

A study of essential oils' medicinal uses and connection to dentistry: A review

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ABSTRACT

There are a number of side effects associated with current antibacterial therapies, and bacterial resistance to the antibiotics is also rising. Therefore, there is a need to identify superior substitutes. Since the beginning of time, essential oils (EOs) have been utilized to cure a variety of diseases and have grown in popularity. Numerous clinical investigations have demonstrated the safety and effectiveness of EOs. This article provides a general summary of EOs, their applications, and unfavorable effects. The PubMed database was searched for clinical trial studies and reviews on EOs that had been published up until 2020. "Lavender essential oil," "cinnamon oil," "clove oil," "eucalyptus oil," "peppermint oil," "lemon EOs," and "tea tree oil" were utilized as search terms. Total of 60 pertinent articles were discovered in the PubMed database. 42 publications were chosen to be included in the present evaluation after abstracts were reviewed. Based on the information now available, it can be said that EOs have the potential to be developed as therapeutic or preventive medicines for a variety of oral disorders, but additional clinical trials are needed to confirm their safety and efficacy.

Key words: Alternative medicine, essential oils, oral pathogens.

1. INTRODUCTION

The World Oral Health Report states that despite significant improvements in oral health in many nations, oral health issues continue to plague both underprivileged groups in developing and industrialized nations. [1] The most significant oral health issues worldwide are dental caries and periodontal disorders. Oral illnesses also have a negative impact on general health. A person's working ability and quality of life are also impacted. [2]

There are reports that the antibacterial medications now used to address oral health issues can have a number of negative side effects, including nausea, vomiting, and diarrhea. Another

significant worry is the rise in bacterial resistance to the medications. There is a need to investigate new therapeutic agents and carry out additional clinical research on conventional medications made from various plant sources due to the negative effects, rising bacterial resistance, and high cost connected with the normal therapeutic approach.

Clinical trials are being conducted to determine the efficacy and potential negative effects of numerous traditionally used antibiotics for treating illnesses. Essential oils are one of these natural medicines (EOs). [3,4] There has been a rise in interest in EOs in recent years. There are currently 3000 Eos that are known. [5] One type of plant extract that has been utilized for centuries to treat a variety of medical and dental issues is essential oils (EOs). These are secondary metabolites that have antibacterial, antifungal, and antioxidant effects that are produced by different medicinal plants. [6-8]

This systematic review's objective is to evaluate the EO-related published data. Numerous research have been done to demonstrate the therapeutic benefits of different EOs, but very few evaluations on their application in dental care have been published. The review provides a general summary of EOs, their therapeutic benefits, and side effects.

2. MATERIAL AND METHODS

An computerized search of the PubMed database was done to find pertinent material. Abstracts and titles underwent screening. This review only contains articles that deal with lemon essential oils, lavender oils, eucalyptus oils, clove oils, and cinnamon oils. Studies pertaining to various additional EOs were not included. For this review, a total of 42 articles were deemed to be pertinent.

EOs : THEIR COMPOSITION AND MECHANISM

In essence, terpenic hydrocarbons, particularly monoterpenes and sesquiterpenes, and oxygenated derivatives such aldehydes, ketones, epoxides, alcohols, and esters make up the secondary metabolites of plants known as EOs. [9] EOs have a wide range of compositions. Even the chemical makeup of EOs derived from plants of the same species varies depending on the region. [10]

The chemical makeup of EOs and the placement of one or more functional groups on the molecules that make them up determine how they work. [12] The maturity of the plant from which the EOs are taken also affects composition.

[10,11]

The primary mode of action is thought to be membrane damage. [13] An significant factor in the antibacterial activity of EOs appears to be their solubility in the phospholipid bilayer of cell membranes. It has been discovered that the terpenoids in EOs obstruct the enzymatic processes of energy metabolism. The following discussion centers on essential oils that may be utilized to treat and prevent oral diseases [15].

Table 1: Essential oils and their composition and Therapeutic properties

EO	Composition	Properties
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Lavender oil	linalool, linalyl acetate, 1,8-cineole, B-ocimene, terpinen-4-ol, l-fenchone, camphor, and viridiflorol	Antimicrobial, Anxiolytic, Antifungal
Eucalyptus oil	1,8-cineole followed by cryptone, α -pinene, p-cymene, α -terpineol, trans-pinocarveol, phellandral, cuminal, globulol, limonene, aromadendrene, spathulenol, and terpinene-4-ol	Antimicrobial, Anti-inflammatory
Peppermint oil	M. piperita, menthyl acetate and menthofuran	Antibacterial, Antifungal, Antibiofilm
Lemon EO	terpenes and oxygenated terpenes.	Lemon EO is suggested to be used as an effective remedy against candidiasis caused by <i>C. albicans</i> .
Clove oil	phenylpropanoids eugenol, eugenyl acetate, carvacrol, thymol, cinnamaldehyde, β -caryophyllene, and 2-heptanone, when analyzed by gas chromatography.	Antibacterial, Antifungal, Antioxidant
Cinnamon oil	trans-cinnamaldehyde, eugenol, and linalool,	<i>Cinnamomum zeylanicum</i> (CZ) has antiparasitic, antioxidant, and free radical scavenging properties.

EOS' IMPLICATIONS IN DENTAL PRACTICE

In the Zahirunnisa trial, the application of lavender oil in the reception area significantly reduced anxiety scores on a statistically significant basis. It has also been demonstrated to lessen the discomfort of needle insertion during surgical operations. [16]

Eucalyptus oil is excellent for use as an anticariogenic agent because it inhibits oral infections like *Lactobacillus acidophilus*. [17] Eugenol oil is used widely in dentistry. It is effective against oral infections linked to periodontal disease and dental caries. It is effective against oral infections linked to periodontal disease and dental caries. [18]

It is advised to use lemon essential oil (EO) as a treatment for candidiasis brought on by *C. albicans*. [19] Antibiotic resistance in multidrug-resistant bacteria can be decreased by combining EOs and antibiotics. When combined with piperacillin, peppermint, cinnamon bark, and lavender essential oils were discovered to be antibiotic resistance-modifying agents. [20]

STUDIES THAT CONTRADICT THE USAGE OF EOS

The advantages of EOs are supported by numerous studies, while some investigations cast doubt on their effectiveness. A study comparing the effectiveness of 0.2% chlorhexidine rinse with an EO mouth rinse revealed that EOs are only useful for a very short time, i.e., 2-3 h, and came to the conclusion that using chlorhexidine is preferable to EOs. [21]

An investigation into the effectiveness of using EOs as a coolant during ultrasonic root debridement for treating chronic periodontitis found no advantage over using water. [22]

ADVERSE EFFECTS CAUSED BY EOs

The use of natural remedies is not necessarily without risks. With EOs, negative effects have also been recorded. Commercial preparations of the essences of sage, hyssop, thuja, and cedar have been shown to cause neurotoxicity and human intoxication in the study by Millet et al., with tonic-clonic convulsions serving as the main symptom. [23]

Posadzki et al review [23] found that the aromatherapy use of EOs such lavender, peppermint, TTO, and ylang ylang can result in mild to severe adverse effects, including mortality. Dermatitis was the most frequent adverse impact among them. [24] Traditional medicines frequently lack toxicological testing. Therefore, additional clinical studies are necessary to rule out the likelihood of toxicity and side effects.

3. CONCLUSIONS

There is strong evidence, as outlined in this review, that EOs could be turned into medications that treat or prevent a variety of oral disorders. Even though many additional potential applications for EOs have been discussed [25] and numerous claims of therapeutic efficacy have been adequately supported by in vivo or in vitro clinical trials, more research is still required to determine the safety and effectiveness of these EOs before incorporating them into clinical practice. They could be highly beneficial in dental therapy and help to raise the standard of care if utilized properly.

Clinical studies that demonstrate the therapeutic potential of EOs in vivo as well as those that address problems like side effects, toxicity, and their interactions with other pharmacological molecules would be very beneficial.

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