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MAGIC OF AYURVEDA IN THE TREATMENT OF PYORRHEA-A REVIEW ARTICLE

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ABSTRACT

Ayurvedic drugs have been used since ancient times to treat diseases including periodontal diseases. Oral rinses made from ayurvedic medicines are used in periodontal therapy to control bleeding and reduce inflammation. Mouth is considered as the mirror of general health. For good oral and systemic health, proper maintenance of good oral hygiene is very important. Ayurveda is considered as the most ancient indigenous medical system of India. Ayurveda includes therapies of treatment of these Orofacial Diseases such as oral cleansing, extraction, excisions, flap surgeries etc. Ayurveda also recommends daily use of therapeutic procedures as preventive measures such as Dant dhavani Jivha lekha, Gandoosha or oil pulling and tissue regeneration therapies. In this article, an attempt has been made to review various herbal plants mentioned in Ayurveda and therapeutic procedures that can be used as an adjunct for the maintenance of oral health.

KEYWORDS: Irimedadi taila, Purusharthas, Periodontal diseases.

INTRODUCTION

Herbal formulations are more appealing because they work without alcohol, artificial preservatives, flavors or colors. Herbal products have shown promising results with minimal side effects. Also, the presence of naturally occurring phytochemicals has an additional effect on inflammatory pathways and antioxidant potential, making them eligible to be used as effective anti-gingivitis agents. These herbal ingredients are abundantly available, easily accessible, economically feasible and culturally acceptable. They possess minimal side effects and hence can be recommended for long term use.^[1] Several natural herbs such as green tea, tulsi, ajwain, turmeric, neem, cranberry, aloe vera, pot marigold; triphala etc., have been effectively used in reducing plaque accumulation and gingival inflammation.^[2,3] The major strength of these products is little or no incidence of side effects.

The main Aim of the Ayurveda is to attain **Dharma**, **Artha**, **Kama** and **Moksha** by health. Ill health takes away the health and happiness from life.^[4] These are the most important desires of Human Life in universe which are known to come under four Purusharthas meaning “for the purpose of the self”.

1. Dharma

↓
Being conscious in your actions, words and thoughts.

2. Artha

↓
Prosperity, Wealth

3. Kama

↓
Pleasure, sensual gratification

4. Moksha

↓
The Pursuit of Liberation

The Mukha i.e., oral cavity works as a reflector of the body health by acting as gateway of the alimentary canal and it is considered to be one of the most important parts of the Urdhwa Jatru. Upakusha is one among the Dantamoolagatha Rogas mentioned under Mukha rogas. The reference is available in Sushruta Samhitha (2350B.C).^[5]

The prevalence of oral diseases is major problem worldwide.^[6] Periodontal diseases are among the most

common infectious diseases affecting mankind and can lead to destruction of the periodontal ligament, cementum, gingiva and alveolar bone. Dental plaque is the primary etiological factor in gingival and periodontal diseases.^[7] Thus, control of dental plaque holds the key to halt the progression of periodontal diseases. Plaque control measures include both mechanical (toothbrushes, interdental brushes, floss) and chemical methods (mouthwashes).^[8] However, a majority of population does not possess the degree of motivation and skill to effectively use the mechanical means of plaque control, therefore emphasizing the importance of adjunctive chemical plaque control.^[9] Chemotherapeutic formulations provide chemically significant benefit in the reduction of plaque-induced gingivitis. Chlorhexidine is considered as the gold standard anti-plaque agent and has been serving the dental profession since a long time. However, it has certain unpleasant side effects like tooth staining, taste disturbance, etc.^[8]

When treating a disease, herbal mineral preparations are added to the latter approach after assessing an individual's constitution traits called as Prakriti in Ayurveda.^[10] With the passage of time, Ayurvedic practitioners developed large numbers of medicinal preparations and surgical procedures for the treatment of various ailments and diseases. Dentistry was included in the Shalakyachikitsa section of Ayurveda.^[11] Varieties of Ayurvedic and herbal preparation such as chewing

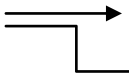
sticks, herbal brushes (Babool, Miswalk, Neem and Mango), Tulsi, Triphala, Neem, Amla, Pomegranate, Licorice, Aloe vera and Ajwain are used for various oral hygiene procedures as well as for treatment of various gum and oral diseases.^[12]

The main aim of this review article is to focus on different Ayurvedic Practices and Herbs which are beneficial for the treatment of periodontitis as well also, helps in maintenance of healthy oral flora.

Oil Pulling (Gandusha)

Irimedadi taila is one such product which is less explored in treating gingival and periodontal diseases. Irimedadi taila is an Ayurvedic oil used for a famous procedure called oil pulling or gargling.^[13] Oil pulling is an ancient Ayurveda procedure that involves 10 ml of swishing oil in the mouth for oral and systemic health benefits, it is kept inside the oral cavity for 10-20min before breakfast on an empty stomach and spitting it out without swallowing.


The oil pulling and swishing is done between the teeth. If the procedure had performed correctly; the oil which was viscous at the starting become thin and milky white. Following thorough pulling, the oil is spit out and the oral cavity is cleaned with warm water followed by the act of tooth brushing.

Swishing of oil is done  for drawing out all the microbes from various sites of oral Cavity.
Detoxifies the toxins.^[14,15]

In india Coconut oil, and Sesame oil are very easily available and inexpensive and also have numerous health benefits. Also, various types of oil are used for pulling,

such as olive oil, avocado, black cumin seed, canola and cedar nut.



ROOTS OF SESAME (*Sesamum indicum*)  Antifungal Activity.



↓

Chlorosesame has Antifungal activity
Polyunsaturated Fatty Acids

↓

Reduces the free radical injury occurring in the oral cavity.

↓

Lauric Acid

↙ ↘

Antimicrobial Anti-inflammatory

↪

Prevents Dental Caries.



Olive Oil

70% Monounsaturated Fatty Acid with Oleic acid (Predominant constituent).

Plant Phenolic Compounds, Squalene, Phytosterols;

Vit A, E and K

These all constituents of Olive Oil have **Antimicrobial**, **Immunomodulatory** and **Antioxidative** Effect.

Mechanism of Oil Pulling



*Antioxidants disrupt the cell wall of the microorganisms and thereby killing them.

*Leads to the attraction of the bacterial cell membrane which causes them to stick and get "pulled" towards the oil.



*Also limits the aggregation of bacteria and formation of plaque

Leads to better gingival and periodontal Health.

Decreases dental decay Eliminating the bad order from the oral cavity.^[16,17]

Beneficiary Effect shown by various Studies

Daniel et al compared the equal effectiveness of oil pulling and chlorohexidine mouthwash in eliminating malodor.^[18,19] Mostly 20% reduction shown by oil pulling in the bacterial count after sesame oil pulling was seen as compared to chlorohexidine mouthwash.

Tulsi (*Ocimum sanctum* Linn)

Tulsi (*Ocimum tenuiflorum*) is widely used in all the parts of India and is considered holy in the Hindu religion.



Often referred to as queen of herbs, Tulsi mouthwashes and dentifrices have become quite popular these days, particularly in Western world. It is quite surprising, despite the widespread use of Tulsi since ancient times; relatively little scientific attention has been paid to its oral health beneficial effects.^[20]

Tulsi is widely used in periodontal disease such as.

a) As an antimicrobial

- Tulsi is known to have strong antimicrobial properties toward *Streptococcus mutans*.
- Aqueous extract of holy basil has shown growth inhibition for *Klesbiella*, *Escherichia coli*, *Proteus*, and *Staphylococcus aureus* sp.
- while alcoholic extract has shown growth inhibition for *Vibrio cholerae*, *Bacillus pumilus*, *Pseudomonas aeruginosa*, and *S. aureus*.^[21]

b) In reduction of oral malodor

- The use of tulsi mouth rinse reduces the effect of oral malodor in 15 days and its effect on malodor was assessed after 15 days.

c) As anti-gingivitis agent

- The anti-gingivitis effect of *O. sanctum* extract dentifrice can be attributed to compounds isolated from *O. sanctum* extract. *Civsilineol*, *Civsimavatine*, *Isothymonin*, *Apigenin*, *Rosavinic acid*, and *Eugenol* compounds in Tulsi were considered to have anti-inflammatory activity or cyclooxygenase (COX) inhibitory activity.^[22]

d) As an antiulcer agent

- The essential oil of tulsi possesses antiulcer activity due to its lipoxygenase inhibitory, histamine antagonistic, and antisecretory effects.^[23]

e) Anticancer activity of *O. sanctum*:

- Tulsi has been shown to possess an excellent anticancer activity.^[24]

f) As analgesic, antipyretic, and anti-inflammatory

- Methanolic extract and aqueous suspension of Tulsi acts a COX-2 inhibitor, proving its anti-inflammatory property.^[25]

g) As an antioxidant

- Phenolic compounds such as *cirsilineol*, *apigenin* and *rosmarinic acid*, and *eugenol* in Tulsi extract render the protection from radiation poisoning and can repair cells damaged by exposure to radiation.^[26]
- It also has the ability to scavenge highly reactive-free radicals.

h) Modulates immunity

- The alcoholic extract of Tulsi modulates immunity, thus promoting immune system function.^[27]

Periodontal Application of Tulsi

○ As mouthwash

- ✓ Tulsi mouthwash has been found to be effective in reducing plaque and gingivitis.^[28] When taken in the concentration of 4%, it has been found effective in reducing volatile sulphur Compounds.^[29]
- ✓ These mouthwashes have been found to decrease periodontal indices by reducing plaque accumulation, gingival inflammation and bleeding and does not have any side effect as compared to chlorhexidine.^[28]
- ✓ Thus, it be effectively used as an alternative chlorhexidine and can be prescribed for longer duration without any side effects for the management of oral problems.^[30]

○ As a dentifrice

- ✓ When used as a dentifrice using 4% Tulsi extract, it showed significant reduction in the plaque and gingival scores after 21 days and also reduced the plaque formation during the 21 days of the trial.^[31]

○ As gel

- ✓ When used as 2% Tulsi, it caused reduction in both gingival and plaque indices.^[32]

• As intracanal irrigant

- ✓ Tulsi has shown to be effective intracanal irrigant when used in the concentration of 4% in primary molars at a concentration.^[33]

Pomegranate (*Punica granatum*)

Pomegranates consist of polyphenols, tannins, ellagic acid and anthocyanins which are considered as powerful antioxidants. The fruits anthocyanidins (red pigment) possess antioxidant activity.^[34]

Pomegranate contains tannins, punicalagins, punicalin, strictinin A and Granitin B which inhibits nitric oxide

production and suppress inflammatory cytokine expression.

It has been seen that pomegranates support oral health, strengthens gums and prevents loosening of teeth.

Studies have shown improved clinical signs of chronic periodontitis with the use of *Punica granatum* extract^[35,36] Anti-bacterial and anti candidal activity was seen in pomegranate seed extract.^[37]

Neem (*Azadirachta indica*)

Neem has been used in Ayurveda, Unani and Homoeopathic medicine and is a wonder tree of modern medicine.^[38] It has been used in many cases of inflammation, infections, fever, skin diseases and dental problems.

Neem alters the effect of tumour suppressor genes (e.g., p53, pTEN), angiogenesis (VEGF), transcription factors (e.g., NF- κ B) and apoptosis (e.g., bcl2, bax).

Nimbidin is a most active isolate from seeds of *A. indica*.



Neem (*Azadirachta indica*)



- I. Dental care products of neem contain Neem leaf or bark extract.
- II. Leaf of Neem is rich in antioxidants.^[41]
- III. Neem, in general acts as a good remedy for curing mouth ulcers, tooth decay and acts as a pain reliever in toothache problems.



Nimbidin



Nimbidin consists of Nimbin, nimbinin, nimbolide, nimbidic acid and quercetin which are responsible for its biological activities.^[40]

Role of Neem in Dentistry

- a) **Periodontal Health:** A study conducted by Bhambal et al,^[42] it was assessed that neem mouth rinse was equally effective as chlorhexidine mouthwash in improving periodontal pathogens.
- b) **Anti-Plaque Activity-** Neem stick reduces the ability of streptococci to colonize tooth surfaces.^[43]
- c) **Antibacterial Activity-**Neem has natural antibacterial activity and has antimicrobial effects against *S. mutans* and *S. faecalis*.^[44] Chewing of dried Neem sticks has showed antibacterial activity against *S. mutans*.^[45]
- d) **Root Canal Irrigant:** The antioxidant and antimicrobial properties of neem, shows its high effectiveness as a root canal irrigant and as an alternate to using sodium hypochlorite.^[46]
- e) **Inhibiting the Bacterial Load In Orthodontic Patients:** A study conducted by Lakshami and Aravind evaluated the anti-plaque activity of the extract against *S. mutans*, *S. sanguis*, and *S. mitis* which is found in patients undergoing orthodontic treatment.^[47]
- f) **Anti Candidal Activity-** A study conducted by Kumar and Sidhu, the aqueous extracts of neem showed anticandidal activity by affecting the adhesion, cell surface hydrophobicity and biofilm formation that inhibits candidal colonization.^[48]

Mango (*Mangifera indica*)

> 5% concentration of *Mangifera indica* used as an antimicrobial property. It contains tannins, bitter gum, and resins which has an astringent effect mucous membrane forming a layer over enamel which provides protection against dental caries.

Prashant et al, conducted a study in which he showed that the effect of 50% of Mango and neem extract was assessed on different *Streptococcus mutans*, *Streptococcus salivarius*, *Streptococcus mitis*, and *Streptococcus sanguis*. It concluded that Neem extract produced the maximum zone of inhibition on *Streptococcus mutans* at 50% concentration.^[49]

Licorice



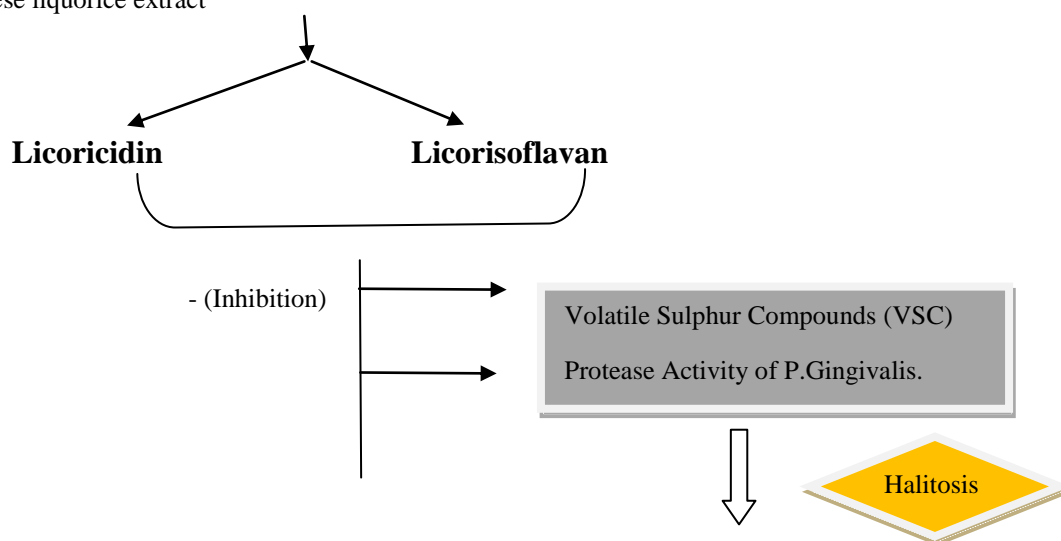
Licorice Dry Extract

Liquorice root has an integral part of Chinese medicine and Ayurveda for centuries. Liquorice is a sweet, moist, soothing herb that belongs to the *glycyrrhiza* species native to Mediterranean countries and Asia.

Role of Licorice in Dentistry

a) Gingivitis

- Raw polysaccharides have shown strong anti-adhesive effects against *P. gingivalis*.
- Chinese liquorice extract



Licoricidin and Licorisoflavan are present in Chinese liquorice extract and have been found to have an inhibitory effect on the production of volatile sulphur compounds (VSC's) and protease activity of *P. gingivalis* therefore reducing halitosis.^[50]

b) Aphthous Ulceration

- Effect of licorica bioadhesive hydrogel in controlling pain and reducing the healing time of recurrent aphthous ulcer. Also concluded the effectiveness in reducing pain and inflammatory component of aphthous ulcer.^[51]

c) Anticaries Activity

- The 4 metabolites of *Glycyrrhiza uralensis* i.e; (5-O-methylglycyrol, isoglycyrol, 6,8-diisoprenyl-5,7,40-trihydroxyisoflavone and gancaonin G) have been extracted from the roots of *glycyrrhiza* have an anti caries activity.^[51,52]

d) Anti- cancer Activity

- Liquorice has been investigated as a chemotherapeutic agent for its beneficial role in management of oral squamous cell carcinoma.

Aloe Vera (*Aloe Barbadensis*)



Antiseptic & Antibiotic

Property: Geetha Bhatt et al., have proven that the use of aloe vera gel can be used as subgingival administrator in the treatment of periodontal pockets.^[53]

Aloe vera is the medicinal herb from the family "Asphodelaceae" genus 'Aloe'. Aloe vera has numerous beneficial properties.

Honey (Propolis)

Propolis, which is also as bee glue, is a natural nontoxic resinous sticky substance that is produced by honeybees.^[54] The term propolis comes from the Greek "pro", in front, "polis" means town or city and relates to the protective properties of the substance.^[55]



Desensitising Toothpaste: It has been used to decrease dentinal hypersensitivity and permeability of dentin and occlude dentinal tubules.^[56,57]

Anti-Viral Agent: It delays growth and progression of skin changes in an early stage of infection with Herpes simplex without any cytotoxic effect.^[61]

Recurrent Aphthous Stomatitis: 500 mg of propolis capsule taken daily significantly reduced outbreaks of RAS ulcers.^[58,59]

Radiation Induced Mucositis: Reduction of oral mucositis which resulted from chemotherapy.^[60]

ROLE OF DIFFERENT TYPES OF SPICES IN PYORRHEA

Turmeric (*Curcuma longa*)



1. Turmnova (Turmeric Lozenges)Botanical Name: *Curcuma Longa*Active Components: Curcuminoids, cyclocurcuminoids, tumerones, essential oils.^[62]

Family- Zingerberaceae



Turmeric Extract (100mg)

Eucalyptus Oil (6.4mg)

Menthol (6.3mg)

Pharmacological Actions

Anti-oxidant, Anti-inflammatory, anti mutagenic, anti platelet, protects the liver, reduces stiffness in symptoms of arthritis and tendonitis, inhibits HIV in test tubes, used to alleviate post-surgical inflammation, Antibacterial, anti parasitic, facilitates process of scabbing in chickenpox, for treatment of otorrhoea, Treats indigestion.^[63]

Role in Dentistry

- **Plaque detector**

- Periodontal disease is due to bacteria present in dental plaque, dental plaque refers to a gelatinous mass of bacteria adhering to tooth surface which is invisible to naked eye. They are stained with plaque staining agents which contains various dyes to determine their exact location. This dental-plaque detection system includes a dental-plaque staining agent, which contains at least one selected from yellow pigment of beni-koji, turmeric extracts, and curcumin; and a light-emitting apparatus, which outputs light having a wavelength within a range of 250 to 500 nm. The dental-plaque detection method includes application of the plaque detector and irradiating the oral cavity with light of the same wavelength.^[64]

Regarding Dental Problems

Turmeric can be used in following ways offer relief from dental problems.

- 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 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 teeth strong.^[63]
- Applying a paste made from 1 tsp of turmeric with ½ tsp of salt and ½ tsp of mustard oil provides relief from gingivitis and periodontitis. Rub the teeth and gums with this paste twice daily.

Various studies on Curcuma Longa

1. Studies by Kwang-Hee lee et al show that Curcuma longa essential oil inhibits S. mutans acid production and growth at concentrations from 0.5 to 4 mg/mL, this oil also inhibited the adhesion to saliva coated hydroxyl apatite beads at concentrations higher than 0.5 mg/mL.^[65]
2. Jeon et al showed that fractions of turmeric separated using methanol extract showed inhibitory effects on the virulence properties of S. mutans biofilms, such as bacterial adherence, acidogenicity and aciduricity.^[66]
3. Curcumin also exhibits phototoxic effects against gram positive and gram-negative bacteria, they can be used for photo dynamic therapy in root canal treatment.^[67]
4. Studies also show that curcumin inhibits E. fecalis biofilm formation, showing that it has potential to be used as an irrigant for root canal treatment.^[68]

2. Ginger (*Zingiber officinale*)

Active components: Volatile oils, Shogaols, Gingerols, Diarylheptanoids.^[69]

Role in Dentistry

- As a sialogogue to promote salivation.
- For treatment of toothache and gingivitis.

Roopal V Patel demonstrated that combined extracts of ginger and honey showed maximum inhibitory concentration against S. mutans and S. aureus and were least effective against L. acidophilus in comparison with gentamycin, showing, there is a significant synergistic effect of antimicrobial activity from the combination of ginger and honey, against isolates from carious teeth.^[70]

Cinnamon and ginger have excellent antimicrobial activity on the growth of Mutans streptococci and lactobacilli, but their effects are more on lactobacilli than mutant streptococci. Cinnamon should be prescribed prior to ginger because it has more antibacterial activity on the growth on both bacteria types even in small concentrations (50mg/ml).^[71]

3. Black Pepper (*Piper Nigrum*)

Active components: Volatile oils, Piperine, pinenes, d-limonene, caryophylline.^[72]

Role in Dentistry

- For treatment of oral abscesses, tooth decay, and toothaches.
- Jayashankar et al showed that brushing with a herbal toothpaste with *Piper nigrum*, *Syzygium aromaticum*, *Zinziber officinale* as one of the major components for a period of 12 weeks, showed a significant reduction in the gingival bleeding, oral hygiene and salivary anaerobic bacteria count and overall improvement in oral hygiene.^[73]
- Yona Siddhartha et al showed that pepper extracts affected the growth extracts of *S. mutans* in vitro thus proving its antibacterial properties.^[74]

4. Clove (*Syzygium aromaticum*)

Active components: Volatile oil, non-volatile ether, crude fiber carbohydrates, mineral matter.

Pharmacological action

Pesticidal and nematocidal, molluscicidal activity, enzyme activity, Antiplatelet activity, antiviral activity, anticancerous activity.^[75]

Role in Dentistry

Anti-oxidant: Eugenol has a scavenging effect i.e., it helps to prevent cell and tissue damage that could lead to disease, it also acts an enzyme activator and this property is effectively used in treating toothaches.^[76]

Anti-fungal: Pinto et al have reported the antifungal activity of clove oil from *Syzygium aromaticum* against *Candida*, *Aspergillus* and dermatophyte species. Studies done by Ahmad et al also show that clove oil possess strong antifungal activity against opportunistic fungal pathogens such as *Candida albicans*, *Cryptococcus neoformans* and *Aspergillus fumigatus*.^[77]

Anti-microbial: Cai L reported that MeOH extract of *S. aromaticum* inhibited the growth of periodontal oral pathogens, including *Porphyromonas gingivalis* and *Prevotella intermedia*.^[78] Pachori et al demonstrated that soaked and boiled extracts of cloves showed a positive anti-microbial activity against *S. mutans* and *C. Albicans*.^[79]

The antimicrobial activity of clove and clove bud oil were investigated by agar well diffusion method against five dental caries causing microorganisms namely *Streptococcus mutans*, *Staphylococcus aureus*, *Lactobacillus acidophilus* (bacteria), *Candida albicans* and *Saccharomyces cerevisiae* (yeast). It was finally concluded that clove oil emerged as the potent agent exhibiting even much higher antibacterial and antifungal activity than the standard antibacterial and antifungal drugs ciprofloxacin and amphotericin-B respectively.^[80]

5. Cinnamon (*Cinnamomum Vernum*)

Active components: Volatile oil, fixed oil, tannin, resin, proteins, cellulose, pentosans, mucilage, starch, calcium oxalate and mineral elements. The volatiles are monoterpenes, sesquiterpenes and phenylpropenes.^[81]

Pharmacological actions

Anti pyretic, antiseptic, astringent, balsamic, carminative, diaphoretic, fungicidal, stimulant, stomachic.

Role in Dentistry

Studies by Shaymaa Al Joubori showed that ultrasonic and oil cinnamon extracts have high activity against *Streptococcus mutans* and decreased the viable bacterial count. They were also shown to increase salivary Ph and flow rate.^[82]

M Vinitha et al performed studies on *Cinnamomum vernum*, *Curcuma longa* and *Myristica fragrans*, and demonstrated that *Cinnamomum vernum* possessed a strong anti candidal effect at concentrations of 25 to 50 mg/L, and both *Curcuma longa* and *Myristica fragrans* did not show any anti candidal activity at 25 to 50 mg/L.^[83]

A study by Lalith Kumar D Chaudhary on 9 essential oils, wintergreen oil, lime oil, cinnamon oil, spearmint oil, peppermint oil, lemongrass oil, cedar wood oil, clove oil and eucalyptus oil against *S. mutans* showed that Cinnamon oil showed highest activity against *Streptococcus mutans*.^[84]

CONCLUSION

From this review article, it can be concluded that various ayurvedic, herbal and spices and certain types of home remedies are effective in controlling plaque-induced gingivitis and periodontitis. Furthermore, it can be served as a natural alternative for patients who wish to avoid, alcohol and other side effects associated with chlorohexidine mouthrinse and other alternatives role of antibiotics in healing of oral infections. These nutraceuticals are very effective and can be used as a treatment modality for oral diseases; however, controlled clinical trials are still required to assess the efficacy of these traditional therapeutic modalities in the field of dentistry.

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