Research Article

In vitro Antibacterial Activity of Camphor oil against Oral Microbes

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ABSTRACT

Camphor oil is extracted from the tree *Cinnamonum camphora*. It is widely used around the world for its strong aromatic smell and medicinal properties. People use camphor topically to relieve pain and reduce itching. It has also been used to treat fungal infections of the toenail, warts, cold sores, hemorrhoids, and osteoarthritis. The present study is aimed to determine the antimicrobial activity camphor oil against oral pathogens. The aim of the study is to evaluate the antibacterial activity of Camphor oil against Streptococcus mutants and *Enterococcus faecalis*. The antibacterial activity is carried out by agar well diffusion technique against the bacterial pathogens and the zone of inhibition is measured in mm diameter. In the present study, Camphor was found to be equally effective against both the organism tested. So from this study it can be concluded that camphor possess antibacterial activity.

Keywords: Agar well diffusion, Antibacterial, Camphor oil, Zone of inhibition.

INTRODUCTION

Camphor is a white crystalline substance, obtained from the tree *Cinnamonum camphora*, of family Laureaceae. *C. camphora* is an evergreen which grows to a great size, is many branched, flowers white, small and clustered, fruit a red berry much like cinnamon. While the tree grows in China, etc., it can be cultivated successfully in sub-tropical countries, such as India. It is commonly known as Sweet wood or Guizhi. Camphor is widely used around the world. For example, in the East camphor acts as circulatory stimulant and analeptics among Chinese whereas in Japan the Japanese used camphor in torch light material.[1] In addition, camphor is one of the most important materials used during religious rituals among Indian people. This is because during rituals its aromatic smoke does not cause irritant to eyes when it is burned.[2]

Camphor essential is white in colour with strong smell odour. The essential oil of camphor is obtained during the process of extraction of camphor from two types of camphor trees.[3] The first one is the Common Camphor tree, bearing the scientific name *Cinnamonum Camphora*, from which the common camphor is obtained. The second variety is the Borneo Camphor tree, which is where Borneo Camphor is derived; it is scientifically known as *Dryobalanops Camphora*. The camphor oil obtained from both have similar properties, but they differ slightly in aroma and in the concentration of various compounds found in them. The main chemical components are a-pinene, camphene, b-pinene, sabinene, phellandrene, limonene, 1,8-cineole, y-terpinene, p-cymene, terpinolene, furfural, camphor, linalool, bornyl acetate, terpinen-4-ol, caryophyllene, borneol, piperitone, geraniol, safrole, cinnamaldehyde, methyl cinnamate and eugenol.[4]

Camphor oil is an effective stimulant, which boosts the activity of the circulatory system, metabolism, digestion, secretion and excretion. This property helps in treating problems and ailments associated with improper circulation, digestion, sluggish or overactive metabolic rates, obstructed secretions, and a wide variety of other less common conditions. It is also beneficial in the treatment of epilepsy, hysteria, viral diseases like whooping cough, measles, flu, food poisoning, infections of the reproductive organs, and insect bites. It is famous for its ability to inhibit varies types of microorganisms and pathogenic bacteria such as Escherichia coli, Staphylococcus aureus, Bacillus subtilis and many more. Camphor is a well known universal spice not only due to its health benefit but also due to its great flavor and ability to preserve food.[5] In food preservative it applies both anti-fungal and anti-bacterial principles in order to prevent the food from being spoiled. In medicine aspect, camphor is mainly used to treat various types of disease. For example it is used for treating diarrhea, flatulent dyspepsia, kidney weakness, fevers and palpitation.[5] Furthermore, it is also applicable in treating minor muscle aches and pains.[6] Other than, camphor can also be used to enhance air flow in the nose. It works by stimulating cold receptors in the nose.[7]

In cosmetic aspect, camphor or *cinnamomum camphora* is significantly used as skin antiseptic. It is able to cure minor bacterial and fungal infections of the skin. In addition, it can increase skin beauty by promoting a rosy complexion in our face especially for women.[5] Apart from that it is commonly used as an insect repellent and a plasticizer at homes.[8] Camphor is also widely used in

aroma chemicals with annual market value of 80-100 million US$.[9]

MATERIALS AND METHODS

Materials

Bacterial strains used were *Streptococcus mutants* and *Enterococcus faecalis*. The organisms were obtained from Department of Microbiology, Saveetha Dental College.

Methodology

Subculturing of organism

Broth cultures of the test organisms compared to Mac Farland's standard 0.5 were prepared[10, 11]Lawn cultures of the test organisms were made on the Muller-Hinton agar [MHA- M1084] plates using sterile cotton swab and the plates were dried for 15 minutes.

Agar well diffusion method

Well measuring 4 mm depth was made on the agar with sterile cork borer. 100µl of the essential oil is added to the wells. 0.2% of Chlorohexidine was used as a positive control. The plates were incubated overnight and the zone of inhibition of growth was measured in mm diameter[12].All the test were done in triplicate to minimize the test error.

RESULTS AND DISCUSSION

Investigation on antimicrobial activity of camphor against two gram positive bacteria, *Streptococcus mutants* and *Enterococcus* was done. The camphor shows growth inhibition of both gram positive organisms on Muller Hinton Agar (MHA). The zone of inhibition towards two different species of bacteria is recorded and tabulated in Table 1.

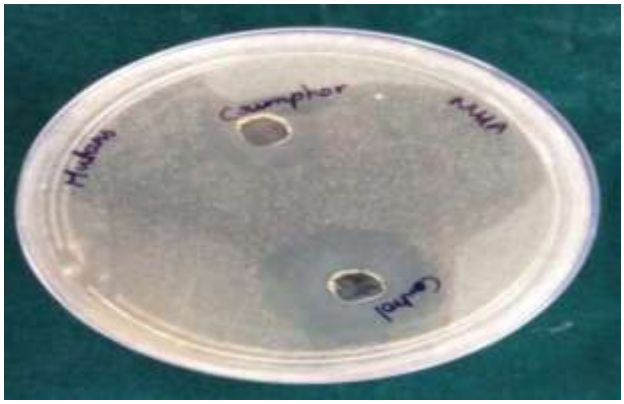

Figure 1: Zone of Inhibition shown by Camphor against Streptococcus mutants

Based on the results, camphor oil showed favorable results for antimicrobial activity against both gram positive organisms. For Streptococcus mutants, the diameter of zone of inhibition was 25mm compared to the control having a zone of inhibition of 33mm in diameter. For the Enterococcus faecalis, the diameter of zone of inhibition for camphor oil and control are almost equal in size which is 20 mm for camphor and 22 mm for control. Camphor oil shows significant antibacterial activity against both organisms tested compared to the control. The activity is more against Streptococcus mutants when compared to Enterococcus faecalis.

Table 1: The table shows the results of the antimicrobial activity on two different microorganisms.

Name of microorganisms	Broth dilution	
	Diameter zone of inhibition (mm)	
	Control	Camphor
Streptococcus mutants	33	25
Enterococcus faecalis	22	20

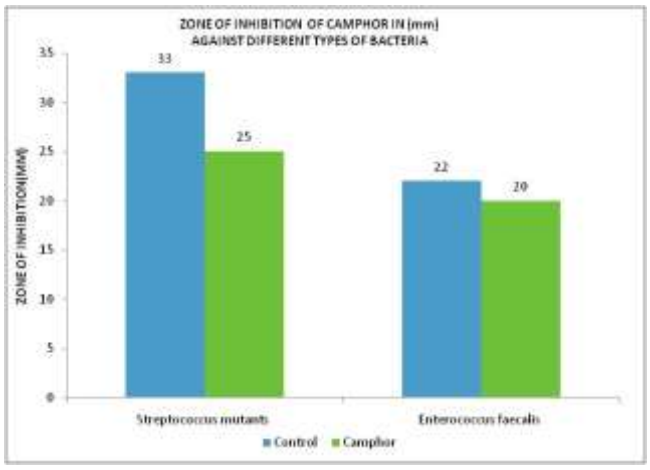

Figure 2: The bar chart shows the antimicrobial activity of camphor against *Streptococcus mutants* and *Enterococcus faecalis*.

CONCLUSION

The results of the study shows that the antimicrobial activity of camphor essential oil against Streptococcus mutants is more effective compared to Enterococcus faecalis. Camphor has tendency to increase its efficiency against the bacteria using other methods or act by combine together with other essential oils.

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