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RESEARCH ARTICLE

PHYTOTHERAPEUTICAL APPROACH IN PERIMPLANTITIS: A REVIEW

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ABSTRACT

Herbs and their extracts have anti microbial, anti oxidant, anti biofilm and anti inflammatory effects. Certain herbal extracts have two or more combinations of different bioactivity, the reason for which is their possession of a combination of bioactive phytoconstituents. The present review is to throw light on the usage of different crude extracts or isolated phytochemical extracts or the isolated bioactive compound as such in the treatment of Periimplantitis. Besides casual treatment for Periimplantitis which represents the Gold standard for Periimplantitis, the use of crude or phytochemical extracts or the isolated bioactive compound with anti microbial/anti biofilm potential can improve the therapeutic outcome in patients with Periimplantitis.

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INTRODUCTION

Despite long term predictability seen in most osseointegrated Dental implants (Adell *et al.,* 1981), there is some amount of complications that occur which are due to pathologic changes around the implant soft tissues called Mucositis. When the Inflammatory changes confine to soft tissue surrounding the implant, it is called Periimplantitis. The clinical sign of periimplanttitis mostly starts in the coronal portion and the implant is clinically not mobile. The major etiological factors associated with Crestal Peri implant Bone tissue resorption are bacterial infection and biomechanical factors over the loaded Implants (Adell *et al.,* 1981).

Bacterial infection

Plaque induced soft tissue inflammation around implants may have more serious implications and larger than marginal inflammation around teeth due to plaque. The reason being less vascular tissue around implants unlike periodontium which directly affects the defense mechanism around the implants (Jovanovic Plaque induced Peri implant bone loss in mongrel dogs, 1994).

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Sub gingival bacterial Flora associated with inflamed implants are very similar to those occurring around natural teeth. In totally edentulous mouth where implants are used to replace missing teeth, the periodontal pathogens are less than in partially edentulous mouth. This indicates higher susceptibility for Periimplantitis in partially edentulous patient (Mombelli *et al.,* 1987) thereby emphasizing the need for a potential solution for debridement and decontamination (anti infective therapy) in a partially edentulous patients.

Many methods of treating periimpalntitis have been documented

- Administration of Systemic Antibiotics alone
- Mechanical Debridement with or without systemic antibiotic
- Mechanical debridement with or without local drug delivery & chlorhexidine oral rinses.
- Surgical debridement
- Surgical debridement with guided bone regeneration for reparation of bony and soft tissue defects
- Laser Decontamination.

Phytotherapy-the next solution?

A review article states that in 2008, the Federal Council of Dentistry approved the use of medicinal plants for oral health

Table 1. Plant extracts with antimicrobial potential used on implant surface microflora

Extract	Effect	Implant placement organisms	Reference
Wormwood extract	Antimicrobial	*Staphylococcus aureus*	(Bahareh Nazemi Salman *et al*., 2017).
Essential oil (EO) of *Ziziphora clinipoodioides*	Antimicrobial	*Staphylococcus aureus*	(Binit Shrestha ML *et al.*,2012)
Proteflazid extract	Antimicrobial	*Streptococcus sanguinis, Staphylococcus warneri and Kocuria kristinae,*	(Binit Shrestha ML *et al.*,2012)
Natural procyanidin extract (from white grape seeds)	Antimicrobial	*Staphyloccus aureus*.	(Bahareh Nazemi Salman *et al*., 2017).
Acacia gum	Antimicrobial	Streptococcus fecalis *Porphyromonas gingivalis & Prevotella intermedia*	(Ananieva MM *et al*., 2017; Gunjan Kumar *et al*., 2013).
Rosemary extracts (Dentrifice)	Antimicrobial	*Sreptococcus mutans, Streptococcus oralis and Lactobacillus rhamnosus*	(Badreldin H.Ali *et al*., 2009).

Table 2. Bioactive compounds and its effect on the microflora of Dental implant surface

Isolated active principles	Class	Effect	Source	Mode of action	Ref
Icariin	Flavonol (a type of flavonoid)	Osteoblastic, anti osteoporotic, anti osteoclastic anti microbial, anti inflammatory, anti cyclooxygenase, and anti inducible nitric oxide synthases	Epimedium (barrenwort)	A.Phosphodiesterase 5 (PDE5) inhibitor B.Enhances the production of bioactive nitric oxide	(Marjorie Murphy Cowan .,1999;Qiang Wang,Xiaoying Wang*et al*., 2012).
Terpinen-4–ol linalool and alpha-terpineol	Terpenoid	anti bacterial	tea tree oil	Destroys the bacterial cell wall	(Nathan S Bryan .,2015)

Table 3. Multiple uses of frequently used Phenolics present in Essential oil

Phytoconstituent	Class	Effect	Herbal source	Uses	Ref
Eugenol	Phenols	anti bacterial and anaesthetic	dianthus oil , Cloves, cinnamon, nutmeg, basil and All spice	With root canal sealers for temporary fillings, pulp capping, impregnating the dentine with silver nitrate and disinfection of root canals	(Marcela Agne Alves Valones , Nathan S Bryan., 2015)
Thymol and Cavacrol	Phenol	anti bacterial and anti mycosal	Thyme	Disinfection of root canals in the treatment of pulp necrosis	(Nathan S Bryan.,2015)

care in Brazil. (Bruna Pinto de los Santos *et al.,* 2015) Plants contain primary metabolites like the nutritive protein, carbohydrate, Lipids, vitamins and minerals which serve as nutrients for their survival and non nutritive secondary metabolites like alkaloid, Terpenoid, Flavanoid, Sapponins and Tannins which are present in them to protect them and enable them to fight for their survival against the pest. These tiny hidden gold mines of plants are being exploited today by human beings and many have proved to be good source of drugs. Few among the many are used in dentistry today. Many studies with the evaluation of the antimicrobial efficacy of different parts of the plant extracts or the isolated phytochemical extracts or the isolated bioactice compound as such has paved the way for their successfull entry as components into dental gels, tooth paste, mouth rinse etc (Ramisetty Sabitha Devi *et al.,* 2013; Anna Szyszkowska Joanna Koper *et al.,* 2010; Bahareh Nazemi Salman *et al.,* 2017).

Secondary metabolites in dentistry

Phenolics

These include the plant phenolics which in turn includes the subgroups phenolics acids, flavonoids, tannins and the less common stilbenes and lignans, (Marjorie Murphy Cowan 1999) etc.

Though we have an exhaustive list of examples two are listed in Table. 1 as recent studies have proved them to be involved in Periimplantitis and other phytoconstituents important in dentistry frequently used are listed in Table .2

Flavonoids

Icariin which is a flavonol (a type of flavonoid) with effective delivery vehicles and proper dosage could facilitate bone graft before implantation, promote osseointegration after implantation by activating Bone Morphogenetic Protein (BMP) signaling pathways, and inhibit inflammation. The enhanced release of Nitric oxide caused by this active compound shows enormous promise in infections, specifically against antibiotic-resistant bacteria through the formation of Reactive Nitrogen Oxide Species (RNOS) intermediates which at optimal concentration can react with aminoacid residues of bacterial proteins and destroy the cell wall (Qiang Wang *et al.,* 2012; Nathan, 2015).

Terpenoids

Terpenoids are also called as “isoprenoids”. They constitute one of the largest families of natural products (Nathan, 2015) Terpinen-4 –ol, linalool and alpha-terpineol were the terpenoids with antibacterial activity isolated from tea tree oil (Marjorie Murphy Cowan, 1999; Warnke *et al.,* 2009).

Essential oils

Studies done on the evaluation of antimicrobial effect of the essential oils like the dianthus oil, eucalyptus oil and peppermint oil have proved the inability of the microorganisms to resist and also exhibits a synergistic effect in combination with an antibiotic (Warnke *et al.,* 2009). Some of the popular, most common essential phenolic constituents of the EO also have other uses as shortlisted in Table. 3. According to a recent study, microencapsulation, of all the formulations in alginate have been proved to be best choice for increasing the use of EOs though they can also be prepared in liquid forms (emulsions, micelles, liquid solutions etc.), semi-liquid forms (gels, liposome, etc.) or solid forms (microcapsules or microspheres) (Emad *et al.,* 2013).

Dental gels and tooth pastes

The aloe vera tooth gel and the toothpastes

The aloe vera tooth gel and the toothpastes were equally effective against Candida albicans, Streptococcus mutans**,** Lactobacillus acidophilus**,** Enterococcus faecalis**,** *Prevotella intermedia* and *Peptostreptococcus anaerobius*. Aloe vera tooth gel also has an enhanced antibacterial effect against *S. mitis.* A review suggested the potential of using aloe vera with its antibacterial, antifungal and antiviral properties because of its bioactive compounds like anthraquinones: aloe emodin, aloetic acid, aloin, anthracine, anthranol, barbaloin, chrysophanic acid, ethereal oil, ester of cinnamonic acid, isobarbaloin, and resistannol. In relatively small concentrations, together with the gel fraction, these anthraquinones provide analgesic, antibacterial, antifungal, and antiviral activities; in high concentrations, they could be toxic (George *et al.,* 2008).

Bioadhesive gel mixture

In a recent study, a gel consists of an original mixture of compounds with specific adhesive function (Poly Vinyl Pyrrolidone copolymer, cellulose gum hydrated silica), those with antiseptic action (Cetyl pyridinium Chloride and Triclosan) and those with antioxidant and anti phlogistic properties which includes combined essential oils of Melaleuca alternifolia, Thymus vulgaris and Commiphora myrrha mixture of Cytilpyridinium chloride, Triclosan and essential oils, essential oils are included; which have shown healing and antioxidant activity (Roncati Marisa *et al.,* 2015).

CONCLUSION

Recent studies conducted with a combination of two or more extracts on the implant surfaces as adjuvants proved successful and opens a way for the trial with phytochemical bioactive compound. Moreover, the extensive studies of these extracts with different class of active principles in them will further hint their possible pharmaceutical exploration in the field of dentistry, where a combined effect of herbs with antibacterial, antibiofim activity, anti-inflammatory and antioxidant activity can be certainly beneficial on the inflamed implants. More insight into this might direct the development of better strategies including further Optimization of combined use of either the isolated bioactive principles or herbal extracts which will be more effective when used alone or synergistically with synthetic compounds to combat Periimplantitis.

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