

EFFECTS OF NATURAL PRODUCTS ON ORAL HEALTH: A REVIEW

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ABSTRACT

The use of plant products to improve dental health and to promote oral hygiene is in exists long since. The rise in the use of sugar diet, bakery products, and carbonated drinks increases the prevalence of dental caries. Lack of oral hygiene results in accumulation of plaque and calculus, which is the major etiology factors for gingivitis and periodontitis. Undoubtedly, the natural products are the source for most of the pharmaceuticals. A range of treatment modalities are available for the treatment of different oral diseases. The frequent use and misuse of currently available therapeutic agents have led to the evolution of increased incidence of adverse effects and development of resistant strains. Hence, the search for an alternative option continues. This article aims to review the efficacy of natural products such as turmeric, camphor, and clove in maintaining oral health in particular and overall health in general.

Keywords: Turmeric, Camphor, Clove, Oral health.

INTRODUCTION

Oral diseases are closely associated to lifestyle. Dental health encompasses the likelihood of making healthy choice in relation to diet, smoking, tobacco, oral hygiene, and utilization of dental health services. The rise in the use of sugar diet, bakery products, and carbonated drinks increase the prevalence of dental caries. Lack of oral hygiene results in accumulation of plaque and calculus, which is the major etiology factors for gingivitis and periodontitis. The oral cavity can be a mirror image of other areas of the body and many systemic illnesses are manifested in the soft tissue of the oral mucosa of the mouth. When oral health is compromised, overall health can be affected [1].

With rise in disease incidence, resistant pathogenic bacteria, opportunistic infections in immune compromised individuals, and financial considerations in developing countries, there is considerable interest in the development of alternative prevention and treatment options for oral diseases [2,3]. Traditional plants and natural phytochemicals can treat bacterial infections and are considered to be a good alternative to synthetic chemicals.

Here, we review the effect of turmeric, camphor, and clove on oral health.

Dental applications of turmeric

Turmeric can be used in following ways to provide relief from certain dental problems.

Dental pain

Massaging the aching teeth with roasted, ground turmeric eliminates pain and swelling.

Periodontal problems

A paste made from 1 tsp of turmeric, ½ tsp of salt, and ½ tsp of mustard oil can be used to treat gingivitis and periodontitis. It is recommended to rub the teeth and gums with this paste twice a day.

Dental-plaque detection system

Caries is thought to be infectious disease caused by microbes present in dental plaques, and it is known that the removal of dental plaques is highly important for the health of oral cavities. However, dental plaques are not easy to identify by naked eye. Hence, plaques are generally stained with dental-plaque detection system includes a dental-plaque

staining agent, which contains turmeric extracts and curcumin; and a light-emitting apparatus, which gives out light having a wavelength within a range of 250-500 nm to an object in the oral cavity where the dental-plaque staining agent is, attached [4].

Pit and fissure sealant

It has been found that tinted pit and fissure sealant is used for applying on tooth surfaces in order to prevent or reduce the incidence of dental caries. This sealant can be produced from a composition containing acrylic monomer and at least one colorant selected from the group consisting Annatto extract, turmeric extract, and -apo-8-carotenal [5].

Mouthwash

In a study made by *Waghmare et al.*, about 100 subjects were randomly selected. Both gingival index and plaque index were recorded at 0, 14, and 21 days. It was found that chlorhexidine gluconate as well as turmeric mouthwash can be effectively used as in addition to mechanical plaque control methods in the prevention of plaque and gingivitis. Turmeric mouthwash prepared by dissolving 10 mg of curcumin extract in 100 ml of distilled water and 0.005% of flavoring agent peppermint oil with pH adjusted to was found to be as effective as most widely used chlorhexidine mouthwash. Though chlorhexidine gluconate is furthermore effective when anti-plaque property was considered. The effect of turmeric observed may be inflammatory action. Reduction in total microbial count was observed in both the groups [6].

Sub gingival irrigant

In a study conducted by *Suhag et al.*, periodontal sites were treated on day 0 (baseline) by a single episode of scaling and root planning. Subsequently selected sites were irrigated (triple irrigation regimen) with saline (0.9%), chlorhexidine (0.2%), curcumin (1%), or several as non-irrigated control sites on day 0 (baseline) immediately following instrumentation. Triple irrigation regimen was repeated for the next 5 consecutive days and on days 15 and 21 Clinical parameters recorded were probing pocket depth (PPD), bleeding on probing, and redness for 200 sites in 20 patients with chronic periodontitis. The results indicated that the irrigated sites had significant improvement in all parameters as compared with the non-irrigated sites on day 2-5. The curcumin group showed a significant reduction in benzoyl peroxide (100%) and redness (96%) when compared with the chlorhexidine group and the saline group on day 5. However, the difference between

AQ1

AQ1

groups was not significant at next recall visits mean PPD reduction was significantly greater for the curcumin group than all other groups on all post-treatment days. Thus, 1% curcumin solution can cause better resolution of inflammatory signs than chlorhexidine and saline irrigation as a subgingival irrigant [7].

Precancerous lesions

It has a major role in the treatment of various precancerous conditions such as oral submucous fibrosis, leukoplakia, and lichen planus. Turmeric extract and turmeric oil have demonstrated oncopreventive activity in *in vitro* and *in vivo* animal experiments. The local symptoms of burning sensation and pain were reduced, and partial reversal of opening of the mouth was also observed [8].

Recurrent aphthous stomatitis (RAS)

RAS is an inflammatory condition of unknown etiology affecting the oral mucosa. Approximately about 20% of the population suffers from RAS sometime in their lives. The disease mainly involves non-keratinized mucosal surfaces and is characterized by single or multiple painful ulcers with periodic recurrence and healing. The appearance of ulcers is preceded by a prodrome of localized burning or pain with lasts for around 24-48 hrs. The peak of onset is between 10 and 19 years and may continue throughout life. Reports have shown that in patients who used conventional antiseptic gel, the lesion healed only after the periods of time as in previous attacks. They experienced no early reduction in pain or frequency of recurrence. The patients who used the curcumin oil reported that ulcers started healing earlier than in previous attacks; there was also early reduction in pain. A follow-up for 1-year has shown no recurrence in these patients [9].

Influence on human gingival fibroblasts

Several studies have also revealed apoptosis of human primary gingival fibroblasts (hPGF) cells at lower doses like 1, 10, and 25 M of curcumin but at higher doses like 50, 60, 75, and 100 M, was statically significant high apoptosis was noted. They have also found that the effect of curcumin treated normal human fibroblasts and microvascular endothelial cells using MTT assay and observed that lower doses of curcumin stimulated the proliferation of normal human fibroblasts and hMVED, whereas higher doses inhibited it [10]. According to other authors curcumin treated hPGF cells exhibited maximum and significant apoptosis at 75 M and showed decrease in cell population and shrinkage of cells size and morphologic alterations in basal cell carcinoma cells after treatment with 50 nM curcumin and found cell shrinkage disappearance of microvilli and appearance of membrane blebbing [11].

Camphor in oral health care

Oral disease impacts our quality-of-life and may lead to systematic and threatening disease. In this era of modern medicine, there has been increased the usage of modern medicinal techniques involving the usage of antibiotics, antipyretics, etc. But the basis of all medicine lies in its botanical foundation which has increased proportions of camphor, neem, tulasi, etc., which has high medicinal importance.

Dental caries

Caries is caused by bacterial acid production in tooth plaque, which can deep localize lesion if it remains too near tooth for any length of time. If left the bacteria then may penetrate the tooth further and progress into the soft pulp tissue. Untreated dental caries can lead to incapacitating pain, potential tooth loss of dental function. The development and progression of dental caries are due to a number of factors, specifically bacteria in the dental plaque (particularly *Streptococcus mutans*) on susceptible tooth surfaces and availability of fermentable carbohydrate on of tooth decay.

Tandpyn druppels

A clear brown colored liquid preparation whose composition contains: Spirits of camphor, opium tincture, capsicum tincture, spirits of chloroform. Chloroform, camphor, catechu tincture, ethanol. The

camphor, capsicum tincture and spirits of camphor have an irritant action, and camphor also has a mild local anesthetic action and hence relieves dental caries pain and sensitivity [12].

Camphor can be ground together with a yellow lead and Chinese honey locust fruit (*Fructus gleditsiae*) in equal quantities into powder and made with honey into pills for insertion into cavities which relieves pain [13]. The neodymium:yttrium aluminum garnet dental laser has been cleared by the United States Food and Drug Administration for Marketing in intraoral soft tissue treatment and it contained small amounts of camphor, which in virtue of its vapor properties help edincarious pain relief. In dentistry, it is prepared with parachlorophenol 35% (and 65% camphor) and used as an antibacterial for infected root canals [14].

PERIODONTITIS AND PULPITIS

In a study conducted, a total of 30 patients with chronic periapical periodontitis was selected from outpatients, and 10 cases each were randomly picked out to treat by sealing with formocresol, camphorated phenol and Ya Kan, respectively. All three products had a significant effect on relieving chronic periapical periodontitis [15].

Gum paints are combination of antiseptics and tanning agents which precipitate proteins, but do not penetrate cells thereby affecting only the superficial layer making it stronger and preventing exudation. By a gentle massage over the gingival, it not only relieves gingival pain but also strengthens the ridge. Arofil gum paint, one which contains camphor 0.2% provides this function effectively [16].

Another study investigated the long-term (1-4 years) outcome of the endodontic treatment of teeth with an apical periodontitis lesion where apical enlargement was done, and the canals irrigated with camphorated paramonochloro phenol paste. Overall results showed that 76% of the teeth healed, 19% were healing, and 5% had not healed. Most healed cases (75%) on failed cases (80%) were already evident at 2 years, demonstrating its pulpal soothing effects [17]. Periodontal camphor mono-chlorophenol, also known as CMCP, is an active disinfectant for the treatment of infected root-canals and periapical infections [18].

The combination of allantoin, camphor, and phenol is used to treat pain, itching. Camphor seems to stimulate nerve endings that relieve symptoms such as pain and itching when applied [19].

Dental plaque

Pawar *et al.* in his study explained a dentifrice/herbal tooth powder which has comprised Acacia catechu, Menthol, and camphor in the proportion 91%, 2.7%, and 6.3%, respectively the powder of Acacia catechu was used to remove tartar, plaque, stain, and in cleansing and polishing tooth surface without producing any abrasion whereas menthol and camphor were used as flavoring agents. A clinical study on this herbal dentifrice, reported 87-95%, 70-72%, and 80-95% reductions in plaque, gingivitis, and dental calculus, respectively, in about 15 days of treatment [20].

Oral ulcers

Camphor can be ground together with realgar in equal quantities into powder and stirred well with sesame oil for application to treat ulcers, e.g., San [21] Camphor has a cooling and a soothing effect which relieves ulcerative pain immediately [15,16].

HERPES SIMPLEX LABIALIS

Herpes simplex labialis, also known as cold sores, is a common cause of perioral discomfort. Herpes simplex labialis is usually caused by the herpes simplex virus, Type 1 (HSV-1), whereas the most common causative agent of genital herpes is HSV, Type 2 (HSV-2). There are five stages of a cold sore, experienced by 46-60% of patients. This stage consists of tingling, itching, inflammation, erythema, hypersensitivity, and/or soreness in the exact location where the lesion will erupt. In patients with recurrent herpes simplex labialis, the location is often the

same from episode to episode, most commonly on the mucocutaneous junction of the upper and/or lower lip, known as the vermilion border [22].

FDA - Approved protectants (e.g., allantoin, calamine, petrolatum, zinc oxide, and cocoa butter) soften the skin to prevent cracking and also relieve dryness. Some products that include these ingredients are anbesol cold sore therapy (64% white petrolatum, 20% benzocaine, 3% camphor, 1% allantoin) [23,24].

EFFECTS OF CLOVE OIL ON ORAL HEALTH

Antimicrobial activity against oral pathogens

Clove oil has an inhibitory action against various organisms like *Streptococcus aureus* L. *Monocytogenes*, and *Aspergillus* [25]. Synergistic effects of clove oil along with other oils of cilantro, dill, coriander, and eucalyptus showed a higher level of inhibition on Gram-negative bacteria's [26], thus proving that the synergism aggravates the antimicrobial activity of clove oil [27]. *S. mutans* are the main causative organism for dental caries [28]. *S. mutans* is the normal flora present in every individual's oral cavity [29]. They are coccus shaped non-motile bacteria *S. mutans* are the predominant one found in dental plaque, which uses the sugar contents present in our food particles and grow and secretes a sticky polysaccharides which then leads to the plaque formation in our teeth. It produces enzymes which metabolizes sugars and releases lactic acids as their by-products, the acids will slowly corrode the enamel thereby leading to dental caries. If these dental caries are left untreated, they enter the pulp chamber and destroy it completely, so the tooth becomes non-vital [30]. Dorman and Deans in UK in 2000 [31] and Betoni *et al.* in Brazil in 2006 [32] has studied the anti-microbial activity of the clove oil. The principal constituent of distilled clove bud oil (60-90%) is eugenol (4-allyl-2-methoxyphenol). The oil also contains about 10% acetyl eugenol and small quantities of gallic acid, sesquiterpenes, furfural and vanillin, and methyl-n-amyl ketone. Other constituents include flavonoids, carbohydrates, lipids, oleanolic acid, rhamnetin, and vitamins [33]. Compared to all other oil extracts, clove oil extract shows a strong inhibition at very low concentration [34].

How to use clove oil for tooth pain [35]

1. Place two to three drops of the oil in a clean, small container. Add ¼-½ teaspoon of olive oil. This mixture will prevent any soft tissue irritation that is common when using clove oil on its own
2. Soak a small piece of cotton in the oil mixture until it is saturated. Blot the cotton on a piece of tissue to remove the excess oil before placing the cotton in your mouth
3. Using a clean pair of tweezers, hold the cotton on the painful area for 10 seconds, making sure you do not swallow any of this oil
4. Once complete, rinse your mouth with saline solutions this step may be repeated 2-3 times daily.

Clove oil should only be used as a temporary way to relieve pain from a toothache. The best pain remedy is to see a dentist.

Clove oil to treat halitosis

Halitosis is widespread and is believed to affect one quarter of the population around the world and most people [36] halitosis (bad breath) is mainly due to the pathogens present in the oral cavity, these pathogens will proteolyze the amino acid and release volatile sulfur [37]. Clove oil can be short remedy for halitosis since it is anti-microbial, but cannot be used long term because it lacks the pro-biotic activity [38]. The Chinese used cloves to get rid of bad breath over 2000 years ago.

CONCLUSION

The traditional medicines are not being used much these days. But it is essential that it is bought back into usage as they are absolutely effective with minimal side effects. Creating awareness on this rich history of traditionally available herbal medicines will help to minimize oral as well as other systemic problem and treating them effectively also.

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