



## HERBS IN DENTAL HEALTH CARE

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### ABSTRACT

Herbal medicines have become increasingly popular. The use of natural substances particularly plants to control diseases is a centuries old practice that has led to the discovery of more than half of all modern pharmaceuticals. Documentation of the use of natural substances for medical purposes can be found as far back as 78 A.D. Herbs have demonstrated their efficacy as healing agents for thousands of years. Medicinal plants are mentioned in the Indian Ayurvedic system, in Chinese traditional medicine, ancient European materia medica. The use of medicinal herbs has also been mentioned in ancient Egyptian medical literature. In spite of the fact that herbal medicines are used extensively in the World, only recently attempts have been made to standardize and characterize plant materials. Herbs may be good alternative to current treatments for oral health problems. However, as yet there is lack of information about the effect of herbs in oral diseases. This article provides useful information on the use of herbs in the prevention and treatment of oral diseases.

**Keywords:** Gingivitis, Toothache, Periodontal Disease, Oral disease.

### INTRODUCTION

Herbal medicine is a popular form of complementary and alternative medicine (CAM). Alternative medicine therapies have become increasingly popular and it has been estimated that one third of all Americans use herbal products. In 1997 herbal medicine sales increased nearly 59% reaching an estimated total 5324 billion [1]. Herbal drugs had been considered in every culture. Several popular drugs used in Western medical science have their origin from medicinal plants [2], for example aspirin from willow bark and digitalis from foxglove. Natural products have served as a major source of drugs for centuries and about half of the pharmaceuticals in use today are derived from natural products for example morphine, quinine, theophylline, vincristine, vinblastine, paclitaxel, cyclosporine, doxorubicin and digoxin etc) [1,3]. In spite of the fact that herbal medicines are used extensively in the World, only recently have there been attempt to standardize and characterize the material used in clinical trials for eg

Echinacea is a tree native American medicinal plant and is used for a variety of medicinal purposes by American Indian tribes including the Cheyenne (sore mouth & gums), Comanche (toothache, sore throat), Crow (toothache, colds) [4]. Many herbal medicines are efficacious and their beneficial effects have been proved scientifically [5]. Herbs may be good alternatives to current treatments for oral health problems. However, as yet there is lack of information about the effect of herbs in oral tissue, mechanism of action and side effects. Herbal products have comparatively fewer side effects and are safer to use than conventional medicines particularly if use topically as poultice, pastes, cream, liniments, ointments, gargles or mouth wash [6]. There is an urgent need for use of evidence based herbal medicine and to evaluate their efficacy and safety in the treatment of oral diseases. Clinical trials of many herbal products are being undertaken and published each year [7] but controlled trials are scarce. This review article provides useful

information on the use of herbs particularly in dental health care.

## MATERIAL AND METHODS

**Data collection:** The data collection for the present review was collected from various text books on medicinal plants, Ayurvedic texts and research articles. Most of the papers reviewed herein pertinent to herbal medicine research were published in internationally recognized peer reviewed journals. Main books refer include reviews on “ Indian Medicinal Plants” Indian Council of Medical Research, New Delhi Volumes 1-9, 2000-2009. “ Medicinal Plants of India”, ICMR, New Delhi, 1987, vol. 2 .Data base on medicinal plants used in Ayurveda , Volumes 1-8, Central council for Research in Ayurveda & Siddha Deptt. Of ISM& H, Ministry of Health & Family welfare, Govt. of India, New Delhi, “ Indigenous drugs of India “ by R N Chopra. “Wealth of India” Council of Scientific & Industrial Research , New Delhi, Volumes I A, 2b , 3, III, IV, V, VI, VII, VIII, IX, X and XI and various Journals of Dentistry. Some of the medicinal plants/ phytochemicals used in the prevention and treatment of oral disease are

***Abutilon indicum* Linn (Malvaceae)**, English name- Indian mallow, Hindi -Jhampi. Bark is astringent & anti-inflammatory. Decoction of leaves is used as mouthwash in toothache and tender gums [8,9].

***Albizia lebbek* Linn (Mimosaceae)**, English name-Siris tree, Hindi- Siras. The bark is astringent, anti-inflammatory, anodyne & tonic. It is useful in strengthening gums, inflammations and as a dentifrice in odontopathy [8,9].

***Acacia leucophloea* Willd (Mimosaceae)**, English name-White babul, Hindi-Safed babul/Kikar. Bark is styptic, astringent anti-inflammatory& demulcent. It is used in dental caries, stomatitis and oral ulcers [10].

***Acacia nilotica indica* (Mimosaceae)**, English name-Indian gum Arabic tree,Hindi- Kikar. Bark is astringent, styptic & emollient. It is used in haemorrhages, on wounds, oral ulcers & odontopathy. Gum is sweet,emollient & haemostatic [11,12].

***Acacia catechu* Willd (Mimosaceae)**, English name-Cutch tree, Hindi-Kair. A small piece of catechu with cinnamon and nutmeg is held in tooth for toothache. It is also useful for bleeding, ulceration and sponginess of gums [13].

***Acorus calamus* Linn (Araceae)**,English name- Sweet flag, Hindi- Bach. Rhizome is useful in odontalgia [8,9].

***Allium sativum* Linn (Alliaceae)** English name- Garlic, Hindi- Lahsun. Bulbs are astringent, rubefacient and are

useful for facial paralysis, lock jaw and dental caries [8,9].

***Anogeissus latifolia* Roxb(Combretaceae)** English name- Button tree, Hindi- Dhavra. The leaf juice is good for otopyorrhea. Bark is astringent, anti-inflammatory and haemostatic[8,9].

***Azadirachta indica* A.Juss (Meliaceae)** English name-Margosa tree, Hindi- Neem.Bark, leaves are astringent, antiseptic & antibacterial [8]. Seeds are astringent and emollient they are useful in odontalgia. Nimbidine gargle and dentifrices are effective in the treatment of bleeding gums and pyorrhea. Nimbidine is found to be effective in Herpes labiales infections [14].

***Aloe vera* Linn (Liliaceae)** English name- Indian Aloe, Hindi- Ghikunwar. The chemical in gradients in aloe vera gel include aloin, vitamins, enzymes, minerals, sugars, fatty acids, amino and salicylic acid [15]. *Aloe vera* gel promotes healing. The aloe activator spray is excellent for throat infections, painful erupting wisdom teeth and joint pain. The gel has been shown to be bactericidal and fungicidal against candida albicans(prevents moniliasis or denture sore mouth [16]. Virucidal activity against Herpes simplex, Herpes zoster and oral lichen planus has also been reported from *A. vera* gel [17]. Local application of *Aloe vera* gel is beneficial for traumatized or scratched gums due to tooth brush, dentifrice, abrasion, dental floss, tooth pick injury , at the site of periodontal surgery, herpetic viral lesions, aphthous ulcers, corners of lips angular cheilosis and gum abscess. Application of *A. vera* gel at the site of extraction prevents development of dry socket. Other oral diseases respond to local application of gel include benign pemphigus,gingivitis associated with AIDS, leukaemia glossitis, burning tongue syndrome, candidiasis, & Sjorgen,s syndrome. *Aloe vera* gel can also be used around dental implants to control inflammation [18].

***Bambusa arundinacea* Retz( Poaceae)** English name-spiny bamboo, Hindi- Bans. Root is beneficial in bleeding gums [8].

***Barleria prionitis* Linn (Acanthaceae)**, Hindi name – Jhinti. Root paste is used to relieve toothache [9].

***Berberis aristata* DC (Berberidaceae)**. English name-Ophthalmic barberry,Hindi- Rasaut. Whole plant decoction is used as mouth wash for treating swollen gums and toothache[8,9].

***Brassica campestris* Linn (Cruciferae)**, English name-Field mustard, Hindi- Sarso. Brushing teeth with seed oil mixed with common salt is reported to cure hemophilia and gum inflammation [9].

***Camellia sinensis* Linn(Theaceae)**, English name –Tea plant, Hindi-chha. Effective in periodontal diseases. The efficacy of various dentifrices and potentiating effect of tea dust amalgamated with the tooth paste were investigated against microbial pathogens and therapeutic effect on clinical application among severely infected patients were also examined [14].

***Carum carvi* Linn(Apiaceae)** ,English name-Black caraway, Hindi- Kala Jeera. The plant is commonly called caraway. Two main components present in the plant are carvone(50-60%) and limonents (40%) [19]. Volatile oil from the plant is beneficial in gingivitis and periodontal diseases (as mouth wash) [20]. Caraway has been used as a flavouring agent in tooth paste, mouth wash and cosmetic products.

***Cichorium intybus* Linn (Asteraceae)**, English name – Chicory, Hindi- Kasni. Clinical study in patients with gingivitis- In a clinical trial on 50 patients with gingivitis and bleeding gums, massage of th gums with alcoholic extract of root, twice daily for 3 weeks showed consistent relief in inflammatory and bleeding conditions of gums as assessed by gingival inflammation index [21]. In another clinical study, therapeutic efficacy of chicory root extract against pyorrhoea was examined in 40 patients. Alcoholic extract of chicory (250mg) massaged on inflamed gums twice daily for 3 weeks gave relief in inflammation and bleeding conditions.

***Cinnamomum verum* Presl (Lauraceae)** English name-Cinnamomum, Hindi- Dalchini . Bark is astringent, styptic, deodorant and useful in toothache. Commercial cinnamomum preparation was studied clinically in 5 patients with oral candidiasis, excellent results are observed in 3 patients. An Ayurvedic tooth paste containing cinnamomum and other products tested in 50 patients suffering from dental disease. Paste was reported to be effective in controlling dental disease [22]. C. tamala oil is also used medicinally as dentifrice and in toothache.

***Citrus reticulata* Blanco Syn. (Rutaceae)** English name-Orange, Hindi- Santra. Dental plaque- Effect of consumption of fresh refrigerated and frozen fruit juice (orange, grapes & pineapple) on plaque and saliva was evaluated in a clinical study. Grape juice was more acidogenic compared to orange & pineapple juice and frozen juice caused a greater reduction in plaque and salivary pH followed by refrigerated and fresh juice[23].

***Cissus quadrangularis* Linn (Vitaceae)** English name-edible stemmed vine, Hindi- Hadjod. Fracture healing- Alcoholic extract of plant in a dose of 0.5 ml intramuscular showed healing of fracture in rats. Accumulation of mucopolysaccharides in the first week of injury was observed and in second week mineralization

process at the fracture site took place (earlier). The plant showed anti-inflammatory, analgesic, antioxidant and anti osteoporotic activity. In a clinical study conducted at SS Hospital BHU Varanasi, the paste of herb on local application to the fractured area in 16 patients showed reduction in total healing time of fracture by 55 to 33%. The radiological examination revealed adequate callus formation and patients were found free from all signs and symptoms of fracture [24]. Clinical trial was also carried out with pills made from stem juice (100 mg extract) in 6 patients having chronic osteomyelitis with discharge sinuses [25].

***Commiphora wightii* Arndt (Burseraceae)** English name- Hill mango, Hindi- Guggal. The gum is astringent, anti-inflammatory, anodyne, antiseptic, nerve tonic. It is useful in neuralgic pain, sciatica, facial paralysis. Gum lotion is used as gargle in dental caries and weak and spongy gums. C. molm plant contains 3 main ingredients (Resin, gum & volatile oil). Resin has analgesic and antimicrobial properties and stimulates macrophages [26]. Plant has astringent and demulcent effects on inflamed tissue in the mouth and throat. Volatile oil of plant is used topically for inflammation of oral and pharyngeal mucosa. It is also used as a mouth wash for gingivitis and ulcers [27]. Tincture from the plant is used for inflammation of gum, oral mucosa, gingivitis and stomatitis [28].

***Coriandrum sativum* Linn (Apiaceae)**, English name-Coriander, Hindi- Dhania). Leaves are astringent, analgesic, anti-inflammatory, styptic and useful in bleeding from gums [8].

***Eclipta alba* Linn (Asteraceae)**, English name- Trailing eclipta, Hindi- Bhringaraja), Plant is anti-inflammatory. It is useful in toothache & stopping haemorrhage and strengthening gums [9].

***Embelia ribes* Burm F (Myrsinaceae)**, English name- Embelia, Hindi- Vayavidanga. Fruits are astringent, anodyne, they are useful in dental caries, odontalgia. Roots are astringent and useful in odontalgia. Leaves are useful in aphthae and ulcers of mouth [8].

***Erythrina variegata* Linn (Fabaceae)**,English name-Indian coral tree, Hindi- Dadap. Bark is useful in inflammation of gums and toothache [9].

***Ficus benghensis* Linn (Moraceae)**, English name-Banyan, Hindi- Bargad. Latex is useful for bleeding and inflamed gums. Whole plant is astringent,styptic and anti-inflammatory. F.racemosa—Infusion of bark and leaves is used as mouthwash for spongy gums [8].

***Hyoscyamus niger* Linn (Solanaceae)** English name – Stinking Roger, Hindi- Khurasani ajwain. Leaves and

seeds are useful in odontalgia, bleeding gums and dental caries [8,9].

***Hydrocotyle javanica* Linn (Umbelliferae)**, Hindi name- Brahmi. Leaf stalks are said to be useful in toothache [29].

***Ichnocarpus fruticans* Linn (Apocynaceae)**. The plant is considered to be useful by the tribals in bleeding gums, ulcerated tongue and sore [30].

***Juglans regia* Linn (Juglandaceae)**, English name- Walnut, Hindi- Akhrot. Therapeutic evaluation- Local application of 1g powder of *J. regia* bark, *Zanthoxylum alatum* bark, *Mimusops elengi* bark and *Hibiscus abelmoschus* seed mixed with honey, twice daily gave relief in 8 out of 10 patients of bleeding gums. Swelling was relieved in 4 days and gum bleeding in 8 days. Discharge from gums disappeared in 10 days [31].

***Jasminum officinale* Linn (Oleaceae)**, English name – Spanish jasmine, Hindi- chameli. The plant is astringent, antiseptic, emollient & dentifrice. Leaves are useful in dental disorders, ulcerative stomatitis. Flowers are useful in diseases of oral cavity [8,9].

***Jatropha curcas* Linn ( Euphorbiaceae)**. English name- Angular leaved physic nut, Hindi- safed errand. Stem juice is haemostatic and styptic. The twigs are used for brushing teeth (in swollen gums) [32]. *J.gossypifolia*- Plant is believed to cure toothache.

***Madhuca longifolia* Koen (Sapotaceae)**. English name- Mahua, Hindi- Mahua. Decoction of bark is used in bleeding gums [33].

***Mammea longifolia* Planch (Clusiaceae)**. Hindi name- Nagkaser. Flower buds are used filling the cavity caused by dental caries and to relieve toothache [9].

***Matricaria recutita* Linn (Asteraceae)**, English name- Chamomile. The plant is commonly called Chamomile. Flowers contain 1-2% volatile oil. Other active ingredients include flavonoids, apigenin, luteolin and quercetin. Whole plant extract is used for gingivitis and periodontal disease as mouth wash. Topical creams or ointment can be applied locally on affected gums, 3-4 times daily [34].

***Mentha piperita* Linn (Labiatae)**. English name- Peppermint, Hindi- Pudina .Plant is also called peppermint. It contains volatile oil 0.1-1%, menthol 29-48% and menthone 20-31%. Peppermint oil can be used topically for toothache (moistened cotton is placed in the cavity or by rubbing oil on the tooth. Oil is also used as mouth wash for relieving gum inflammation [35].

***Kinganelia reticulata* Juss (Euphorbiaceae)**. Leaf juice with camphor and cubebs ( *Piper cubebe*) is useful in bleeding gums [36].

***Mimusops elengi* Linn (Sapotaceae)** ,English name- Bullet wood tree, Hindi- Bakul. Bark is astringent, it is used as gargle for odontopathy, inflammation and bleeding gums. Unripe fruit is used as a masticatory and will help to fix loose teeth [8].

***Moringa oleifera* Lam (Moringaceae)** ,English name- Drumstick, Hindi- Sahinjan. The gum is given in dental caries with sesame oil [8].

***Moringa citrifolia* Linn (Rubiaceae)** English name- Indian Mulberry, Hindi- Bartundi. Fruits are used in spongy gums [9].

***Myrica esculenta* Linn (Myricaceae)**, English name- Box berry, Hindi- Kaiphal. Bark is astringent and antiseptic. Chewing of bark is said to relieve toothache [36].

***Nelumbo nucifera* Gaertn (Nelumbonaceae)**. English name- Lotus, Hindi- Kamel Roots are useful for caries of teeth [8].

***Ocimum americanum* Linn (Lamiaceae)**, English name – Hoary basil, Hindi – Kala Tulsi Decoction of plant and leaf is used as mouth wash for relieving toothache [9].

***Paederia foetida* Linn (Rubiaceae)**, English name- Chinese moon creeper, Hindi- Gandhaprasarni. Fruit is considered as specific against toothache [8].

***Peristrophe paniculata* Forssk (Acanthaceae)**, Hindi name- Atrilal, Kakajangha. Root if useful in dental caries [8].

***Phyllanthus emblica* Linn (Euphorbiaceae)**, English name Emblic Myrobalan, Hindi- Amla. The root bark is astringent and is useful in ulcerative stomatitis [8,9].

***Pongamia pinnata* Linn ( Fabaceae)** ,English name- Indian Beech, Hindi- Karanj. Roots are good for cleaning teeth and strengthening gums [8].

***Portulaca oleracea* Linn (Portlanceae)**, English name- Common Indian purslane, Hindi- Badi noni. Stem and leaves are useful in odontalgia, scurvy and ulcerative stomatitis [8,9].

***Psidium guajava* Linn (Myrtaceae)**, English name- Guava, Hindi- Amrood. Leaves are used as efficacious gargle for swollen gums and ulceration of the mouth [9,33].

***Punica granatum Linn (Punicaceae)***, English name- Pomegranate, Hindi- Anar. Root and stem bark are astringent and good for strengthening gums [8].

***Rosmarinus officinalis Linn (Lamiaceae)***, English name- Rosemary. Volatile oil (Eucalyptol, Cineole) is a potent antibacterial and antifungal. Gram positive gram negative bacteria inhibited include Staph. aureus, Steph. Albul, vibro, cholera & E. coli and candida species.

***Salvia officinalis Linn (Lamiaceae)***, English name- Garden sage or common sage. Plant is commonly known as sage. The volatile oil of sage contains alpha and beta thujone, camphor, cineole, rosmarinic acid, tannins and flavonoids [39]. Sage oil has antibacterial, antifungal and antiviral properties. In European countries, gargal of sage tea is recommended to treat sore throat, inflammation of mouth and gingivitis [40].

***Sanguinaria canadensis Linn (Papaveraceae)***, English name- Blood Root. The main alkaloid sanguinarine from this plant is used for gingivitis and periodontal diseases in the form of tooth paste or mouth wash [41]. Sanguinarine has been shown to possess antibacterial activity.

***Solanum anguivi Lam (Solanaceae)***, English name- Poison berry, Hindi- Badi kateri. Root is useful in toothache. *S. virginianum* (Yellow berried nightshade)- Whole plant is useful in dental caries. Fumigation with the vapour of burning seeds is used to cure toothache [8,9].

***Symplocos racemosa Roxb (Symplocaceae)***. English name- symplocos bark, Hindi- Lodh. Bark is astringent, anti-inflammatory & haemostatic. It is useful in spongy and bleeding gums [8].

***Syzygium cumini Linn (Myrtaceae)***, English name- Jaman, Hindi Jamun. Bark is astringent antibacterial. The ash of leaves is used for strengthening the teeth and gums. Fruits and seeds are used to strengthening teeth & gums [8].

***Syzygium aromaticum Linn (Myrtaceae)***, English name- Clove tree, Hindi- Laung. Useful in odontalgia dental caries and toothache, Eugenol obtained from the clove is used as obtundent in dental practice. Clove is commonly used in Ayurvedic tooth paste [9].

***Tribulus terrestris Linn (Zygophyllaceae)***, English name- Land Caltrops, Hindi Chhota Gokhru. The root, fruits are useful for ulceration of gums. Leaves are useful in inflammation of gums. Seeds are used for ulcerative stomatitis [8].

***Tamarindus indica Linn (Caesalpinaceae)***, English name- Tamarind tree, Hindi- Imli. Root bark is astringent and is useful in gingivitis [8].

***Tephrosia purpurea Linn (Fabaceae)***, English name- Purple Tephrosia, Hindi- Sarphoka. Plant is astringent and is useful in toothache and gingivitis [8].

***Thymus vulgaris Linn (Lamiaceae)***, English name- Wild thyme, Hindi- Banajwan. Volatile oils containing phenol, thymol and carvacol. Plant products are used to treat oral Herpes and candidiasis [42,43].

***Zanthoxylum armatum DC (Rutaceae)***, English name Toothache tree, Hindi- Tejovati. The bark is antiseptic, disinfectant and is useful in disorders of buccal cavity. Stem is used in toothache. Seed oil is used as antiseptic. A polyherbal formulation GL402 containing *Zanthoxylum armatum* & other herbs was applied topically in 45 patients of periodontitis, twice daily for 15 days. It was found that 33 patients had no bleeding & inflammation. Plaque was absent in 9 patients, calculus formation inhibited in 11 patients and teeth mobility inhibited in 19 patients. The drug was safe and effective in treating periodontitis [44].

#### Miscellaneous medicinal plants, useful in dentistry

*Oenothera* (Onagraceae) - Evening primrose - For inflamed gums, *Equisetum* (Equisetaceae) - For mouth & gum infections, *Gaultheria fragrantissima* (Ericaceae) - stop haemorrhage, *Humulus lupulus* (Cannabinaceae) - For toothache folia, *Lobelia nicotiana folia* - For Jaw pain, *Nepita cataria* (Labiatae), *Origanum vulgare* - For toothache, *Panax ginseng* (Araliaceae) - repair gum tissue, *Pimpinella anisum* - Demulcent for gums, *Satureja horlensis* (Labiatae) - Anti-inflammatory, *Stellaria medica* (Caryophyllaceae) Demulcent for mouth sore, relieve oral cancer pain, *Syphytum* (Boraginaceae) - relieve pain of Jaw & tooth fracture, *Tagetes erecta* (Compositae) - Mouth wash for ulcer, *Taraxacum officinal* (Compositae) - For mouth abscess, *Viola odorata* (Violaceae) - relieve pain caused by oral cancer [45].

#### CONCLUSION

The use of these herbal extracts in the form of chewing sticks, tooth pastes, mouth rinses and gum is entirely consistent with the primary health care approach principles and in particular that of a focus on prevention, community participation and the use of appropriate technology.

Future studies should be focused on chemical nature and mode of action of active constituents of these plants.

## REFERENCES

1. De-Smet. PAGM. The role of plant derived drugs and herbal medicines in health care. *Drugs*, 54, 1997, 801-840.
2. Chen K. Chinese Medicinal Material and their interface with Western medical concepts. *J Ethnopharmacol*, 96, 2005, 1-18.
3. Swerdlow JL, Johnson. Nature's Medicine: Plants that heal. *National Geography*, 2005.
4. Taylor JA, Wefer W, Standish L. Efficacy and safety of Echinacea in treating upper respiratory infections in children. *JAMA*, 290, 2003, 2824-2830.
5. British Herbal Medicine Association Scientific Committee. British Herbal Pharmacopoeia. West York, U.K. *British herbal medicine association*, 1983.
6. Murray MC, Worthington HV, Blinkhorn AS. A study to investigate the effect of a propolis containing mouth rinse on the inhibition of de novo plaque formation. *J Clin Periodont*, 24, 1997, 796-798.
7. Rotblatt M, Zimet I. Evidence based herbal medicine. Chapter 1, 2002, 1-5.
8. Data base on medicinal plants used in Ayurveda. Volumes 1-8, Central Council for Research in Ayurveda & Siddha (Dept. of ISM& H, Ministry of Health & family welfare) Government of India, New Delhi.
9. Chopra RN, Chopra IC, Handa KL, Kapur LD. Indigenous drugs of India. 2<sup>nd</sup> eds, UN Dhur & Sons pvt. Ltd. Calcutta, 1958.
10. Terlinden S. Natural material for dental care. *Dtsch Aph Ztg*, 125(35), 1985, 1731-1733.
11. Almas K, Al Laf TR. The natural tooth brush. *World Health Forum*, 16(2), 1995, 206-210.
12. Jain N, Magan A, Sondhi SM. Determination of mineral elements presented in medicinal plants used for development of health for treatment of cough, vomiting, pyorrhea, rheumatic and allied disorders. *Indian Drugs*, 30, 1993, 190-194.
13. Date DB, Kulkarni PH. Assessment of rasadanti in various oral disorders. *Ayurved Research paper II* (Ed PH Kulkarni), 1995, 167-175.
14. Patel VK, Bhatt VKH. Folklore therapeutic indigenous plants in periodontal disorders in India (Review experimental and clinical approach) *Intern J Clin Pharmacol Ther Toxicol*, 26, 1988, 176-184.
15. Danhaf IE, Mc-Anally BH. Stabilized aloe vera: effect on human skin cells. *Drugs Cosmet Ind*, 133, 1983, 52-106.
16. Blitz JJ, Smith JW, Gerard JR. Aloe vera gel in peptic ulcer therapy: Preliminary report. *J Am Osteopath Associ*, 62, 1963, 731-735.
17. Choonhakarn C, Busaracome P, Sripanid Kulchai B. The efficacy of aloe vera gel in the treatment of oral lichen planus: a randomized controlled trial. *Br J Dermatol*, 158, 2008, 573-577.
18. Ulbricht C, Armstrong J, Basch F. Evidence based systematic review of Aloe vera by the natural standard research collaboration. *J Herb Pharmacother*, 7, 2007, 279-323.
19. British Herbal Medicine Association Scientific Committee. British Pharmacopoeia. West Y Yorks UK: *British Herbal Medicine Association*, 1983.
20. Wichtl M. Herbal drugs and Phytopharmaceuticals. Boca Raton, FL: *CRC Press*, 1994, 128-129.
21. Patel VK, Doshi JJ, Venkatakrishn- Bhatt H. Chicory extract massage in gingivitis. *Indian J Pharmacology*, 15, 1983, 149-152.
22. Quale JM, Landman D, Zaman M M, Burney S, Sathe SS. In vitro activity of cinnamomum fanicum against azole resistant and sensitive candida species and a pilot study of cinnamomum for oral candidiasis. *Am J Chin Med*, 24, 1996, 103-109.
23. BananLK, Hegde AM. Plaque and salivary changes after consumption of fresh fruit juices. *J Clin Pediat Dent*, 30, 2005, 9-13.
24. Udupa KN, Prasac GC. *Cissus quadrangularis* in healing of fracture. A clinical study. *J Indian Med Assoc*, 38, 1962, 590-593.
25. Natarajan S, Nair PB, Viswa Kumar VP. *Cissus quadrangularis* in osteomyelitis. A preliminary study. *Indian Med Gaz*, 13, 1973, 17-19.
26. Mills SY. Out of the earth: The essential book of herbal medicine. *Middlesex, UK: Viking Arkana*, 1991, 500-502.
27. Sheir Z, Nasr AA, Massoud A. A safe, effective, herbal antischistosomal therapy derived from myrrh. *Am J Trop Med Hyg*, 65, 2001, 700-704.
28. Braun R, Standardzulassungen Fr F. Text and Kommettar. *Stuttgart: Deutscher Apothekor, Verlag*, 1997.
29. Chopra RN, Chopra IC, Verma BS. Supplement to glossary of Indian medicinal plants. Publication & Information Directorate (CSIR), New Delhi, 1968.
30. Jain SK, Tarafder CR. Medicinal plant-lore of the santal (A review of P.O. Bodding, s work. *Econ Bot*, 24, 1970, 241.
31. Lahankar MA, Rehman MK. Preliminary clinical study of some medicinal plants on gum bleeding. *Deerghayu International*, 6(21), 1990, 5-7.
32. Jain SK. Medicinal plant – lore of the tribals of Bastar. *Econ Bot*, 19, 1965, 236.
33. Nadkarni AK. *Indian Meteria Medica*, Vol 1, 3<sup>rd</sup> eds. *Popular Book Depot, Bombay*, 1954.

34. Srivastava JK, PandeyM, GuptaS. Chamomile, a novel and selective Cox-2 inhibitor with anti-inflammatory activity. *Life Sci* , 85, 2009, 663-669.
35. Kligler B, Chaudhary S. Peppermint oil. *Am Fam Physician*, 75, 2007, 1027-1030.
36. Satyavati GV, Gupta AK, Tondon N. Medicinal plants of India. Vol 2, *Indian Council of Medical Research, New Delhi*, 1987, 1-600.
37. Huhtanen C. Inhibition of clostridium botulinum by spice extract and aliphatic alcohols. *J Food Protac*, 43, 1980, 195-196.
38. Blumenthal M, Busse WR, Goldberg A. The complete commission E Monographs: Therapeutic guide to herbal medicines. Boston: *Integrative medicine communicationa*, 1998, 197.
39. Wichtl M. Herbal drugs and Phyto pharmaceuticals. Boca Raton, FL: CRC Press, 1994, 440-443.
40. E4SCOP. Salviae folium (Sage leaf) Monographs on the medicinal use of plant drugs. Exeter, UK: *European Scientific Co-operative on Phytotherapy*, 1997.
41. Hannah JJ, Johnson JD, Kuftinec MM. Long term clinical evaluation of tooth paste and oral rinse containing sanguinaria extract in controlling plaque, gingival inflammation and sulcular bleeding during orthodontic treatment. *Am J Ortho Dentofacial Orthop*, 96, 1989, 199-207.
42. Gruenwald J, Brendler T, Jaenicke C. Editors PDR for herbal medicines Montvale, NJ: *Medical Economic*, 1998, 1184-1185.
43. Weiss RF. Herbal medicine. Gothenburg, Sweden: Abarcanum and Beaconsfield, UK: *Beacons field Publishers Ltd*, 1988, 208-209.
44. Shah A. GL-402: A herbal preparation in the treatment of periodontal disorders. *Antiseptic*, 99, 2002, 239-242.
45. Stay FP. Excerpted with permission from the complete book of dental remedies, *Avery publishing group*, 1996.