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RESEARCH ARTICLE

ANTIMICROBIAL EFFECT OF CRUDE EXTRACT OF GARLIC TOWARDS ORAL MICROBIOME

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ABSTRACT

Objective: To analyze the antibacterial activity of crude extract of Garlic (*Allium Sativum*) ex vivo as a mouth rinse and compare their efficacy with chlorhexidine gluconate 0.12%.

Materials and Methods: A solution made with white clone of garlic was used as a mouth rinse and compared with conventional chlorhexidine mouth rinse. Three groups were assigned, each having 10 patients, where, Group A consisted of patients who used saline as mouth rinse, Group B consisted patients who used chlorhexidine gluconate 0.12% mouth rinse and Group C consisted patients who used crude extract of garlic mouthrinse. Pre and post saliva samples were collected. Pre and post mouth rinse saliva samples were collected from 30 patients. The samples were then cultured and the total bacterial count was calculated. The antibacterial effect of garlic was then compared with the antibacterial effect of Chlorhexidine mouth rinse.

Results: The microbial colonies of all the three groups showed a confluent growth. In this study we found that there is significant reduction of Coagulase negative staphylococci by Garlic in saliva sample.

Conclusion: There was a partial benefit with the crude extract of garlic. Chlorhexidine gluconate 0.12% showed a better disinfection property than the crude extract of garlic.

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INTRODUCTION

The bacteria in the plaque at the gingival margin is widely known as the primary factor that induces the development of chronic periodontitis. There are around 500 bacterial species in one milligram of plaque from oral cavity (Takarada, *et al.,* 2004). Supragingival plaque consists of gram positive bacteria predominantly and subgingival plaque is predominantly characterized by gram negative bacteria (Perinetti *et al*, 2004). *Allium sativum* L. Liliaceae, also known as garlic, contains multiple biologically active components like alliinase, allicin, alliin, S-allycystein, allymethyltrisulphide and diallylsulphide. When the bulbs of garlic is crushed, an amino acid called Alliin is converted into allicin by allinelyase catalyses. Allicin is the precursor of sulphur-containing compounds, and they are majorly responsible for the odour, flavour and pharmacological properties. When expose to air, allicin is converted into diallyldisulphide, which contributes antibacterial effects (Jesse *et al.,* 1997). Bacterial growth inhibition and bactericidal properties are mainly due to allicin and thiosulphonates found in garlic.

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Other sulphur contains compounds, like ajoenealso decrease bacterial growth (Shelef, 1984 and González Fandos, *et al*, 1994). There are many literature on the antibacterial effect of fresh garlic juice, steam distilled oil, aqueous and alcoholic extracts, lyophilized powders, and other commercially available forms of garlic (Sathiyawathie, 2015). In 2014, a systematic review done by Kritika Jangid showed that herbal mouthwashes can be used as an alternative to chlorhexidine to treat or prevent plaque induced gingivitis(Kritika Jangid, 2014).Hence, This study is performed with crude extract of garlic to analyse the efficacy of antibacterial effect of crude of extract of garlic.

Aim and Objective

To analyze the antibacterial activity of crude extract of Garlic (Allium Sativum) as a mouth rinse and compare the same with the antibacterial effect of chlorhexidine gluconate 0.12%.

MATERIAS AND METHODS

Healthy subjects, 18 – 50 years of age, presenting no allergies were selected. The subjects included had not used any antimicrobial drugs or mouth wash for past 4 weeks. Informed consent was obtained from all individuals.

Table 1. Interpretation of bacterial colonies between the three groups

	Pre- Mouth Rinse	Post mouth rinse	Interpretation
Group A (Saline)	Confluent growth	Confluent growth	There was no difference in density of total bacteria
Group B (Chlorhexidine)	Confluent growth	Confluent growth	There was more than 50% of reduction in density of total bacteria.
Group C (Garlic)	Confluent growth	Confluent growth	There was 30% reduction in density of total bacteria. There was significant reduction of CONS (more than 75%)

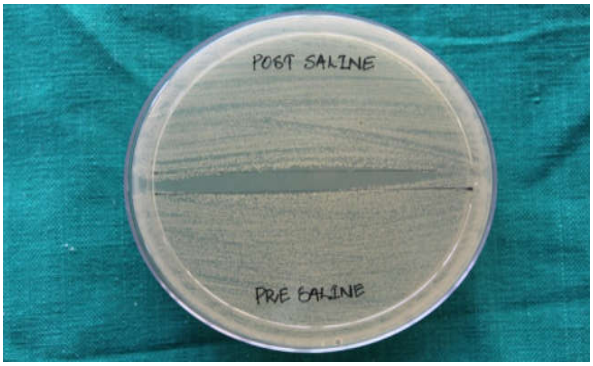

Fig.1. Pre and post saline saliva Sample showing confluent growth

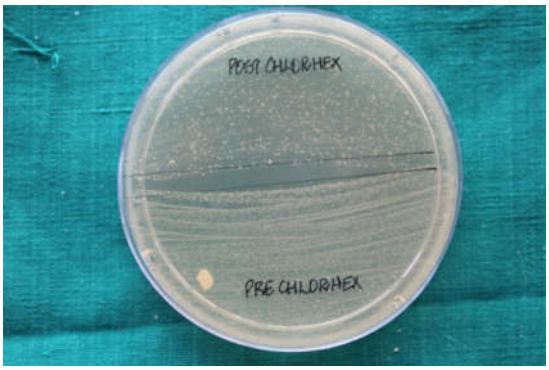

Fig.2. Pre and post chlorhexidine saliva sample showing confluent growth

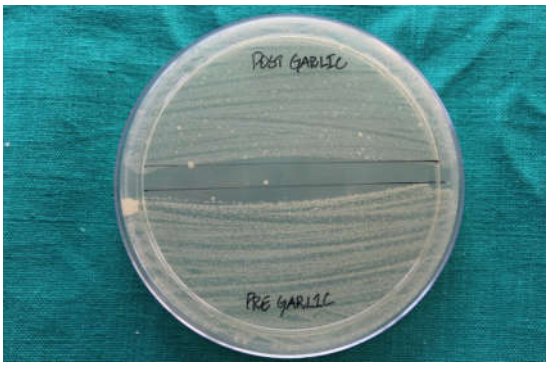

Fig. 3. Pre and Post Garlic mouth rinse salivasample showing confluent growth

Three groups were assigned, each having 10 patients. Group A consisted of subjects who used normal saline as mouthrinse (control group), Group B consisted of subjects who used chlorhexidine gluconate 0.12% and Group C comprised of subjects who used crude extract of garlic mouthrinse.

Preparation of Crude extract of garlic

White clone of garlic was purchased, the bulbs of garlic were peeled and cleaned with running tap water. The peeled garlic was crushed into a paste. 250 g of garlic paste was then mixed with 500 ml of distilled water in a sterile glass container. This mix was stored at 5ºC for 4 days. Later the mixture was centrifuged and filtered with a grade I wattman filter paper to remove any impurities.

Salivary sample

Pre and post mouthrinse unstimulated saliva samples were collected from all 30 patients in a sterile container. After collecting Pre mouth ringe salivary sample, subjects were asked to use 30 ml of mouth rinse to swish around the mouth for one whole minute AND SPIT. Later, Post mouth rinse saliva samples were collected two minutes after mouth rinse. The samples were then cultured and the bacterial count was calculated.

Microbiological analysis

Each sample was diluted in saline solution (1:80). The diluted sample were spread on small petridish containing blood agar (agar base + 5 percent sheep blood). The dishes were the placed in an aerobic incubator at 37˚C, for 24 hours.Counts for the total oral microorganism were performed under microscope.

RESULTS

The microbial colony of all the three groups showed a confluent growth (Refer Fig.1). As shown in Table 1, Chlorhexidine gluconate 0.12% showed more than 50% of reduction in density of total bacteria whereas crude extract of garlic (Allium sativum) showed 30% reduction in density of total bacteria. It was also found that there was almost upto 75% reduction of Coagulase negative staphylococci in post garlic rinse saliva samples.

DISCUSSION

In the present study, the standard mouthrinse, Chlorhexidine gluconate, consistently displayed superior potency when compared with the crude extract of Allium sativum (Garlic). This may be attributed to the fact that chlorhexidine, as a conventional mouthrinse, is prepared by means of a reproduceable manufacturing processes and procedures, extracts of herbal medicines are often subject to decomposition and degradation on storage (Abubakar, 2009). The study done Roy *et al*. 2006 showed decrease in potency of garlic extracts upon storage and attributed this to the volatile nature of the active principles in garlic (Roy *et al.,* 2006). Bakri and

Douglas in 2009 showed in their study that the garlic extract containing 220µg/ml of allicin inhibited the growth of gram negative microorganisms, indicating that garlic extract inhibits the growth of oral pathogens and certain proteases and, hence they may have therapeutic value, more precisely in periodontitis. Also, Jamil *et al*. 2011 performed a study and concluded that Garlic extract has a potential use for prevention and treatment of periodontal disease. Their study showed that allicin was found to inhibit growth of all tested bacterias like P. gingivalis, F. nucleatum, A. actinomycetemcomitans, S. mutans, E. coli, and A. viscosus. They also found that allicin was a potent irreversible inhibitor of P. gingivalis proteases and capable of killing S. mutans in bio film. Rees *et al.* 1993 also performed a study on efficacy of garlic on E coli and concluded that garlic prevented the establishment of Ecoli.

Conclusion

Chlorhexidine gluconate 0.12% showed a better disinfection property than garlic. When compared with Chlorhexidine gluconate 0.12%, crude extract of garlic had a partial benefit.

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