

REVIEW

INDIAN FLORA- THE RECONDITE MASTERPIECE OF ORAL DISEASES.

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Abstract

Ayurveda is a timeless practice in India and the first recorded book on Ayurvedic medicine is Charaka Samhita dates back to 600 BC. The traditional healers have used this resource since time immemorial for the benefit of humankind. Herbal medicines are known to have two distinctive characteristics that distinguish them from conventional pharmaceuticals; it is the use of crude herbs and prolonged usage. Experiments have shown that there are real benefits of extracts from whole medicinal plants since the ingredients in them work in symphony with each other. Abundant documentation proves that medicinal plants confer valuable therapeutic activity against microbes responsible for several dental diseases. Isolation of phytochemicals is carried out for the prevention, treatment, and maintenance of oral health. The use of tannins, terpenoids, flavanoids, and alkaloids in the treatment of specific oral lesions extensively. The biggest challenge and problem is the lack of information and understanding about the effect of herbs on oral tissues, mechanism of action, and side effects. Extensive literature supporting various Indian flora and their products as effective therapeutic agents in the treatment of various oral disease and conditions since ancient times is available. Data were performed in Google Scholar, PubMed Central and Cochrane library using MeSH Terms – Ayurveda, Dentistry, Herbal Medicine, Oral diseases, Indian Flora, Therapeutics. A total of 112 relevant articles were found from period of 1995 and 2017 which included case reports.

Key-words: Indian Flora, Ayurveda, Floral species, Oro-dental Health, Oral diseases, Oral Medicine, Therapeutics

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INTRODUCTION:

Oral diseases contribute to a significant disease burden in India and around the globe. Tobacco consumption, lifestyle factors has led to the development of Oral Sub Mucous Fibrosis, Leukoplakia, Lichen Planus and many premalignant lesions of the oral cavity. Lack of proper oral hygiene contributes to diseases of gingiva and periodontium that ultimately leads to deterioration in the overall quality of life of the affected. The main reasons for negligence to treat oral diseases include the cost of treatment and lack of adequate counselling in awareness of oral diseases. Prevalence of self-medication thrives on being a universal phenomenon, with prevalence rates of 32- 60% in the Indian subcontinent.^[1] In developing countries like India, rampant poverty and malnutrition call for re-routing health care to cost-effective and readily accessible modes of treatment for the same. India is one amongst the wealthiest countries in the world with regards to the genetic resource of medicinal and aromatic plants with up to 11% of entire flora in the globe to constitute medicinal values.^[2] It is interesting to note inexpensive herbs such as Neem, Tulsi, Mango, Turmeric, and so forth are some of the indispensable parts of the Indian household. Experiments with these plant derivatives as a separate entity or in combination with other methods of processing have led to the immaculate discovery of various therapeutic agents to treat oral diseases. The need for the development of cost-effective, readily accessible therapeutic agents derived from these herbs can act as a light of cure for many oral disorders.

INDIAN FLORA IN AYURVEDA

Recognition of many Indian plants for their benefit as excellent antioxidants. Scartezzini and Speroni (2000) extensively reviewed on *Curcuma longa*, *Magnifera indica*, *Momordica charantia*, *Phyllanthus emblica*, *Santalum album*, *Swertia Chirata*, *Withania somnifera* which are known to possess antioxidant activity and used in traditional Indian medicine.^[3]

Govindarajan et al. (2003) reviewed healing properties and phytochemistry of *Acorus calamus*, *Aloe vera*, *Andrographis paniculata*, *Asparagus racemosus*, *Azadirachta indica*, *Bacopa monnieri*, *Desmodium gangeticum*, *Glycyrrhiza glabra*, *Picrorhiza kurroa*, *Psoralea corylifolia*, *Semecarpus anacardium*, *Terminalia chebula*, *Tinospora cordifolia*.^[4] It's is time to overlook updated research status and promote new, accurate Ayurvedic therapeutics for the future. Perceiving knowledge in the field of traditional medicine is in the form of received wisdom that continually molds to individual needs and self-provess of the health care provider.^[5] This stream of acquiring skills to heal are custom-suited to most practitioners in herbal and conventional. The present era of medicine craves for constant possible reputation hence securing facts in Ayurveda is at one's disposal that poses the question regarding the validity of Ayurvedic treatment modalities. Therefore, Research forums for the field must strive to protect and play a prospective role so that the rights to formulate and utilize Ayurvedic medications have no restrictions by the law.^[6]

IMPLICATIONS IN ORO-DENTAL HEALTH

ALOE VERA

Aloe vera possesses chemical constituents such as Anthraquinones, Saccharides, Prostaglandins and fatty acids, amino acids, vitamins, minerals, cholesterol, triglycerides, steroids, uric acid, lignins, beta-sitosterol, gibberellin, salicylic acid.^[7] These serve as agents of analgesia, antibacterial, antiviral, antifungal, antioxidant, immunomodulatory, antiseptic, anti-inflammatory activity.

Therapeutic effects of aloe vera have positively experimented 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, leukaemia, migratory glossitis, geographic tongue and burning mouth syndrome, denture sore mouth, candidiasis, desquamative gingivitis, vesiculobullous diseases, acute monocytic leukemia, xerostomia.^[8] In 2008, Choonhakarn et al. conducted a double-blind study of AV gel in the treatment of OLP and found it to be useful in the treatment of OLP. The authors reported that 81% of the patients treated with AV experienced improvement. Studies have shown one demerit that its application might lead to allergic reactions: generalized eczematous and popular dermatitis (from topical application).^[9]

BLACK COHOSH (Rhizoma Cimicifugae Racemosae)

The vital phytochemical ingredients are cycloartenol-based triterpenes, acetylactone, 26-deoxyacetol, cimidenol, 26-deoxyactein, and cimicifugoside. Anti-inflammatory effect is one of its popular applications. Studies have been conducted using this property in treating periodontitis, but there is a lack of evidence. Avoidance during periods of pregnancy or lactation, or in children under the age of 12 years is advisable. Minor gastrointestinal upset and headache are few adverse effects of black cohosh.^[10] Cimicifugae racemosa is indigenous to North America, and Native Americans applied it principally for the treatment of musculoskeletal pain. Research led by Wang group in the University of Illinois at Chicago Botanical Research Center, indicated that a 75% ethanol extract of black cohosh serves as a mixed competitive ligand for the human μ opiate (nociceptive receptor), this role provides evidence for its therapeutic value in Myofascial Pain Dysfunction Syndrome (MPDS) and several pain-related conditions in Oral and Maxillofacial region.^[11]

BLOODROOT (Sanguinaria canadensis)

Its principal chemical constituent is sanguinarine, known to possess antibacterial, anti-inflammatory & antifungal property. It is a curative agent for gingivitis and periodontal disease, also repair of demineralized enamel lesions.^[11] It is an absolute contraindication for use in children, pregnant and nursing women. Prolonged usage might cause nausea and vomiting, glaucoma, edema, heart disease, miscarriage, diarrhea, stomach pain, visual changes, and paralysis.^[12] With strong tumouricidal effects it is reportedly able to eliminate cancer cells selectively or preferentially (Ahmad et al. 2000), and Mazzi and Soliman (2009).^[13]

CLOVE OIL (Syzygium aromaticum)

Clove consists of essential oil, eugenol, eugenol acetate, and β -aryophyllene. Upon application, it produces analgesic, antibacterial, antiviral, anti-inflammatory, antioxidant property. It effectively relieves odontalgia, periodontitis, as an anesthetic and also to treat bleeding gums, Allergic contact dermatitis. Its practice must be in caution with children, pregnant and lactating women. The tincture is composed of (1:5, 25% ethanol). Also, lozenges, toothpaste, mouthwash are available. Hosseini et al. demonstrated the analgesic property of clove oil on mice and concluded that Eugenol promotes depression in the action potential of A and C fibers & also inhibition of Na^+ currents in the dorsal nerve root ganglia, that explains its analgesic property.^[14]

GARLIC (Allium sativum)

Garlic with-holds alliin, ajoene, diallyl sulfide, dithiin, S-acetylcysteine, and enzymes, B vitamins, proteins, and several minerals. It produces antibacterial, antiviral, and antifungal, antiseptic, bacteriostatic, antihelminthic effects. Studies using garlic to treat dental caries and periodontitis have been carried out.

Its adverse effects include allergic reactions- contact dermatitis and asthmatic attacks, increased bacterial attachment to orthodontic wires. Abdullah TH et al. demonstrated strong effects on immunoreactions and improvement in the percentage of phagocytosing peripheral granulocytes and monocytes upon usage of alliin standardized garlic powder preparation that supports its immunomodulatory effects. Its antioxidant effect has been highlighted in studies by Rojas et al. using SAC (S-allyl cysteine) a vital component in garlic extract that reduces lipid peroxidation and superoxide radical production and elevates Cu-Zn-superoxide dismutase activity in 1-methyl-4-phenylpyridinium-induced Parkinsonism in mice.^[15]

GINGER (*Zingiber officinalis*)

Ginger contains various ingredients such as 1-4% essential oil, oleoresin, zingiberene, curcumin, sesquiphellandrene, bisabolene, Monoterpene aldehydes, and alcohols. It is therapeutic in dental pain, acts as a sialagogue, and in the treatment of Candidiasis. Ginger reduces systemic toxicity induced by chemotherapeutic agent cyclophosphamide.^[16] Contraindications are related to pregnancy and patients with the biliary disease. Because ginger interferes with blood clotting, it is mandatory to observe precautions in patients on anticoagulant therapies- coumarin or heparin. Stoilova et al. have positive experimental reports on the antioxidant activity of ginger extract (*Zingiber officinale*) concerning to hydroxyl radical lipid peroxidation.^[17]

NEEM (*Azadirachta indica*)

Major phytochemical constituents are genin, sodium nimbin, salannin, nimbin, azadirachtin, nimbidiol, quercetin, and nimbidin. Its leaves contain fiber, carbohydrates and a minimum of 10 amino acid proteins, calcium, carotenoids, fluoride. It exhibits antiviral, antifungal, antimicrobial, antibacterial, antipyretic, anti-inflammatory, antitumor, analgesic, antihelminthic,

anticariogenic, antioxidant activities. Catechin found in neem inhibits metalloprotease production, hence applied in periodontal diseases, it also reduces invasion, migration, and induces apoptosis of cancer cells. Its blooming flowers and leaves have implied with powerful antioxidant potential. An indicator of oxidative stress, malondialdehyde (MDA), was reduced by 46.0% and 50.6% for the flower and leaf based extracts, respectively, prompting the recommendation to use neem as a bitter vegetable tonic to promote good health. Its Dosage on infusion is (1:20): 15-30 ml; Tincture (1:5): 4-8 ml and for external applications: 70% ethanol extract of the leaves diluted to 40%, apply twice daily.^[18]

PEPPERMINT (*Mentha Piperita*)

These leaves yield approximately 0.1-1.0% of volatile oil that is primarily composed of menthol (29-48%) and menthone (20-31%). Roza Haghgoo et al. conducted a study on the use of a peppermint mouthwash and demonstrated the elimination of halitosis significantly ($P < .02$) [19]. It possesses muscle-relaxing action. Odontalgia is relieved on the application of its essential oil, by soaking a cotton ball in the oil and placing it in the cavity or by directly rubbing it on the affected tooth. Its contraindications are severe liver damage, inflammation of the gallbladder or bile duct obstruction. Its reported adverse effects are gastrointestinal burning and upset, pruritis, headache, heartburn, perianal burning, bradycardia, muscle tremors and ataxia.^[20]

TRIPHALA

Triphala is a combination of amalaki, haritaki and, bibhitaki. Amalaki contains numerous therapeutic constituents such as ascorbic acid, thiamin, riboflavin and niacin, β -sitosterol, gallic acid, ellagic acid, ethyl gallate, galloyl glucose, and chebulagic acid.

Haritaki contains chebulagic and chebulinic acid, as well as corilagin. It is a potent antioxidant and antimicrobial. Used in dental caries, bleeding and ulcerated gums. Synergistic effects of individual components of Ayurvedic formulation using Triphala was reported for its exclusive antioxidant activities by Vani et al. (1997).^[21]

TURMERIC (*Curcuma longa*)

Turmeric rhizome has 6% volatile oil, number of monoterpenes and sesquiterpenes, including zingiberene, curcumin, α - and β -turmerone among others. Its coloring principle constituents are curcuminoids (5%), 50-60% of which are a mixture of curcumin, mono des methoxy curcumin, and bis des methoxy curcumin. It manifests Antimutagenic, anticarcinogenic, antioxidant, and antibacterial activities predominantly. Used in the treatment of dental caries, oral lichen planus, gingivitis, halitosis, pit and fissure sealant, dental plaque detection system. Curcumin enhances cancer-fighting power with tumor necrosis factor related apoptosis-inducing ligand (TRAIL). Daily recommended a dosage of up to 10 g can suppress tumor initiation, promotion. Massaging an aching tooth with roasted, ground turmeric is known to eliminate pain and swelling.^[22]

TULSI (*Ocimum sanctum*)

Tulsi has tannins (4.6%) and essential oil (up to 2%), eugenol (up to 62%), methyl eugenol (up to 86%), and α and β -caryophyllene (up to 42%), methyl chavicol, linalool and 1,8-cineole. Studies by Jha.AK et al.^[23] and Manikandan.P et al.^[24] brings to highlight that tulsi prevent cancers by reducing DNA damage and inducing apoptosis in precancerous and cancerous cells, thereby reducing the growth of experimental tumors and thereby enhancing cell survival. It provides antihelminthic, analgesic, antipyretic, immune stimulatory, antiulcer, antimicrobial, anti-inflammatory property. It's contraindicated in pregnant and lactating women, and to be used with caution in children.

GUDUCHI (*Tinospora cordifolia*)

Its effects include anti-inflammation, anti-oxidation, immunomodulation. A highly significant difference in a study with regards to improvement in the salivary flow rate and reduction in the severity of oral mucositis in patients undergoing radiotherapy, proving the role of guduchi as a radio-protector. Amruthesh. S et al.^[25] justified statistically significant improvement in the Whole Stimulated Salivary rate & statistically significant decrease in the severity of mucositis in the study group compared to the control group. Henceforth, its delivery as a radioprotector in patients undergoing radiotherapy for head and neck cancer will be beneficial.

Anar/Dalima (*Punica granatum*) Pomegranate preparations when topically applied are particularly useful for controlling inflammation of oral mucosa, as well as bacterial and fungal counts in periodontal disease and Candida-associated denture stomatitis.^[26] The ellagitannin, punicalagin, is responsible for its antibacterial activity.^[27]

All concentrations of the pomegranate extract had antibacterial activity against *S. aureus* and *S. epidermidis*.^[28] Extract concentrations of 8 mg/mL and 12 mg/mL were effective against *L. acidophilus*, *S. mutans*, and *S. salivarius*.^[29] Amra/Mango (*Mangifera indica*) Leaves of mango are known to contain ascorbic and phenolic acids. Studies have shown that as an adjunct for oral hygiene maintenance, they possess antibacterial effects against anaerobic dental microflora such as *Prevotella intermedia* and *Porphyromonas gingivalis*.^[30] Sham S Bhat et al.^[31] carried out a clinical trial and discovered a significant reduction in the microbial count, with improved plaque control and gingival health using mango leaf mouth-rinse in comparison to chlorhexidine.

JASMINE (*Jasminum grandiflorum*) REFERENCES:

Practise of using the leaves of jasmine has proven advantageous in the treatment of odontalgia, chronic periodontitis, ulcerative stomatitis and lacerations of oral mucosa.^[32] They also possess potential antiulcer activity, that may be attributable to its antioxidant mechanism of action. The recent upsurge of interest in the therapeutic potentials of medicinal plants as antioxidants in reducing free radical-induced tissue injury has led to advantageous discoveries.^[33]

CONCLUSION

The drug delivery system of Ayurveda is unique, as it upholds the concept of a target-specific therapeutic function, rather than active principles or a few biochemical reactions obtained from a given herb. Ayurveda believes that drugs do not act against diseases only because of their physical nature or properties, but they function in a time specific manner towards the target tissue where it affects a final therapeutic action. The treatment modality aims in the alleviation of symptoms, maintenance of Dosha balance, at the same time ensuring that no potential harm can happen to the patient. Ayurvedic formulations of logical combinations using ingredients obtained from nature are meant for multitargeting, rather than single-targeting. Such traditional wisdom plays a vital role in guiding evidence based scientific investigations using Indian flora. We hypothesize that a strategic mind set shift from identification of herbs with medicinal values, followed with phytochemical constituent isolation, formulation discovery that ultimately leads to therapeutics, will open up an entirely new realm to integrative oral medicine and general systemic health. Whether the argument is toward or against the benefits of Ayurveda, it has been driven more by prejudice on the concept than by the evidence.

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