Effect Of Antimicrobial Activity Of Herbal Medicines On Streptococcus Mutans

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Abstract: Background: Many plants or herbs exhibit potent antimicrobial activity against various microorganisms. They have no side effects and presumably act against and modulate the factors that are crucial for microbial survival or their activity. Osimum sanctum(Tulsi)is the most commonly found in households plants of India. Azadirachta indica (Neem) is perhaps most traditionally useful plant in India. As well aleo vera has also medicinal properties. Streptococcus mutans is a pioneer bacteria implicated in dental caries. This study aims to evaluate the antimicrobial activity of Tulsi, Neem and Aleo vera on Streptococcus mutans by evaluating their zone of inhibition and determining their minimum inhibitory concentration. Material And Methods: Tulsi powder, Neem and Aleo vera gel were incorporated in blood agar in which streptococcus mutans were cultivated. Antibacterial effect was studied at various concentrations of Tulsi, Neem and Aleo vera gel. Result: All three herbal medicines showed different sized zone of inhibition at different concentrations.Conclusion: Tulsi, Neem and Aleo vera gel have antimicrobial effect at different concentrations. [Shah P, Natl J Integr Res Med, 2019; 10(6):16-18]

Key Words: Herbal medicine, Sheep blood agar, Antimicrobial Activity

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Introduction: Dental caries is a chronic microbial disease affecting humans in all parts of the world[1,2]. mutans group of streptococci,being the active cause of caries[3,4], produce weak organic acids after fermenting carbohydrates, or a byproduct resulting in demineralization of the tooth structure[5,6].

Preventing and controlling dental caries has been a great challenge. For ages many prophylactic agents have been used to prevent dental caries such as antibiotics, plant and herb derived compounds, mouth washes, tooth pastes, gels, varnishes, and the caries vaccines.[(7)] One such method practiced from an age-old time is use of natural herbs especially by rural people to clean their teeth. In our study, we aimed at evaluating the antimicrobial potential of natural herbs like Tulsi,Neem and Aleo vera gel on streptococcus mutans.

Aim And Objectives: To assess the in vitro antibacterial property of Tulsi, Neem and Aleo vera gel against Streptococcus mutans and to evaluate their efficacy as antimicrobial agent at different concentrations.

Material & Methods : Neem, tulsi powder and aloe vera gel were used for the study. Ethanohlic extracts of tulsi and neem powder and Aloe vera gel were prepared and subjected to dilution with inert solvant, dimethyl formamamide. (2%, 4%and 6%). Chlorhexidine(0.2%) was used as positive control and dimethyl formamide as negative control. Freeze dried forms of streptococcus mutans were used for the study and cultured on sheep blood agar as a medium. (fig 1)and (fig 2) circular wells were cut in the agar plates to incorporate neem, tulsi and aloe vera gel.(fig 3) and were incubated at 37 degree celcius for 48 hrs. Inhibition zones were measured using a vernier calpier. (fig 4).

Figure 1: Sheep blood agar plate

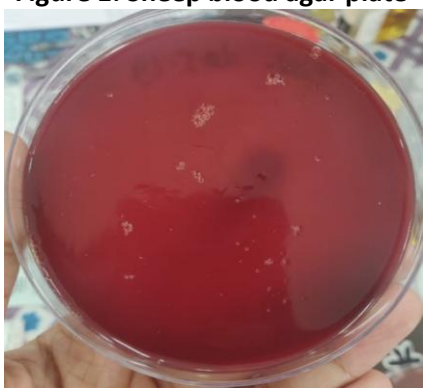


Figure 2: Growth of streptococcus mutans

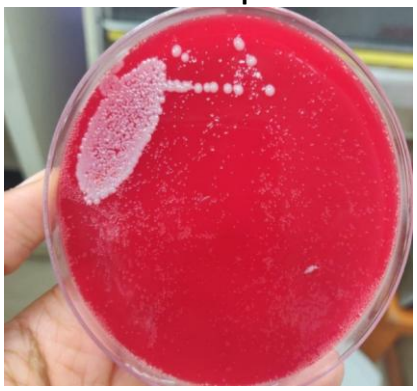


Figure 3: Circular well in agar plate

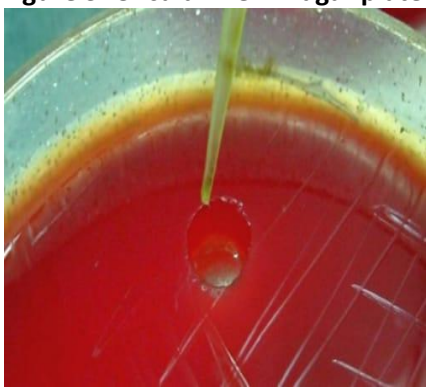
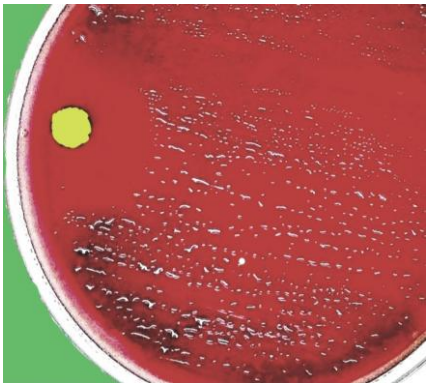


Figure 4 Inhibition zone around Aloe vera gel



Results: On observing the activity of Tulsi Powder against S.mutans, at 2% concentration,an average inhibition zone of 21.5mm was seen. Maximum zone of inhibition of 24 mm was noticed at 4% concentarion. The minimum zone of 19.5mm was observed at 6%. In case of Neem extracts, the minimum zone of 21.5mm was observed at 2% and maximum zone of inhibiton was observed was 25mm at 6%concentarion. In case of Aloe vera gel minimum zone of 16mm was seen at 4% concentration and maximum zone of inhibition was 17mm at 6% concentration. However,0.2% chlorhexidine (positive control)gave wider zone of inhibition of 29mm. S.Mutans were resistant against Dimethyl formamide.(negative control).

Discussion: Dental caries is an irreversible chronic disease initiated by streptococcus mutans, a Gram-positive, facultative anaerobic microorganisms.[8] In the present study, we have made an attempt to assess the antimicrobial effect of 4% tulsi extract against S. mutans. Agarwal et al. found that 4% tulsi extract showed maximum antibacterial activity against S. mutans[9] Subramanian et al. showed that among the various extracts of tulsi, ethanolic extract of tulsi (Ocimum sanctum) had higher antimicrobial activity when compared with other extract.[10] Eugenol (1-hydroxy-2 methoxy4allylbenzene), the active constituent present in Tulsi (O. sanctum), has been found to be largely responsible for the therapeutic potentials of tulsi.[11]

Neem contains the alkaloid margosine, resins, gum, chloride, fluoride, silica, sulfur, tannins, oils, saponins, flavenoids, sterols, and calcium. [12] In a study to determine the most effective method for reducing plaque formation and the level of bacteria on tooth surface, it was found that micro-organisms in inflamed gums are resistant to penicillin (44%) and tetracycline (30%) but were not resistant to antibacterial plant extracts like the Neem.[13] In another report by the UCLA School of dentistry, it was found that Neem could reduce the ability of Streptococcal bacteria to colonize on the surface of teeth, thus providing an explanation for Neem's long-standing reputation as a cavity fighter.[14]

Aloe vera, also known as Aloe barbadensis belongs to the Asphodelaceae family. It is rightly called as the 'Plant of Immortality' in the Egyptian culture owing to its diverse therapeutic applications.[15] The pharmacological uses of Aloe vera can be attributed to its anti-inflammatory, anti-tumor, anti-microbial and wound healing properties.The clinical effectiveness of Aloe vera against various ailments such as asthma, thermal burn, diabetes, radiation induced skin injury, arthritis and hyperlipidemia is documented in literature.[16-18]

The limitations of our study include that this study was conducted in vitro with the extracts neem, tulsi and aleovera gel. The duration of the contact of such extracts with the microorganisms in the oral cavity in vivo is not clear; hence further studies comparing the prevalence of dental caries among users and nonusers of such extracts should be evaluated. Further research with larger samples, variations in concentration and volume are still required.

Conclusion: In our present study Tulsi, Neem and Aloe vera gel extracts exhibited antimicrobial activity against S.mutans with maximum zones observed at 4% and 6% concentarion which were comparable to that of Chlorhexidine. However, studies simulating in vivo situations more closely are required to get a clear understanding.

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