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Research Article

ACTION OF TEA TREE OIL AND CINNAMON LEAF OIL AGAINST ORAL PATHOGENS

RATHNA SUBHASHINI MH[1]*, GEETHA RV[2]

[1]Department of Microbiology, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India. [2]Department of Microbiology, Saveetha Dental College and Hospitals, Chennai, Tamil Nadu, India. Email: rathnasweety72@gmail.com

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ABSTRACT

Objective: To evaluate the antimicrobial effect of tea tree oil (TTO) (*Melaleuca alternifolia*) and cinnamon leaf oil (*Cinnammomum osmophloeum)* against oral pathogens. This study gives a detail description about the action of TTO and cinnamon leaf oil against pathogens that are responsible for dental caries. The mouth contains a wide variety of oral bacterial, and only a few specific species of bacteria are believed to cause dental caries: *Streptococcus mutans* and *Lactobacillus* species among them. TTO or *Malaleuca* is an essential oil with a fresh camphoraceous odor and color ranges from pale yellow to colorless or clear. It is used for medications as it has an antimicrobial effect. The essential oil of *M. alternifolia* exhibits antimicrobial activity against a wide range of Gram-positive and Gram-negative bacteria, yeasts, and fungi. Cinnamon oil contains cinnamaldehyde which possess the strongest antibacterial activity. Since essential oil has a very good antimicrobial effect, it is used against the action of oral pathogens involved in dental caries.

Methods: Cinnamon leaf oil and TTO disc diffusion method is used.

Result: The results obtained from our study shows that the two essential oils have got a very good antibacterial activity against *S. mutans*.

Conclusion: From this study , we conclude that herbal product have a very good anti bacterial effect. So herbal products can be introduced for dental treatments.

Keywords: Cinnamon oil, tea tree oil, dental caries, disc diffusion, S. Mutans, herbal product.

INTRODUCTION

Dental caries also known as tooth decay, cavities, or caries, is a breakdown of teeth due to the activities of bacteria. The cavities may be a number of different colors from yellow to black. Symptoms may include pain and difficulty with eating. Complications may include inflammation of tissues around the tooth, tooth loss, and infection or abscess formation. The bacteria break down the hard tissues of the teeth (enamel, dentin, and cementum) by making acid from food debris on the tooth surface. Simple sugars in food are these bacteria's primary energy source, and thus, a diet high in simple sugar is a risk factor. If the mineral breakdown is greater than build up from sources such as saliva, caries results. Risk factors include conditions that result in less saliva such as: Diabetes mellitus, Sjogren's syndrome, etc. Medications that decrease saliva production include antihistamines and antidepressants. Caries are also associated with poverty, poor oral hygiene, and receding gums resulting in exposure of the roots of the teeth. The bacteria most responsible for dental cavities are the mutans *Streptococci*, most prominently *Streptococcus mutans* and *Streptococcus sobrinus*, and *lactobacilli*. If left untreated, the disease can lead to pain, tooth loss, and infection [2].

Tea tree oil (TTO), or *Melaleuca* oil, is an essential oil with a fresh camphor odor and color that ranges from pale yellow to nearly colorless and clear. It is taken from the leaves of the *Melaleuca alternifolia*, which is native to Southeast Queensland and the Northeast coast of New South Wales, Australia [3]. TTO should not be confused with tea oil, the sweet seasoning and cooking oil from pressed seeds of the tea plant *Camellia sinensis* (beverage tea) or the tea oil plant *Camellia oleifera* [3].

TTO uses

Tea tree leaves were originally used for healing skin ailments, scrapes, insect bites, skin spots, cuts, infections, and burns by crushing the leaves and applying them to the area in need. TTO has also been used to treat conditions such as acne, athlete's foot, dandruff, nail fungus, vaginitis, thrush, periodontal disease, boils, lice, eczema, psoriasis, yeast infections, and as a general antiseptic. It is often used in creams, ointments, soaps, lotions, and shampoos [8].

Not only can TTO help with bad breath (halitosis), but because it has antibiotic qualities, it can also help heal gum infections [1]. It can treat severe chronic gingivitis (gum disease/periodontal disease) and bleeding gums. This is one of the main reasons a dentist would tell a patient to use toothpaste that contains TTO for treating bad breath [2].

Cinnamon essential oil

Cinnamon essential oil is one of the most versatile essential oils. Cinnamon is a sweet spice relished all over the world. It is also used as an herbal tea. Cinnamon is also used to extract an essential oil which has its exact sweet, pervading aroma which is very soothing. Cinnamon essential oil has a plethora of health benefits and healing properties [4].

The source of cinnamon essential oil is the sweet spice *Cinnamomum verum* (also zeylanicum). This is known as true cinnamon. There is another cheaper variety of cinnamon powder that we get from trees in the genus *Cassia* [4]. This cheap cinnamon comes from China, while true cinnamon grows in many parts of the tropical world, notably in Sri Lanka and India. Although *Cassia cinnamon* is also used to extract the essential oil, the one from true cinnamon is the one which possesses wonderful health benefits. There are two kinds of essential oils derived from this tree [5].

- Cinnamon leaf essential oil: This one is steam distilled from the leaves of cinnamon. This is yellowish in color
- Cinnamon bark essential oil: This is steam distilled from the bark of cinnamon. It is slightly reddish in color.

Both of these essential oils have some differences in their chemical composition, obviously because they come from different parts of the same plant. However, their health benefits can be quite similar [5].

METHODS

Test microorganisms

Bacterial strain used was *S. mutans*. The organism was isolated using selective media Mutans -Sanguis agar (Hi media M977), and maintained in nutrient agar slope at 4°C in Department of Microbiology, Saveetha Dental College.

Table 1: Antibacterial activity of essential oils

Organism	Conc µl	E1	E2	Chlorhexidine
Streptococcus mutans	250	12	10	22
	500	19	14	30
	1000	24	20	38

E1: TTO, E2: Cinnamon leaf oil, TTO: Tea tree oil

Methodology

The essential oils, cinnamon leaf, and tree tea oil were loaded on sterile filter paper discs measuring 6 mm diameter in the following concentrations 50 µl, 100 µl, and 200 µl, respectively. The discs were dried and kept aseptically [9].

Screening of antibacterial activity (Disc diffusion technique)

Broth culture of the bacterial strain compared to Mac Farland's standard [4-6] 0.5 was prepared. Lawn culture of the test organisms were made on the Muller Hinton agar (MHA-Hi media M1084) plates using a sterile cotton swab and the plates were dried for 15 minutes. Filter paper discs loaded with different concentrations of the essential oils were placed on the respective plates. The plates were incubated at 37°C overnight, and the zone of inhibition of growth was measured in millimeters. All the tests were done in triplicate to minimize the test error [9].

RESULT AND DISCUSSION

The antibacterial activity of the essential oils at different concentrations was screened by disc diffusion technique, and the zone of inhibition was measured in mm diameter. The results are given in Table 1. The TTO was more effective against *S. mutans* with a zone of inhibition of 24 mm diameter (at conc1000 µl) cinnamon leaf oil showed a zone of 20 mm diameter. Dental caries is a microbial disease that results in the destruction of mineralized tissue of the teeth. *S. mutans* is the potent initiator and leading cause of dental caries worldwide. It is considered to be the most cariogenic of all of the oral *Streptococci*. The present study was to evaluate the antibacterial activity of tree tea oil and cinnamon leaf oil on caries causing organisms. The results obtained from our study shows that the two essential oils have got a very good antibacterial activity against *S. mutans* [10].

CONCLUSION

From this study we conclude that many herbal products have a good anti-microbial effect. So, using mouthwash and paste which contains herbal extracts as constituents have a very good effect on oral pathogens. These constituents help in preventing dental caries and many other oral infections.

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