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## REVIEW

# Essential oils in periodontics. What is the interest?

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### ABSTRACT

Periodontal diseases are inflammatory diseases of infectious origin. Their initial treatment is based on a mechanical debridement associated with a chemical approach; through antiseptics and/or antibiotics. Currently, natural products based on essential oils are increasingly used as a new alternative chemical therapy in the treatment of periodontal diseases, due to their innumerable medicinal properties.

**KEYWORDS:** Essential Oils, Medicinal Properties, Periodontics.

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### INTRODUCTION

Periodontal diseases are inflammatory diseases of infectious origin. The treatment of these pathologies is generally based on periodontal debridement, which is often associated with a complementary chemical approach; using antiseptics and/or antibiotics.

Antiseptics as Chlorhexidine are the most used in periodontics. Although they are known for their benefits, adverse effects may occur with long-term use [1]. In addition, the antibiotics used, can induce bacterial resistance [2]. This has led researchers to find a new therapeutic alternative as a complement to conventional periodontal therapy, based on natural agents such as essential oils extracted from various aromatic medicinal plants.

### DEFINITION

An essential oil is a pure and natural extract from aromatic plants [3]. It concentrates the essence of the plant, in other words its perfume. It is a volatile, oily substance with a high concentration of active ingredients [4].

#### Medicinal properties of essential oils

Essential oils have many medicinal properties that give them great interest in periodontology:

- Antimicrobial activity

It is the most studied property thanks to the aromagram, which allows studying the sensitivity of germs to essential oils, in order to test the bactericidal and bacteriostatic power of essential oils against a germ. Several studies have shown antimicrobial properties of essential oils acting on bacteria as well as on fungi and viruses. The molecules

which have the highest antibacterial power are the phenols (e.g. essential oil of clove, essential oil of thyme), the monoterpenols whose antibacterial power is slightly lower than phenols (e.g. essential oil of peppermint, essential oil of Thyme), the group of aldehydes (e.g. essential oil of Cinnamon) and finally the group of ketones that have a more limited action (e.g. essential oil of Champre) [5-7].

- Anti-inflammatory activity:

Due to aldehydes, essential oils promote anti-inflammatory defense mechanisms. The essential oils of lemon Eucalyptus, Chamomile, Myrrh, geranium, ginger, and clove have a good anti-inflammatory power [8].

- Analgesic, anesthetic activity:

Essential oils are often used for their analgesic power. The eugenol contained in the essential oil of Clove is the best known to treat pain in dentistry. Noble Laurel also has a greater analgesic effect due to the phenol it contains [9].

- Healing activity:

The rate of tissue repair can be accelerated by ketones and monoterpenes. Notably, the essential oils of lavender aspic, palmarosa, niaouli, ravensare, and rosemary [10].

- Hemostatic activity:

Thanks to terpene compounds found, for example, in the essential oil of Cistus ladaniferus (cistus ladanifera) [10].

### USE OF ESSENTIAL OILS IN PERIODONTICS

Periodontal diseases are chronic inflammatory and infectious diseases of polymicrobial origin. They are manifested by the destruction of tissues supporting the tooth (gum, alveolar bone, cementum and periodontal ligament). Depending on the degree of damage to these

tissues and on the patient's immune system, this can lead to either gingivitis, i.e. a damage to the superficial periodontium (gums), or periodontitis, i.e. a destruction of the deep periodontal tissues (alveolar bone, cementum and periodontal ligament).

The initial periodontal treatment involves a mechanical approach (scaling, subgingival debridement in the presence of periodontal pockets) often associated with a chemical approach based on antiseptics and/or antibiotics. Depending on the severity of the periodontal damage, surgical treatment can also be used with the chemical approach based on essential oils that could improve the postoperative effects.

The American Dental Association has approved Chlorhexidine (CHX) and essential oils (EO) as antiseptics in mouthwashes. However, it has been recorded some effects as hypersensitivity, dental discoloration, irritation of the oral mucosa, and alteration of taste, hence the interest in the use of herbal medicine, mainly essential oils [11]. Various galenic forms can be used; for local application: essential oils diluted in a vegetable oil type excipient or gel such as carbopol 974P or carbopol 980, possible contact with the mucous membranes (diluted), and an open wound (diluted in HV). Also, they can be used as mouthwash, toothpaste and subgingival irrigation in the presence of periodontal pockets by ultrasonic devices, by micropipette or by hydropulsion device with modified tip.

## DURING NON-SURGICAL PERIODONTAL TREATMENT

### Gingivitis

Their treatment is based on scaling aimed at the elimination of biofilm and supra and subgingival calculus mechanically associated with good oral hygiene.

According to Mangal (2012), several essential oils have been shown to be effective in the treatment of gingivitis [12]. Clove essential oil (90% eugenol) acts as a mild oral anesthetic and heals oral sores, ulcers, and painful gums. It has "strong activity" against bacteria associated with plaque formation and helps reduce bad breath. It also helps fight bacterial and inflammatory infections. Lemon essential oil acts as a good stimulant of the body's immune system and is used in the treatment of gingivitis. Orange essential oil is an anti-inflammatory and antiseptic that promotes healing of inflamed gums. Basil essential oil has antibacterial properties that prevent the formation of dental plaque, dental caries and bad breath. Eucalyptus essential oil inhibits the formation of dental plaque and effectively kills several strains of Staphylococcus bacteria. Tea tree essential oil is used for the treatment of severe and chronic gingivitis. Myrrh essential oil is useful for treating gingivitis and oral ulcers.

Several authors have proposed the application of a solution prepared by mixing different essential oils. Lamendin (2005) indicates the local application 3 to 4 times a day of the oily solution composed of: 0.75 ml of noble laurel essential oil, 1.5 ml of tea tree essential oil, 0.75 ml of sage officinale essential oil, 1 ml of aromatic ravensare essential oil, 0.75 ml of wintergreen essential oil, 0.25 ml of peppermint essential oil [3]. While Roux (2016) recommends applying a mixture of one drop of Clove essential oil, one drop of Noble Laurel essential oil and two drops of St. John's Wort essential oil locally on the gums three times a day after brushing [13]. A study conducted in 2004 by Soukoulis and al, showed that the application of

tea tree essential oil in the form of a gel twice a day for 8 weeks, decreases gingival inflammation [14].

## PERIODONTITIS

Their treatment is based on a mechanical debridement associated with an adjuvant chemical treatment (antiseptics and/or antibiotics) in order to eliminate all the pathogens in the inaccessible dental areas.

Essential oils, as antibacterial agents, can also be used to eliminate periodontal pathogens.

In 2004, Takarada and al. have demonstrated the bacteriostatic effect of lavender essential oil on the tested bacteria (*Porphyromonas gingivalis*, *Aggregatibacter actinomycetemcomitans*, *Fusobacterium nucleatum*, *Streptococcus mutans*, and *Streptococcus sobrinus*). Equally, they have proved that tea tree essential oil has bactericidal action on *Porphyromonas gingivalis* and *Fusobacterium nucleatum* [15]. A study that was conducted in 2013 by Warad and al; based on the application of Chamomile essential oil, 2% in periodontal pockets after root planning showed a significant reduction in probing depth and gingival index [16]. In 2020, Marcela showed that the essential oil of dill, sage and savory have high bactericidal and antibiofilm activity against Gram+ and Gram- bacterial strains isolated from patients with periodontitis [17].

In 2002 Montain proposed the use of the mixture composed of 0.8ml of clove essential oil, 0.6ml of tea tree essential oil, 0.6ml of peppermint essential oil [9]. Lamendin (2005) indicated to use a preparation for periodontal pocket irrigation consisting of 3ml of tea tree essential oil, 3ml of noble laurel essential oil, 2ml of myrrh essential oil, 1ml of clove essential oil, 20ml of calophyll volatile oil and 80ml of St. John's wort volatile oil [3]. Zatalka (2014) recommends an oily solution to be applied in gingival massage for 3 times a day after brushing. This solution contains 12 drops of clove essential oil, 5 drops of noble laurel essential oil, 5 drops of tea tree essential oil and 5ml of hazelnut volatile oil [18].

### Necrotizing periodontal diseases

The necrotizing periodontal diseases are acute inflammatory pathologies characterized by the necrosis of the periodontal tissues, pains, ulcerations and gingival bleedings. Until now, there are no studies to prove the action of essential oils in the treatment of necrotizing periodontal diseases. However, Montain in 2002 proposed a mixture of essential oils that have anti-inflammatory, calming and anesthetic effects. The solution is composed of 20% of *Helichrysum immortale* essential oil, 20% of *Rosemary officinalis* essential oil with cineole, 20% of *Lavender officinalis* essential oil, 10% of *Gaultheria* essential oil, 5% of *Peppermint* essential oil, 25% of *Aromatic Ravensare* essential oil and the volatile oil of St. John's wort or Sweet Almond [19]. In 2005 Bouffet, recommends the use of 35% of thyme essential oil, 25% of rosemary verbenone essential oil, 20% of ravensare aromatic essential oil, 15% of laurel essential oil and 5% of peppermint essential oil [20].

## DURING SURGICAL PERIODONTAL TREATMENT

To promote the regeneration of the mucosa after a periodontal surgical procedure, the practitioner can use a mixture of essential oils; 10 ml of *Eugenia caryophyllus* essential oil e.i. cloves (anti-inflammatory, local anesthetic

and antiseptic), 10 ml of *Melaleuca alternifoliae*. essential oil e.i. tea tree (antibacterial, antiviral), 10 ml of *Laurus nobilis* essential oil e.i. laurel (bactericide, fungicide, powerful analgesic), 10 ml of *Lavandula angustifolia* essential oil e.i. lavender (antiseptic, healing, analgesic), 10 ml of *Chamaemelum nobile* essential oil e.i. noble chamomile (anti-inflammatory, antispasmodic), 10 ml of *Artemisia dracunculus* essential oil e.i. tarragon (antispasmodic), 5 ml of *Helichrysum italicum* essential oil e.i. Italian helichrysum (antihematoma), 10 ml of *Calophyllum inophyllum* vegetable oil e.i. calophylla inophyllum (healing, anti-inflammatory), 15 ml of *Rosa rubiginosa* vegetable oil e.i. rose hip (healing, regenerating). Dab the gum with a cotton ball soaked in a few drops of this mixture [20].

#### AUTHORS' CONTRIBUTIONS

All the authors have actively participated in the redaction, the revision of the manuscript, and provided approval for this final revised version.

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#### CONCLUSION

Many studies have shown the action of essential oils on several periodontal pathogens. Thanks to their medicinal properties (antimicrobial, anti-inflammatory and analgesic, healing), essential oils would therefore represent a good therapeutic alternative to chemical agents used in the treatment of periodontal diseases.

However, these natural products present some toxicity risks that should not be neglected. Therefore, further studies are necessary to determine the appropriate doses and a safe dosage for better results in the treatment of periodontal diseases in short and medium terms.

#### CONFLICT OF INTEREST

Authors have no conflicts of interest to declare.