

Original Research

Comparative evaluation of clinical effects of simultaneous ultrasonic scaling and irrigation with medicated water containing 2% *Occimum sanctum* on gingivitis- A Clinical Intervention Study

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ABSTRACT:

Background-Antimicrobial therapy is considered essential as an adjunct to mechanical therapy for periodontal disease. To compare and evaluate the effectiveness of ultrasonic scaling and irrigation with 2% *Occimum sanctum* extract, 0.2% chlorhexidine and distilled water in patients with chronic gingivitis. **Methods-**A sample size of 45 subjects in the age group of 20 – 65 years were randomly allocated via simple random sampling technique into three groups. Group A - Ultrasonic scaling using medicated water containing extract of 2% *occimum sanctum*. (test group), Group B – Ultrasonic scaling using 0.2% chlorhexidine (test group) and Group C – Ultrasonic scaling using Distilled water (control group). The Gingival Index, Plaque Index and Sulcular Bleeding Index were obtained at baseline, 7 days and 21 days. **Results-** Intra-group comparison shows significant reduction in the Plaque score for all the groups while intergroup comparison did not show any significant difference in group A and B. Intragroup comparison shows significant reduction in the Sulcular Bleeding Score for all the groups while intergroup comparison did not show any significant difference in group A and B. Intragroup comparison shows significant reduction in the Gingival score for all the groups while intergroup comparison did not show any significant difference in group A and B. Gingival inflammation was also significantly reduced in both group A and B when individually compared with group C. (p value <0.05). **Conclusion-**The results of the study has shown that ultrasonic scaling and irrigation with Tulsi extract has better effect on plaque control and gingival health and is at par with the gold standard of chlorhexidine.

Key words: *Occimum sanctum*, chlorhexidine, gingival, plaque.

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INTRODUCTION

Periodontitis is a chronic inflammatory destruction of tooth supporting tissues resulting in clinical attachment loss and radiographic bone loss.[1] Degenerative changes as a result of periodontitis mainly include collagen tissue breakdown and alveolar bone destruction, leading to periodontal pocket formation. Another key biologic feature of periodontitis is bleeding on probing that is due to the chronic inflammation in periodontal tissues provoked by a mechanical stimulus such as probing with a periodontal probe. Gingivitis is the inflammation of gingiva without apical migration of junctional epithelium.[2] A recent study by Balaji et al 2018 has shown a high prevalence of periodontal disease of 42.3% in an urban study population of 1000 individuals from

South India.[3] Mechanical debridement is the prerequisite for controlling periodontal infections. However, there are some limitations of scaling and root planning. Certain deep periodontal pockets experience recolonization of pathogenic bacteria by 120-240 days despite multiple sessions of subgingival debridement.[4] Bacteria like *P. gingivalis*, *A. actinomycetemcomitans* etc. have the ability to invade the gingival tissues and dentinal tubules.[5,6] These bacteria therefore cannot be eradicated completely by mechanical debridement alone. Other niches in the oral cavity such as tongue, tonsils and buccal mucosa also harbour the pathogenic microorganisms which cannot be eradicated by scaling and root planning.[7] Therefore antimicrobials were introduced as an adjunct to conventional mechanical

debridement. The advantages of using local antimicrobial agents include achieving the required and higher concentration of the antibiotic in the pocket, ability to affect the organisms inhabiting the remainder of the oral mucosa and extra dental sites, able to deliver antimicrobial agents not suitable for systemic delivery, improvement in patient compliance as compared to systemic drug delivery due to professional local pocket application of local antimicrobial agents and reduction in the risk of developing drug resistant bacteria.[8]

Chlorhexidine (CHX) is considered as “gold standard” antibacterial solution and is extensively used as mouthwash and irrigating solution. However, it has certain side effects with prolonged use such as alteration in taste sensation, brown staining of teeth, calculus formation and parotid swelling.[9] Recently, herbal extracts have been used as the main ingredient in mouthwash to reduce gingival inflammation. These products have fewer side effects because of their herbal nature.[10] Aloe, betel pepper (*Piper betel*), black pepper (*Piper nigrum*), clove (*Syzygium aromaticum*), coriander, (*Coriandrum sativum*), eucalyptus (*Eucalyptus globules*), garlic (*Allium sativum*), turmeric (*Curcuma longa*), green tea (*Camellia sinensis*), Onion (*Allium cepa*), papaya (*Carica papaya*), potato (*Solanum tuberosum*) and Tulsi (*Occimum sanctum*) are few Indian plants species which contain antimicrobial activities.[11] A recent review on use of medicinal plants for gingivitis by Safiaghdam et al 2018 has discussed the use of herbal medicines such as pomegranate, aloe, triphala, green tea and miswak in the form of dentifrice, mouthwash, gel and gum for the treatment of gingivitis. These products have scientific evidence of effectiveness in gingivitis as they possess anti-inflammatory, antimicrobial and antioxidative effects.[12]

Therefore this study aims to assess the effectiveness of ultrasonic scaling and irrigation with 2% *Occimum sanctum* extract, 0.2% chlorhexidine and distilled water in patients with chronic gingivitis.

MATERIAL AND METHODS

A randomized controlled clinical study was conducted to assess the effectiveness of ultrasonic irrigation and scaling with medicated water containing in the Department of Periodontology. Institutional Ethical Committee clearance was obtained before the commencement of research work and informed written consent was taken from the participants before the study.

A sample size of 45 systemically healthy subjects with chronic gingivitis in the age group of 20 – 65 years was randomly allocated via simple random sampling technique into three groups: Group A - Ultrasonic scaling using medicated water containing extract of 2% *occimum sanctum*. (TEST GROUP), Group B – Ultrasonic scaling using 0.2% chlorhexidine (TEST GROUP) and Group C – Ultrasonic scaling using Distilled water (CONTROL GROUP)..

The inclusion criteria of the study is-

- Patients with generalized chronic gingivitis.

- Patients in the age group of 20-65 years.
- Systemically healthy subjects with Gingival index score, Plaque index score and sulcular bleeding index score > 1 at the time of examination.

The exclusion criteria of the study is-

- Patients with periodontitis
- Smokers
- Antibiotic therapy within last 6 months of the study
- Patients with systemic diseases such as rheumatic fever and other conditions requiring prophylactic antibiotic therapy before dental treatment
- Pregnant and lactating women.
- Patients undergone or having undergone periodontal therapy within last 6 months of study.
- Patients taking antioxidants.

The Tulsi extract was prepared with cold extraction method. The leaves of Tulsi plant were collected, separated and dried. An extract of the dried leaves was obtained and dried leaves were ground to a powder.

To prepare an ethanolic extract from Tulsi powder, 250 gm of Tulsi powder was macerated with 100% ethanol for 3 days. This alcoholic decoction was subjected to filtration to obtain a clear filtrate. The filtrate was then reduced at a low temperature to obtain a solid residue of Tulsi extract. From 250 gm of Tulsi powder dissolved in 1L of ethanol, 18 gm of solid residue was obtained. 1g of this extract is dissolved in 10 ml of formamide to obtain a concentration of 10%. Similarly concentration of 0.5 %, 1%, 2% and 5 % of Tulsi extract were obtained.

The assessment criteria included Gingival Index (GI) score, Plaque Index (PI) score and Sulcular Bleeding Index (SBI) score that were measured at baseline, at 7 days and at 21 days.

To study whether the test group and control group differ significantly from baseline to 21 days with each parameter and to know the mean change in values, paired test was used at 95% confidence level. To analyze which pair actually shows a significant difference and over which parameter, unpaired test was carried out at 95% confidence.

RESULTS

45 subjects were enrolled in the study to assess the effect of 2% *Occimum sanctum* extract on gingival inflammation.

Plaque Index

Intra group comparison shows significant reduction in the Plaque score for all the groups while intergroup comparison did not show any significant difference in group A and B.

Sulcus Bleeding Index

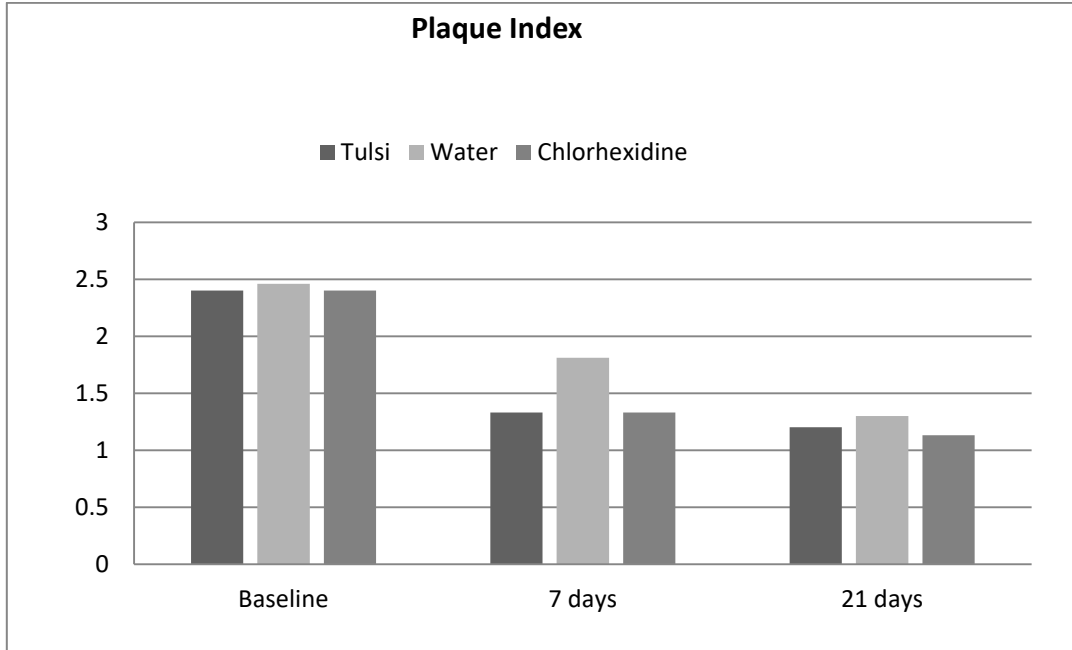
Intragroup comparison shows significant reduction in the sulcular bleeding score for all the groups while intergroup comparison did not show any significant difference in group A and B.

Gingival index

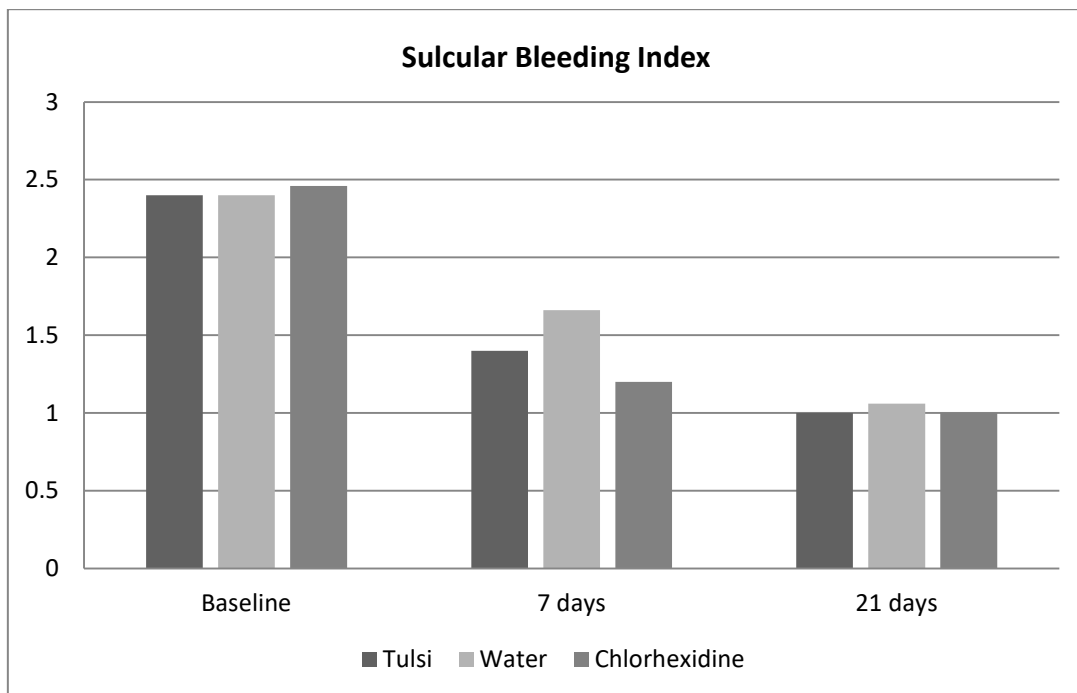
Intra group comparison shows significant reduction in the Gingival score for all the groups while intergroup

comparison did not show any significant difference in group A and B. Gingival inflammation was also significantly reduced in both group A and B when individually compared with group C.(p value <0.05)

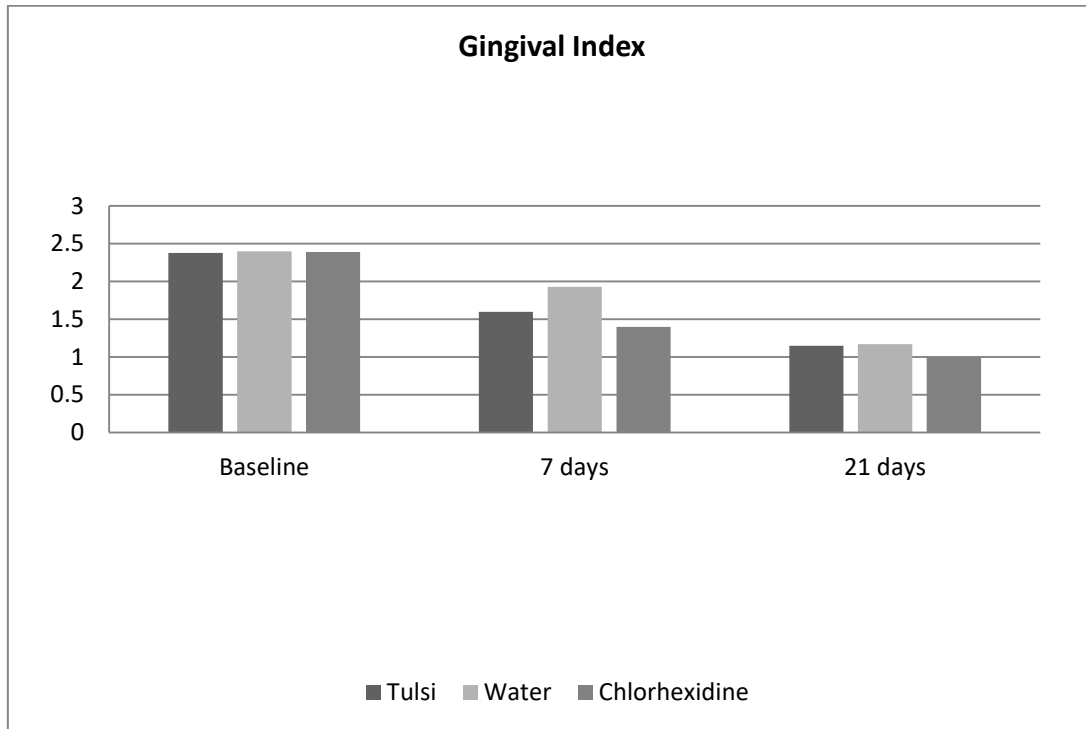
The results of the study show that Tulsi extract has comparable efficacy when compared to chlorhexidine in terms of its anti-plaque and anti-inflammatory properties. However, the long term benefits i.e. after 21 days were better with chlorhexidine as compared to Tulsi extracts.



Graph 1- Comparison of Plaque Index (PI) scores



Graph 2- Comparison of Sulcus Bleeding Index (SBI) scores



Graph 3- Comparison of Gingival Index (GI) scores

DISCUSSION

In this study, use of herbal extract has been compared with chlorhexidine in addition to mechanical debridement by ultrasonic scaling in patients with chronic gingivitis. Gingivitis is the most common periodontal disease in children and adolescents. The use of subgingival irrigation has been proven to be beneficial when used in addition to scaling and root planning (SRP) when compared to SRP alone.[13]

Due to the emerging resistance to chemotherapeutic agents,[14] herbal based pharmaceutical products are now being used for the treatment of periodontal diseases. Since herbal derivatives are less harmful than synthetic medications, significant efforts have been made to identify novel, herbal extracts for use as anti-plaque agents. Herbal drugs are known to have a better acceptance by the patient and therefore the patient compliance is improved. Also, their cultivation and processing is environment friendly. Tulsi is an aromatic shrub that is referred to as “Mother medicine of nature”. It has anti-inflammatory, antimicrobial, antioxidant, analgesic and immunomodulatory properties.[15] Tulsi’s broad spectrum activity, which includes activity against *Streptococcus mutans*, the organism responsible for tooth decay, further suggests that it can be used as a herbal mouth wash for treating bad breath, gum disease and mouth ulcers. This has been confirmed in clinical trials that have demonstrated that rinsing with tulsi is as effective as 0.2% Chlorhexidine and Listerine in reducing the levels of *Streptococcus mutans* and that a herbal mouthwash that includes tulsi is preferred for its taste and convenience.[16]

The results of this study showed that the PI and GI decreased significantly from baseline and second and third visits in both the test groups as compared to control group and the anti-plaque and anti-gingivitis effects of Tulsi are comparable to Chlorhexidine for the first 21 days after use. However, the long term effects are better with Chlorhexidine. Makarem, Khordimood and Pooreslami have shown that herbal agents have antiplaque characteristics which make them appropriate as possible anti-plaque and tooth cleansing agents.[17] Adamkova H et al conducted a clinical trial on 40 subjects with gingivitis to evaluate the effectiveness of a herbal based dentifrice. He concluded that the dentifrice was effective in reducing the symptoms of gingivitis as evaluated by CPITN and PBI indices.[18]

The Tulsi extract was used as solution of medicated water along with ultrasonic scaling because studies have shown that study procedures at home demonstrated that patients could be influenced by factors that may mask the efficacy of a test agent as compared to control.[19] One such factor is Hawthorne effect which states that the patient enrolled in oral hygiene studies experience behavioural modifications as a consequence of participating in the study and not as the effect of the test agent which may affect the study outcome.[20] However, the 21 days period of the study was insufficient to show significant effects of Tulsi extract on gingival inflammation.

The use of 2% *Occimum sanctum* extract along with mechanical debridement has comparable anti-plaque and anti-gingivitis effects with Chlorhexidine. Keeping in consideration the numerous advantages of herbal products such as improved patient compliance and disadvantages

of Chlorhexidine such as staining of the teeth, calculus formation and alteration of taste sensation, herbal products can be used for the treatment of gingival inflammation.

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