

Assessment of 4% ocimum sanctum and 0.2% chlorhexidine irrigation as an adjunct to scaling & root planing in management of chronic periodontitis - a randomized controlled trial

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ABSTRACT

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Background: Ocimum sanctum is a plant which is of great medicinal value and has various properties for curing and preventing disease. Hence a study was conducted to determine the effectiveness of Ocimum sanctum on bacterial plaque and its comparison with Chlorhexidine gluconate which is considered as the gold standard.

Materials and Methods: 30 chronic periodontitis patients were randomized into two groups. Group A received scaling and root planing plus intra-pocket irrigation of Ocimum sanctum (n= 15) and Group B received scaling and root planing plus intra-pocket irrigation with Chlorhexidine gluconate (n = 15). Clinical parameters including the plaque index, gingival index, pocket probing depth and clinical attachment level were assessed at baseline and 30 days. Statistical analysis was carried out using SPSS version 17. Statistical significance of $P \leq 0.001$ was considered.

Results: Our data showed that Ocimum sanctum was equally effective in reducing periodontal indices as chlorhexidine. Significant reduction in all clinical parameters were observed over a period of four weeks in both the test and the control groups.

Conclusion: The results of the present study revealed that subgingival irrigation with 4% Ocimum sanctum may prove to be effective owing to its ability in reducing plaque accumulation, gingival inflammation and bleeding and has no side effects as compared to chlorhexidine.

Keywords: Chlorhexidine, Ocimum sanctum, Irrigation, Periodontitis

INTRODUCTION

Periodontitis is an inflammatory disease which causes pathological alterations in tooth supporting tissues and hence leads to loss of periodontal tissues. Scaling and root planing (SRP) is considered as the effective means of treating periodontitis.¹ However, the failure to gain access to deep pockets or furcations often results in a substantial variation in its effectiveness.² To compensate for these technical limitations, use of antimicrobials has been established which prevents early microbial recolonization and ultimately ensures significant chances of clinical improvements.³ From the past four decades subgingival irrigation has been used as a useful adjunct to scaling and root planing for the treatment of periodontal diseases.⁴ Subgingival delivery of antimicrobial agents have been shown to be effective both, in office as well as in home hygiene regimes.

Various compounds have been evaluated for their effectiveness on plaque and gingivitis including bisbiguanides such as chlorhexidine gluconate⁵ pyrimidines, quaternary ammonium compounds, essential oils⁶ phenolic compounds, oxygenating agents, halogens etc. Among these agents, chlorhexidine is the most studied and effective

antiseptic for inhibition of plaque and gingivitis, when used as mouth rinse twice daily⁷.

Topical treatment with 0.2% Chlorhexidine gluconate (CHX) has been found to be particularly efficacious for the control of supragingival plaque⁸ but simple mouthrinses do not allow access of the substance to the subgingival area.⁹ It has been recently shown that subgingival irrigation with CHX seems to cause significant changes in both clinical and microbiological parameters in humans^{10,11} and animals¹² although some observations contradict these findings.¹³

Medicinal plants are widely used in curing and controlling various diseases in day to day practice. Despite the presence of extracts of herbs, or synthetic chemicals based on herbs in modern day medicine still the natural form offers less side effects and a cheaper alternative to pharmaceutical drugs.¹⁴ Ocimum sanctum is one such natural substance, also known as the "Queen of herbs". In ancient literature, it is considered as a sacred medicinal plant and is frequently mentioned as one of the main pillars of herbal medicine. Tulsi has been renowned as a general tonic and vitalizer, "The Elixir of Life".¹⁴ Oil of O. sanctum contains five fatty acids (stearic, palmitic, linoleic, oleic and linolenic acids) which is considered to be a good source of beta carotene, calcium, vitamin C. Also, it contains various volatile substances (including estragol, eugenol, linalool, methyl chavicol and small quantities of methyl cinnamate, cineole, and other terpenes), tannins, camphor, flavonoids, triterpene, urolic acid. Leaves are diaphoretic and antiperiodic which are used in patients suffering from bronchitis, gastric and hepatic disorders. Decoction of leaves is often recommended

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for cough, malaise and in cold. It is a good mosquito repellent as well. Oil extracted from flowers can also be used to cure skin diseases and ring worm infections.¹⁵

Ocimum sanctum seed oil modulates both humoral and cell mediated immune responsiveness as well as it inhibits acute as well as chronic inflammation. The essential oil and seed extract act by the inhibition of cyclo-oxygenase and lipoxygenase pathways.¹⁶ It may be considered as a drug of natural origin which has both the anti-inflammatory as well as the anti-ulcer activity.¹⁷

As studies related to herbal mouth rinses are lacking and research in this area is necessary to generate the evidence. Hence, this study was planned with the objective to evaluate clinically the efficacy of 4% Ocimum sanctum irrigation in preventing plaque accumulation and gingival inflammation in comparison with commercially available 0.2% chlorhexidine (CHX).

MATERIALS AND METHODS

30 chronic periodontitis patients were selected from the OPD of Department of Periodontology and Oral Implantology, I.T.S Dental College, Muradnagar, Ghaziabad. The experimental procedures were undertaken with the understanding and written informed consent of the patient and the study was approved by the ethical committee of the institution.

A randomized, controlled clinical trial was conducted to compare the efficacy of scaling and root planing plus pocket irrigation with Ocimum Sanctum versus Chlorhexidine in patients diagnosed with chronic periodontitis. Patients of both the sexes between ≥ 28 years of age, diagnosed with chronic periodontitis and periodontal pocket measuring ≥ 5 mm, patients who were nonsmokers or smoking < 5 cigarettes /day were included in the study. Subjects on antibiotics for last three months and who had undergone periodontal therapy in the past six months, patients with systemic diseases, smokers, alcoholics and patients with less than 8 teeth in the oral cavity were excluded from the study. 30 sites were randomly divided into two groups. In Group A, 15 sites were treated with scaling and root planing plus intra pocket irrigation with Ocimum Sanctum and in Group B, 15 sites were treated with scaling and root planing plus intrapocket irrigation with 0.2% chlorhexidine was done. Each site was irrigated with 2 ml of solution, thrice at 15 minutes of interval.

PREPARATION OF EXTRACT

The extract was prepared as described by Aggarwal et al¹⁸. The preparation of Ocimum sanctum extract was done in the Department of Pharmacy ITS Dental College Muradnagar.

Leaves of Ocimum sanctum were taken from the institutional nursery and were washed and dried under controlled conditions. The dried leaves were then powdered finely. 300 grams of finely powdered leaves of Ocimum sanctum were then macerated with 100% ethanol for a week in a round bottom flask.

To avoid effect of light on the active ingredients, the flask was kept in dark. Filtration of the extract was done through a muslin cloth for coarse residue and finally through Whatman No. 1 filter paper. To obtain a solid residue of Ocimum sanctum extract, the so obtained filter was reduced at a low temperature < 50 degree Celsius. 18g of residue (extract) was obtained from 300 g of Ocimum sanctum powder dissolved in 1L of ethanol and thus the yield was 6% w/w. A final concentration of 4% (w/v) was obtained after suspending the extract in polyethylene glycol (20% v/v) and sterile distilled water. Flavouring agent 0.005% spearmint oil was also added to the extract (Fig. 1 and 2).

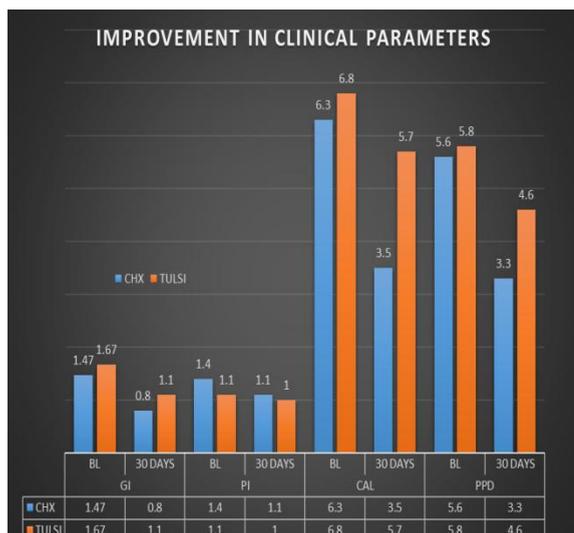
Patients were evaluated after 30 days interval. Periodontal assessments were performed using the Plaque Index using (Turesky Gilmore Glickman modification of Quigley Hein Plaque Index, 1970)¹⁹, Gingival Index (Loe & Silness, 1963)²⁰, Probing Depth and Clinical Attachment Level were measured using UNC 15 probe.



Fig. 1: Armamentarium for preparation of 4% Ocimum sanctum extract



Fig. 2: 0.2% Chlorhexidine gluconate and 4% Ocimum sanctum extract



Graph 1: Change in clinical parameters at baseline and 30 days between the two groups

Table 1: Change in clinical parameters at baseline and 30 days between the two groups

		0.2% Chlorhexidine	4% Ocimum sanctum	P value
GI	Baseline	1.47 ±0.38	1.67± 0.237	
	30 days	0.875 ±1.13	1.1 ±0.21	< 0.01
PI	Baseline	1.4 ±0.56	1.1 ±0.316	
	30 days	1.1 ±0.316	1.0 ±0.00	<0.331
PD	Baseline	5.6 ±0.576	5.8 ±0.422	
	30 days	3.3 ±0.483	4.6 ±0.576	<0.001
CAL	Baseline	6.3±0.822	6.8±0.422	
	30 days	3.5 ±0.527	5.7 ±0.625	<0.001

STATISTICAL ANALYSIS

SPSS 17 was used for the results assessment. T test was used to analyze the plaque and gingival index, probing depth and clinical attachment level in the two groups. $P \leq 0.001$ was considered as statistically significant.

RESULTS

No statistical differences were observed for baseline variables Table 1. The mean plaque and gingival scores for the Group I, II are depicted in Table 1. T test was used to analyze the reduction in plaque and gingival index, probing depth and gain in clinical attachment level in the two groups. There was a significant decrease in the plaque and gingival index in both the Ocimum sanctum and chlorhexidine groups at 30 days ($P < 0.001$) (Graph 1). Significant reduction was seen in all clinical parameters for both the groups at 30 days, though chlorhexidine group showed better results as compared to Ocimum sanctum group but difference was not statistically significant. The difference in the decrease in plaque and gingivitis between Ocimum sanctum and chlorhexidine groups was not statistically significant. Data showed that there was no significant difference

between Ocimum sanctum and chlorhexidine for any clinical parameters throughout the study.

DISCUSSION

Our data showed that Ocimum sanctum was equally effective in reducing periodontal indices as chlorhexidine. The results demonstrated a significant reduction in all clinical parameters in both groups over a period of four weeks (Table 1). During the study, Ocimum sanctum reduced plaque formation which may be attributed to the fact that the antibacterial agents present in Ocimum sanctum i.e. Eugenol (1-hydroxy-2-methoxy-4-allylbenzene), Carvacrol (5-isopropyl-2-methylphenol), Linalool (3,7-dimethylocta-1,6-dien-3-ol), Caryophyllene (4,11,11-trimethyl-8-methylene-bicyclo-4-ene), Ursolic acid (2,3,4,5,6,6a,7,8,8a, 10,11,12,13 14-tetradecahydro-1H-picene-4a-carboxylic acid) and Methyl carvicol (also called Estragol: 1- allyl-4-methoxybenzene). Also, the stem and leaves of Ocimum sanctum contain a variety of constituents that forms high molecular weight complexes with soluble proteins in saliva, causes bacterial lysis on the tooth surface and saliva and interferes with bacterial adherence mechanisms on tooth surfaces which may have anti-bacterial activity like the saponins, flavonoids, triterpenoids and tannins.²¹

Our study showed a significant reduction in gingival and plaque scores in Ocimum sanctum, which can be attributed to compounds isolated from Ocimum sanctum extract. Civsilineol, civsimavatine, isothymonin, apigenin, rosavinic acid and eugenol were observed for their anti-inflammatory activity or cyclooxygenase inhibitory activity.^{22,23} Singh²⁴, Singh and Majumdar²⁵ in their study reported that the anti-inflammatory effect of Ocimum sanctum may be due to the variable amount of linoleic acid present in the fixed oil which has the capacity to block both the cyclooxygenase and lipoxigenase pathways of arachidonate metabolism. Our results were in accordance with the study done by Gupta et al¹⁴ who stated that Ocimum sanctum mouthrinse may prove to be an effective mouthwash owing to its ability in decreasing periodontal indices by reducing plaque accumulation, gingival inflammation and bleeding and has no side effect as compared to chlorhexidine. However Carlos Alfredo Franco Neto et al²⁶ revealed no difference in the efficacy of 0.12 to 0.2% chlorhexidine and reported that the former concentration leads to less staining of teeth. Though our study reported no staining of teeth with use of 0.2% chlorhexidine solution. Hosadurga et al²⁷ used 2% tulsi (Ocimum sanctum) gel in chronic periodontitis and showed significant anti-inflammatory properties for a period of 24-48 hours resulting in reduction of gingival inflammation and reduced pocket depth. Agarwal et al¹⁸ analyzed the effect of various concentrations of the Ocimum sanctum extract ranging from 0.5 to 10%, and it was observed that a 4% concentration of the extract was optimum as an antibacterial agent against bacterial

pathogens of the oral cavity; thus, in the present study, a concentration of 4% was used. Our study also showed significant reduction in pocket depths and gain in the clinical attachment levels over a 30 day period for both the test and the control groups, though there was no significant differences seen when intergroup comparison was done.(Table 1) The results of the study indicated that irrigation with 4 % Ocimum sanctum showed comparable results when compared to 0.2% of Chlorhexidine gluconate.

CONCLUSION

Both the groups demonstrated reduction in clinical parameters after 30 days from baseline. CHX group depicted better results as compared to Tulsi. However Tulsi can be recommended as a safe herbal alternative for its appreciable clinical results and absence of adverse effects.

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