

## Phytomedicines in Dentistry

Shailja Chatterjee, M.D.S.

Associate Professor, Department of Oral and Maxillofacial Pathology, MMCD SR, M. M. University,  
Mullana (Haryana), India.

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**ABSTRACT:** In this era of emergence of superbugs, one is in dire need of treatment modalities that treat a patient without hampering the microflora and immunity status. Traditional medicines like herbal by-products are currently being researched over and reintroduced in the commercial market as old wine in new bottles. This paper highlights the use of such plant products in dentistry, short-termed as “Phytomedicines”.

**Key words:** Phytomedicine, superbugs, dentistry.

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### I. INTRODUCTION

Antibiotic resistance involves the ability of a microorganism to withstand the effects of an antibiotic. Mutations can develop either by random mutations or by application of environmental stress. Overuse of broad-spectrum antibiotics results in microbial drug resistance.[1] Therefore, an effort should be made to seek antibacterial agents effective against resistant pathogenic bacteria. In dentistry, phytomedicines have been used as anti-inflammatory, antibiotic, analgesic and sedative agents. These phytopharmacological therapeutic agents can be classified as: [2]

- A. Antimicrobial: *Matricaria chamomile*, *Salvadora peruviana*, *Azadirachta indica*.
- B. Anti-inflammatory: *Plumeria acuminata*, *Kalanchoe brasiliensis*, Propolis.
- C. Sedatives and anxiolytics: *Melissa officinalis*, *Passiflora incarnata*, *Piper majthsticum*.

Dental diseases like caries, gingivitis and periodontitis are common causes for morbidity in general population. The primary etiology underlying these disease processes is the change in ecological behavior of commensal oral microflora as it has been observed that micro organisms in biofilm are more resistant than those in planktonic state.[3] Medicinal plants are a potential source of biomolecules that can aid as adjunctive therapy to control cariogenic dental biofilms.

### II. PHYTOMEDICINE DERIVATIVES AND THEIR TARGET ORGANISMS

**Fungal organisms:** *Candida albicans* are commensal fungal organisms in oral cavity. They become pathogenic under certain environmental conditions. This commensal adheres to host tissues as well to acrylic denture surfaces. *Equisetum giganteum*, *Pelargonium graveolens* and *Rheedi brasiliensis* extracts have therapeutic activity against this fungal organism.[3,4] *Candida*-associated denture stomatitis is observed in 11-67% of denture wearers. Application of 1% Geranium oil is effective against *Candidal* organisms associated with this condition (table 1). The active constituents of Geranium oil are “beta citronello” and “geranoil”.[4,5]

**Bacterial organisms:** *Streptococcus mutans* is the main organism responsible for causation of dental caries. The mutability of this microorganism is responsible for development of resistance to any of the caries vaccine tested till date. Biomolecules derived from various botanical sources such as *Rheedi brasiliensis*,[3] *Eucalyptus globules* (acetone preparation)[1] and *Zinziber officinale*[1] are effective against *mutans streptococcus*(MS). Various phytoderivatives and their microbial targets include- *Eucalyptus globules* (acetone extract) is effective against *S. viridians* and *Bacillus megaterium*; ethanolic extract works against *Bacillus megaterium* and *S. salivarius* whereas water extract inhibited the growth of *S. viridians*.[1] Both ethanolic and acetone extract of *Zinziber officinale* inhibits growth of *Neisseria catarrhalis*.[1] Chloroform extract of *Szygium aromaticum* showed activity against both *N. catarrhalis* and *S. viridians*.[1] Acetone extract of *Piper betle* possesses inhibitory activity against *Bacillus megaterium* and *Pseudomonas aeruginosa*.[1] *Gymnema sylvestre* (acetone extract) shows highest activity against *Bacillus megaterium* and *Pseudomonas aeruginosa* however, its water extract shows maximal effectiveness against *S. viridians*.[1] *Azadirachta indica* (acetone extract) shows antibacterial action against *N. catarrhalis* and *S. salivarius*.[1] Acetone extract of *Chrysopogon zizanioides* showed significant activity against *S. viridians*.[1]

Other phytotherapeutic agents:

- a) *Morinda citrifolia*: Its antibacterial property can be attributed to L-asperuloside and alizarin. It is used as a root canal irrigant.[6,7]
- b) Triphala: This is an Ayurvedic preparation comprising of *Emblica officinalis*, *Terminalia bellirica* and *Terminalia chebula*. It has a chelating property thus, can aid in removal of smear layer and also found to be an alternative to sodium hypochlorite for root canal irrigation.[8]
- c) Propolis: Propolis is obtained from resins collected by honey bees from poplars or conifers or flowers of genus 'clusia'. It is used as intracanal medicament and root canal irrigant and storage medium for avulsed tooth.[9,10,11]
- d) *Azadirachta indica* (Indian neem): Neem products are effective against *E. faecalis* and *C. albicans*. It is a potential agent for root canal irrigation due to its antibacterial properties.[12]
- e) German chamomile: Active components of German chamomile include- chamazulene, capric acid and caprylic acid chlorogenic acid. It can be used for smear layer removal.[13]
- f) *Allium sativum* (Garlic): Active compound in *Allium sativum* is allicin. It has antibacterial property and has immunoregulatory function. Allicin destroys cell wall and membrane of root canal bacteria, hence, it can be used as irrigant.[14]
- g) Lemon solution: Lemon solution (pH 2.2) is a natural source of citric acid (pH 1.68). it can be used for root canal irrigation.[14]
- h) *Sanguinaria*: It is derived from blood root, *Sanguinaria Canadensis*. It causes inhibition of cyclooxygenase pathway. The plant derivative can be used as a component of mouthwashes to cure and prevent gingival inflammation.[15]
- i) Evening Primrose oil: This product has therapeutic usage as it inhibits production of lipoxygenase and leukotriene B4 in the tissues. Inhibition of proinflammatory pathways relieves Sjogren's syndrome.[15]
- j) *Rhus*: It contains gallic tannins and gallic acid. Tannins exhibit antibacterial and antifungal properties. Gallic acid aids in reduction of periapical inflammation.[14]
- k) *Acacia catechu* wild: Main constituents of this plant are catechin, eocatechin, epigallocatechin, epicatechin gallate, phloroglucin, protocathechuic acid, quercetin, pterasterol glucosides, procyanide, kaempferol, L-arabinose, D-galactose, D-rhamnose, andaldobiuronic acid, afzelchin gum, mineral and taxifolin. *Acacia catechu* heartwood extract is highly active on orodental pathogens.[15]
- l) *Glycyrrhiza glabra* (Liquorice root): Root extracts of this plant: Glycyrrhizin and glabridin inhibit generation of reactive oxygen species by neutrophils at site of inflammation. Significant antibacterial activities against *Bacillus subtilis*, *Staphylococcus aureus*, *E. coli* and *Pseudomonas aeruginosa* and *S.mutans*. [15]
- m) *Achillea millefolium*(family Asteraceae): This plant is named after Greek figure, Achilles, who used it to arrest bleeding from wounds of his soldiers. The plant extract has low microbial inhibitory capacity against other acidogenic bacteria.[15]
- n) *Aloe vera* (Asphodelaceae juss): It is used for treatment of aphthous ulcers and reduction of alveolar osteitis after third molar extraction surgeries.[16] Mouth rinse containing *Aloe vera* was found to reduce gingival inflammation and bleeding.[17]
- o) *Copaifera langsdorffi*: *Copaifera langsdorffi* (oleo-resin) is derived from the *Copaifera langsdorffii* trees found mainly in Amazon rainforest. The purified resin oil is extracted from the trunk of these trees. It is popular as a traditional medicine due to its anti-inflammatory, analgesic wound-healing properties. Pulpotomized teeth showed better biocompatibility due to least tissue irritation and formation of mineralized tissue barrier subjacent to the capping material.[18]

### III. CONCLUSION

Phytomedicine is a branch of pharmaceutical products derived from plants. Herbal extracts have the advantage of showing their beneficial effects without the risk of developing microbial resistance. Over the years, these products have been marketed in various forms such as toothpastes and mouth rinses. This apparently novel branch has its roots in ancient medicine which is the preantibiotic era.

## REFERENCES

- [1]. TT Shafi, Ashok A and K Suresh. A study on the antibacterial effects of selected Western ghats against dental caries bacteria. *Int J of Phytomed* 2011;3:416-21.
- [2]. Groppo FC, Bergamaschi CC, Cogo K et al. Use of phytotherapy in dentistry. *Phyther Res* 2008;22:993-8.
- [3]. Almeida LSB, Murata RM, Yatsuda R et al. Antimicrobial activity of *Rheedi brasiliensis* and 7-epiclusianone against *Streptococcus mutans*. *Phytomed* 2008;15:886-91.
- [4]. Sabzghabace AM, Shirclare Z, Ebadian B et al. Clinical evaluation of the essential oil of *Pelargonium graveolns* for the treatment of denture stomatitis. *Dent Res J* 2011;8(5):S105-8.
- [5]. Redding S, Bhatt B, Rawls HR et al. Inhibition of *Candida albicans* biofilm formation on denture material. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2009;107:669-72.
- [6]. Kandaswamy D, Venkatesh Babu N, Gogulnath D et al. Dentinal tubule disinfection with 2% chlorhexidine gel, propolis, *Morinda citrifolia* juice, 2% povidone iodine and calcium hydroxide. *Int Endod J* 2010;43:419-23.
- [7]. Murray PE, Farber RM, Namerow KN et al. Evaluation of *Morinda citrifolia* as an endodontic irrigant. *J Endod* 2008;34:66-70.
- [8]. Prabhakar J, Senthil Kumar M, Priya MS et al. Evaluation of antimicrobial efficacy of herbal alternatives (Triphala and Green tea polyphenols) < MTAD and 5% sodium hypochlorite against *Enterococcus faecalis* biofilm formed on tooth substrate: An in vitro study. *J Endod* 2010;36:83-6.
- [9]. Oncag A, Cogulu D, Uzel A et al. Efficacy of Propolis as an intracanal medicament against *Enterococcus faecalis*. *Gen Dent* 2006;54:319-22.
- [10]. de Silva FB, de Almeida JM, de Souse SMG. Natural medicaments in endodontics. A comparative study of the anti-inflammatory action. *Braz Oral Res* 2004;18:174-9.
- [11]. Martin MP, Pillegi R. A quantitative analysis of Propolis: a promising new storage media following avulsion. *Dent Traumatol* 2004;20:85-9.
- [12]. Bohora A, Hegde V, Kokate S. Comparison of antibacterial efficacy of neem leaf extract and 2% sodium hypochlorite against *E. faecalis*, *C. albicans* and mixed culture: an in vitro study. *Endod* 2010;22:8-12.
- [13]. Sader Lahijini MSS, Raof Kateb HR, Heady R et al. The effect of German chamomile (*Marticaria recutita* L) extract and tea tree (*Melaleuca alternifolia* L) oil used as irrigants: a scanning electron microscope study. *Int Endod J* 2006;39:190-5.
- [14]. Kumar AS, T Lakshmi, AV Arun. Role of phytomedicine against dental plaque in fixed orthodontic appliance treatment - A literature review. *Int J Can Res and Rev* 2011;4(4):19-31.
- [15]. Meredith MJ. Herbal nutraceuticals: A primer for dentists and dental hygienists. *The J of Cont Dent Prac* 2001;2(2):1-15.
- [16]. Wynn RL. Aloe vera gel: Update for dentistry. *Gen Dent* 2005;53:6-9.
- [17]. Scherer W, Gultz J, Lee SS et al. The ability of a herbal mouthrinse to reduce gingival bleeding. *J Clin Dent* 1998;9:97-100.
- [18]. Lima RVE, Esmeraldo MRA, Carvalho MGF et al. Pulp repair after pulpotomy using different pulp capping agent: A comparative histological analysis. *Paediatr Dent* 2011;33:14-8.