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Research Article

IN VITRO ANTIBACTERIAL ACTIVITY OF CLOVE AND PEPPER ON *STREPTOCOCCUS MUTANS*

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ABSTRACT

Dental caries is an oral disease of bacterial origin that causes demineralization and destruction of tooth structure. *Streptococcus mutans* is Gram-positive bacteria that play a vital role in the formation of tooth decay. Instead of opting for synthetic antibacterial substances, natural therapy can be followed. Various spices have bactericidal properties that can be used to prevent tooth decay. Clove is an herb, used as a spice that has effective bactericidal action. Black pepper has been named the "black gold" for its wide therapeutic uses. The effect of these spices on *Streptococcus mutants* is studied using disc diffusion technique. The results obtained from our study shows that the two extracts have got a very good antibacterial activity against *S. mutans*.

Keywords: Bactericidal, Cariogenic, Dental caries, Disc diffusion.

INTRODUCTION

Dental caries or tooth decay is a chronic endogenous infection caused due to demineralization of enamel and dentin by bacteria. These microorganisms colonize the tooth surface and form plaque. Dental plaque is one of the factors that lead to the formation of dental plaque. There are various dental treatments that can be done to remove the carious portions of the tooth. However, natural products can be used for the prevention of occurrence of caries in the oral cavity.

In many regions of the world, natural products are used for the treatment of various diseases. In nations, such as India, China, Japan, and Korea, herbal product are being used as medicines. These natural products have antibacterial, antifungal, antiviral and anti-inflammatory properties. The World Health Organization estimates that 80% of people living in developing countries use traditional medicine almost exclusively [1,2].

Cloves are obtained from *Syzygium aromaticum*, a member of the *Myrtaceae* family. They are dried, the unopened inflorescence of about 1/2-3/4 inch in length. They contain 14-20% essential oil. Cloves are strongly pungent due to their high content of eugenol, which can be extracted by distillation to yield the essential oil [3]. Cloves have been used by humans for medicinal applications for over 2000 years, being chewed to alleviate the pain of toothache and are also widely used as disinfectant root canals in temporary fillings [4] and as an oral anesthetic. It is a natural antibiotic [5] with broad antimicrobial activities against Gram-positive, Gram-negative, and acid-fast bacteria, as well as fungi [6,7].

Black pepper (*Piper nigrum* L.) is popularly known as the "King of Spices." Apart from its usage in cooking, it is also used in traditional medicinal systems like Ayurveda. Pepper is also used in folk medicine as aphrodisiac, carminative, stomachic, antiseptic, diuretic, for treatment of cough, rheumatoid arthritis, peripheral neuropathy, melanoderma, and leprosy due to presence of volatile compounds, tannins, phenols, and various unknown substances [8-11].

MATERIALS AND METHODS

Test microorganisms

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

Methodology

The extracts namely clove and pepper were loaded on sterile filter paper discs measuring 6 mm diameter in the following concentrations 250 µl, 500 µl, and 1000 µl, respectively. The discs were dried and kept aseptically.

Screening of antibacterial activity (disc diffusion technique)

Broth culture of the bacterial strain compared to McFarland's standard [12-14] 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 extracts were placed on the respective plates. 0.2% chlorhexidine was used as the positive control. 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.

RESULT AND DISCUSSION

The antibacterial activity of the extracts at different concentrations was screened by disc diffusion technique and the zone of inhibition was measured in mm diameter. The results are shown in Table 1. The clove extract was more effective against *S. mutans* with a zone of inhibition of 22 mm diameter (at concentrate 1000 µl) and pepper extract showed a zone of 17 mm diameter (at concentrate 1000 µl). Dental caries is one of the major causes for the destruction of mineralized tissue of the teeth. *S. mutans* is the potent initiator and is considered to be the most cariogenic of all of the oral streptococci. The present study was to evaluate the antibacterial activity of clove and pepper on caries causing organisms. The results obtained from our study shows that the two extracts have got a very good antibacterial activity against *S. mutans*.

Table 1: Antibacterial activity of clove and pepper on *Streptococcus mutans*

Extracts	Zone of inhibition (in mm diameter)		
	1000 µl	500 µl	250 µl
Clove	22	17	10
Pepper	17	14	08
Chlorhexidine	35	24	17

CONCLUSION

Spices have been declared as powerful antibacterial agents and hence must be used appropriately. The use of spices in dentistry should be based on evidence of effectiveness and safety. The antibacterial activities could be enhanced if active components are purified and adequate dosage determined for proper administration. The present results, therefore, offer a scientific basis for traditional use of clove and pepper on oral pathogens.

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