytochrome p450 2E1 enzyme and induces DNA repair mechanisms [13].

### Honey (*Apis Mellifera*)

Honey has high anti-inflammatory activity and stimulates immune responses. It alters the chemical pH and osmotic effects, which helps in its antibacterial action. Ingestion of honey can inhibit the growth of bacteria that causes caries and also inhibits the formation of dental plaque, gingivitis, and periodontal diseases. The amylase present in honey increases the osmotic effect in the media by increasing the sugar concentration and consequently inhibits the fungal activity. Application of honey to severely infected cutaneous wounds is capable of clearing wound infection and healing. It can also be used for treatment of various oral ulcerative conditions [14]. It also shows antiviral activity against herpes labialis and rubella and has strong antioxidant activity by preventing the formation of free radicals released from the inflamed tissues. It increases the absorption of some antioxidants like vitamin C (47%), carotene (3%), glutathione reductase (7%) and thus acts as anticarcinogenic agent.

### Neem (*Azadirachta Indica*)

It has antiviral, antifungal, antimicrobial, antibacterial, antipyretic, anti-inflammatory, antitumor, analgesic, antihelminthic, anticariogenic and antioxidant properties. It is used effectively in the treatment of dental caries, gingivitis and periodontitis [2]. The inhibitory effects of neem on adhesion of bacteria to hydroxyapatite on tooth surfaces, biofilm formation on tooth surfaces, and production of insoluble glucan, might affect in vitro plaque formation. Neem stick extract is anticariogenic by reducing the colonization of some streptococci to tooth surfaces [1,2].

### Tulsi (*Ocimum sanctum*)

It has antihelminthic, analgesic, antipyretic, immune stimulatory, antiulcer, antimicrobial and anti-inflammatory properties. It can be used in the treatment of periodontitis, candidiasis, lichenplanus, leukoplakia and oral submucous fibrosis, pemphigus and aphthous ulceration [3]. It should be used with caution in children, and is contraindicated in pregnant and lactating women.

### Turmeric (*Curcumin longa*)

It belongs to the ginger family Zingiberaceae with antiseptic, antibacterial, anti-inflammatory, analgesic and hepatoprotector properties [15]. In dentistry, it has been used as a pit and fissure sealant and in the dental plaque detection system. It has been suggested that rinsing the mouth with turmeric water and massaging the affected tooth gives sudden relief from pain. Similarly, applying a paste made from turmeric with salt and mustard oil gives relief from periodontitis and gingivitis [4]. It acts as an antioxidant, inhibits the initiation and promotion of oral cancer and precancerous lesions including oral leukoplakia, oral lichen planus and oral submucous fibrosis [16]. In OSMF, curcumin reduces the micronuclei formation in exfoliated cells, which prevents oncotransformation. It also prevents the formation of fibrosis by acting as an antifibrotic agent by blocking leukocyte influx and inhibiting the activation of inflammatory cells [13].

### Grape seed extract

It contains proanthocyanidins, which are potent antioxidants and possesses anti-inflammatory, antibacterial and immune-stimulating effects. It has been reported to strengthen collagen based tissues by increasing collagen cross-links. It also stimulates the remineralization effects on artificial root caries and therefore, is a promising natural agent for non-invasive root caries therapy [17]. It is also an important source of polyphenols and antioxidants, thus used as anticarcinogenic agents [16].

### Papaine

Papaine is a proteolytic enzyme extracted from the latex of the leaves and fruits of the green adult papaya. It has an anti-inflammatory, bacteriostatic, bactericidal property and is effective against gram positive and gram negative

organisms. It acts only in infected tissue as it lacks a plasmatic antiprotease called a-1-anti-trypsin which causes partial breakdown of degraded collagen molecules only, contributing to the degradation of fibrin “mantle” formed by carious process. This technique is an effective alternative for treatment of carious injuries [17].

### Tomato

Lycopene is an acyclic isomer of  $\beta$ -carotene and found abundantly in tomatoes and red fruits and vegetables, such as red carrots, watermelons, papayas, and grapes [13]. *Anticarcinogenic* mechanism of lycopene is through regulation of gap junction communication. It inactivates free radicals which are responsible for lipid peroxidation process and prevents the tissue damage. Another mechanism is by the suppression of carcinogen-induced phosphorylation of p53, Rb antioncogenes and halting the cell division at the G0-G1 cell cycle phase. It acts as an antiproliferative agent by inhibiting insulin like growth factor and thus reduces proliferative capacity of cells. Modulation of immune functions is carried out by regulation of intrathymic T-cell differentiation [13]. In OSMF, lycopene inhibits the growth of abnormal fibroblast. It has positive effect on mouth opening and at the same time can be helpful in alleviation of burning sensation. Studies have also demonstrated that it can resolve leucoplakia as they have a protective effect against cell damage and progression of dysplasia [13, 18].

### Eucalyptus globules

Qualitative phytochemical investigation has shown the presence of alkaloids, phenolic compounds, steroids, cardiac glycosides and terpenes. Eucalyptus globules are highly effective against Lactobacillus acidophilus and have great potential as anti-cariogenic agents that may be useful in the treatment of oral disease [10].

## AYURVEDIC METHODS IN ORAL HEALTH CARE

### Tooth brushing (*Dant dhavani*)

Ayurveda recommends the herbal chewing sticks such as neem, licorice, cutch, arjuna, milkweed or fever nut for the purpose of brushing as an alternative to the new age bristle brushes [19].

### Jivha lekhana

The early Ayurvedic text says that cleaning the tongue removes halitosis, distastefulness and by cleaning out the white coat on the tongue, teeth and mouth brings relish immediately [19].

### Oral cleansing

*Kavala* and *Gandoosha* are two traditional methods of oral cleansing, a specialized therapy to treat as well as to prevent oral diseases. The difference between the two is in the dosage and technique of use of drug. In *Gandoosha* the medicated fluid is held mouthful for some time and then spat out, whereas in *Kavala graham* it's only three fourth full, the fluid is swished and then spat out [19]. This inhibits the growth of pathogens such as, *Actinomyces* species, *E. nodatum*, *Prevotella intermedia*, *Prevotella melaninogenica*, *Prevotella nigrescens*, *T. forsythia* and *S. mutans* [8].

## STUDIES ON AYURVEDA IN DENTISTRY

Kadam et al.,[20] in their study emphasized on the medicinal and anti-cariogenic properties of the chewing sticks. Almas et al., [21] observed that *Streptococcus mutans* were more susceptible to *Miswak* antimicrobial activity than lactobacilli. Sharma et al.,[22] found that Neem sticks were commonly used by children in Kangra District of Himachal Pradesh. Sumanth et al.,[23] studied the efficacy of mango leaf as an oral hygiene aid and concluded that *Mongiferin* had significant antibacterial property against certain strains of Pneumococcal, Streptococcal, and Lactobacillus Acidophilus. Subramanian et al.,[24] in their study observed that methanol leaf extracts of tulsi showed a significant zones of inhibition against three human pathogens *Escherichia coli*, *Staphylococcus aureus* and *Candida albicans*. *Mimusops elengi* seed protein extract has also shown inhibitory action against *Staphylococcus aureus*, *Streptococcus pyogenes* and *Candida albicans*. Studies reported the good inhibitory potential of hexanolic and ethyl acetate extracts of Piper betle plants against *Candida albicans*. The formulation of essential oils exhibit antimicrobial activity against dental pathogens [10].

## CHEMOPREVENTIVE ALTERNATIVES IN ORAL CANCER

Oral cancer is the eighth most common cancer worldwide and an important cause of mortality and morbidity [16].

Chemoprevention is a relatively novel approach for controlling cancer that uses specific natural products to suppress or prevent premalignancy. Along with vitamin C, E and carotenoids, polyphenols are strong antioxidants that act as chemopreventive agents [23]. American Cancer Society recommends eating of five or more serving of fruits and vegetables each day can reduce the risk of cancer significantly. Fruits and vegetables consist of phytochemicals which are produced by plants. They are grouped as carotenoids, isothiocyanates, glucosinolates, sulfides, diarylhepanoids, saponins [13].

### TOXICITY OF THE HERBAL PRODUCTS

Although the traditional herbs have been considered to be nontoxic and have been used by the general public to treat a range of ailments, however, they have the same potential to cause serious adverse effects. Conventional drugs in the market such as aspirin (from white willow bark), Digitalis (from foxglove), and Sudafed (modeled after a component in the plant ephedra) are derived from herbs. Herbal medicine and its extract may vary in their effectiveness from person to person and can only be used as adjuvant in dental therapy. Therefore, care must be taken in selecting herbal products especially in high-risk patients such as the elderly, expectant mothers, children, those taking several medications for chronic conditions, those with hypertension, depression, high cholesterol, or congestive heart failure [13].

Based on the available published reports, the side effects associated with herbal medicines in any form is rare. This could be due to the fact that adverse reactions following their use are minor allergic reactions that they are not reported. Perhaps the major problem with regard to the safety of herbal medicines is related to the manufacturing practice including contamination, substitution, incorrect preparation and dosage, intentional addition of unnatural toxic substances, interactions involving synthetic prescriptions, drugs, and herbal medicines, either intentional or unintentional mislabeling, and the presence of natural toxic contaminants. Herbal medicines are less expensive than conventional medications and are believed to be less toxic. Despite the general belief, they can cause severe toxicity and even death as well [8].

### CONCLUSION

Plants are precious reservoir of natural compounds which can be used both in prophylaxis and treatment of oral and

dental diseases. Herbal medicines are used in the treatment of chronic pathological conditions in which medicines are not well endured. Since these drugs do not cause addiction or allergic reactions, they can be used for a long time. However, herbal compounds should be taken following its instructions, on proper time and dosage. Therefore, adequate knowledge of their properties is necessary to prescribe the optimal drug. It was rightly stated by Philippus Theophrastus (Paracelsus) "All that man needs for health and healing has been provided by God in nature, the challenge of science is to find it."

### REFERENCES

1. Patwardhan BK. Ayurveda: The 'Designer' medicine: A review of ethnopharmacology and bioprospecting research. *Indian Drugs*. 2000;37(5):213-27.
2. Anushri M, Yashoda R, Puranik MP. Herbs: A good alternatives to current treatments for oral health problems. *Int J Adv Health Sci*. 2015;1(12):26-32.
3. Gupta R, Ingle NA, Kaur N, et al. Ayurveda in Dentistry: A review. *J Int Oral Health*. 2015;7(8):141-3.
4. Bhardwaj VK. Ayurveda and holistic approach in orodental care: An overview. *SRM J Res Dent Sci*. 2015;6(3):181-6.
5. Digra R, Rao NC, Gupta N, et al. Ayurvedic herbs in dentistry: Learn how to manage oral health and tooth decay with these modest herbs? *J Orofac Res*. 2014;4(1):41-5.
6. Agbar MA, Naidoo S. Ethnomedicinal plants used by traditional healers to treat oral health problems in Cameroon. *Evidence-based complementary and alternative medicine* 2015;2015:1-10.
7. Taheri JB, Azimi S, Rafieian N, et al. Herbs in Dentistry. *Int Dent J*. 2011;61(6):287-96.--7
8. Kumar G, Jalaluddin MD, Rout P, et al. Emerging trends of oral care in dentistry. *J Clin Diagn Res*. 2013;7(8):1827-9.
9. Subhash, AV, Suneela S, Anuradha Ch, et al. The role of Aloe vera in various fields of medicine and dentistry. *J Orofac Sci*. 2014;6(1):5-9.
10. Ishnava KB. Role of herbal medicine in dental health. *J Environ Chem Toxicol*. 2018;2(1):28-9.
11. Iyer M, Gujjari AK, Rao RN, et al. Biomedical applications of phytomedicines: Dental perspective. *Dent Hypotheses*. 2016;7:34-41.
12. Mansour A, Kazemi M, Rasale N. In vitro comparison of the effects of garlic juice and chlorhexidine mouthwash on oral pathogens. *Jundishapur J Microbiol*. 2012;5(2):398-400.

13. Lee UL, Choi SW. The Chemopreventive properties and therapeutic modulation of green tea polyphenols in Oral Squamous Cell Carcinoma. *ISRN Oncol.* 2011;2011:1–7.
14. Markose A, Krishnan R, Ramesh M. Management of oral health through ayurvedic methods. *J Dent App* 2016;3(2):319-21.
15. Adyanthaya A, Ismail S, Sreelakshmi N. Indian traditional medicinal herbs against dental caries – an unsung past to a bright future, *Saudi J Oral Dent Res.* 2016;1(1):1-6.
16. Scrobota I, Bolfa P, Filip AG, et al. Natural chemopreventive alternatives in oral cancer chemoprevention. *J Physiol Pharmacol.* 2016;67(1):161-72.
17. Jain N, Rajwar YC, Batra M, et al. Dentistry: Turning towards herbal Alternatives: A review. *Sch J App Med Sci.* 2014; 2(1C):253-7.
18. Ganjre A, Kathariya R, Bagul N, et al. Anticariogenic and antibacterial properties of selected spices: Implications in oral health. *Clin Nutr Res.* 2015;4(4):209-15.
19. Prathima GS, Kavitha M. Ayurvedic Dentistry. *Journal of Scientific Dentistry* 2015;5(1):20-24.
20. Kadam A, Prasad BS, Bagadia D, et al. Effect of Ayurvedic herbs on control of plaque and gingivitis: A randomized controlled trial. *Ayu.* 2011;32(4):532–5.
21. Chatterjee A, Saluja M, Singh N, et al. To Evaluate the antigingivitis and antipalque effect of an *Azadirachta indica* (neem) mouthrinse on plaque induced gingivitis: A double-blind randomized, controlled trial. *J Indian Soc Periodontol.* 2011;15(4):398-401.
22. Sharma A, Bansal P, Grover A, et al. Oral health status and treatment needs among primary school going children in Nagrota Bagwan block of Kangra, Himachal Pradesh. *J Indian Soc Periodontol.* 2014;18(6):762–766.
23. Singh. A, Purohit B. Tooth brushing, oil pulling and tissue regeneration: A review of holistic approaches to oral health. *J Ayurveda Integr Med.* 2011;2(2):64-8.
24. Subramanian G, Tewari BB, Gomathinayagam R. Studies of antimicrobial properties of different leaf extract of Tulsi (*Ocimum tenuiflorum*) against human pathogens. *Am Int J Contemp Res* 2014;4(8):149-157.

**How to cite this article:** Ali AKS, Rajani ER, Rahman SA, et al. Ayurvedic dentistry: An unsung past to a bright future. *J Orofac Res.* 2020; 9(4):57-62.

*Funding: None; Conflict of Interest: None Stated.*