

ORIGINAL ARTICLE

EVALUATION OF THE EFFICACY OF 0.12% CHLORHEXIDINE AND WATER AS ORAL IRRIGANTS IN THE TREATMENT OF CHRONIC PERIODONTITIS

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ABSTRACT:

Background: one of the single most important easily demonstrable local etiological factor playing a significant role in the initiation and progression of periodontal disease is Dental plaque. Periodontal therapy aims at reducing or even eradicating periodontal pathogens by adequate oral hygiene instructions combined with thorough scaling and root planing. Chemical agents can play a pivotal role as adjuncts to mechanical plaque-control methods.hence; we conducted the present study to clinically evaluate the efficacy of 0.12% Chlorhexidine and water as oral irrigants in the treatment of chronic periodontitis. **Materials & methods:** 40 patients (both males and females) showing clinical evidence of chronic periodontitis were selected amongst the patients visiting the Department of Dentistry. At day 0, oral prophylaxis of each patient was done and oral hygiene instructions using modified Stillman’s method of toothbrushing twice a day i.e. once after breakfast & half an hour before going to bed at night were be given. Total of 40 patients were randomly and equally divided into 2 test groups. Test group 1 consisted of Patients irrigated with 0.12% Chlorhexidine digluconate. Test group 2 consisted of Patients irrigated with distilled water (control). In office, the patients were treated with irrigation using oral irrigator device (Water Pik) in all areas with pocket formation ≥3mm respectively in both test groups i.e. test group 1 with 0.12% chlorhexidine digluconate and test group 2 with distilled water on day 0 (baseline), 7, 21 and 42. At home, patients were instructed to rinse i.e. test group 1 with 0.12% chlorhexidine digluconate and test group 2 with distilled water twice a day, atleast half an hour after toothbrushing for 21 days. Loe and Silness gingival index to assess gingival scores. **Results:** Mean plaque score in the 20 patients at day 0, 7 and 21 was 1.3, 1.1 and 1.0 respectively. Significant results were obtained while comparing the mean plaque score, gingival score, calculus score and pocket depth in between various time intervals. **Conclusion:** Chlorhexidine is a potent antimicrobial irrigating solution but with its long term use there are some adverse reactions

Key words: Chlorhexidine, dental plaque, periodontal disease

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INTRODUCTION

Dental plaque, a biofilm, is considered to be the single most important easily demonstrable local etiological factor playing a significant role in the initiation and progression of periodontal disease.¹ Periodontal diseases are amongst the most common diseases characterized by inflammation and destruction of the attachment apparatus, often leading to tooth loss resulting from interaction between plaque bacteria and a susceptible host. The control of dental plaque seems to have an important bearing in the successful treatment of inflammatory periodontal disease.² It was clearly demonstrated in a study that gingival inflammation consistently follows the build-up of plaque, and that conversely, with the removal of plaque can reverse this process. Therefore, periodontal therapy aims at reducing or even eradicating periodontal pathogens by

adequate oral hygiene instructions combined with thorough scaling and root planing.^{3,4} Chemical agents can play a pivotal role as adjuncts to mechanical plaque-control methods. These agents include metal salts (tin fluoride, zinc, or copper); essential oils; phenols (triclosan); fluorides (sodium fluoride or stannous fluoride); bisbiguanides (chlorhexidine); quarternary ammonium compounds (chloride cetylpyridium); sanguinarine; and oxygenating agents among others.^{5,6} These chemical agents can be used as either mouthrinses or as irrigating solutions. The aim of the study was to clinically evaluate the efficacy of 0.12% Chlorhexidine and water as oral irrigants in the treatment of chronic periodontitis.

MATERIALS AND METHOD

40 patients (both males and females) showing clinical evidence of chronic periodontitis were selected amongst the patients visiting the **Department of Dentistry**.

CRITERIA FOR SELECTION OF PATIENTS:

INCLUSION CRITERIA:

1. Patients between the age group of 30-40 yrs (both males and females).
2. Patients suffering from chronic periodontitis.
3. Visible supragingival plaque and calculus present on both the anterior and posterior teeth covering atleast 1/3rd of the tooth surface with periodontal pocket depth \geq 3mm.

EXCLUSION CRITERIA:

1. Long term use of local and systemic antibiotics and antiseptics within last six months.
2. Patients who were immunocompromised or were on long term use of immuno-suppressant drugs.
3. Pregnant and lactating patients.
4. Patients who were practising any other methods of oral hygiene other than for tooth brushing (e.g. mouthwash, flossing etc.).
5. Patients having less than 20 teeth in oral cavity.
6. Smokers
7. Other systemic ailments

METHOD

At day 0, oral prophylaxis of each patient was done and oral hygiene instructions using modified Stillman’s method of tooth brushing twice a day i.e. once after breakfast & half an hour before going to bed at night were be given.

Group formation:

Total of 40 patients were randomly and equally divided into 2 test groups.

Test group1: Patients irrigated with 0.12% Chlorhexidine digluconate

Test group2: Patients irrigated with distilled water (control).

In office: Patients were treated with irrigation using oral irrigator device (Water Pik) in all areas with pocket formation \geq 3mm respectively in both test groups i.e. test group 1 with 0.12% chlorhexidine digluconate and test group 2 with distilled water on day 0 (baseline), 7, 21 and 42.

At home: Patients were instructed to rinse i.e. test group 1 with 0.12% chlorhexidine digluconate and test group 2 with distilled water twice a day, atleast half an hour after toothbrushing for 21 days.

All clinical parameters were recorded before each irrigation i.e. on day 0, 7, 21& 42, & on day 90 i.e. at the completion of the study. Pocket depth were recorded at day 0, 21, 42 & 90.

Simplified Oral Hygiene index was used for assessing calculus.

Turesky-Gilmore-Glickman Modification of the Quigley Hein Plaque Index was used to assess plaque.

Loe and Silness gingival index to assess gingival scores.

RESULTS

The purpose of this study was to evaluate the efficacy of 0.12% Chlorhexidine and water as oral irrigants in the treatment of chronic periodontitis.

The present study was undertaken in the 40 patients showing clinical evidence of chronic periodontitis (20- Chlorhexidine group, 20- Distilled Water group) selected amongst the patients visiting the department of dentistry in the age group of 30-40 years (both males and females).

The results thus obtained were statistically analyzed using following tests:

1. Mean
2. Standard Deviation
3. Student ‘t’ test at 95% confidence interval

RESULTS

Table 1: Showing comparison of Mean Plaque Scores, Mean Gingival Scores, Mean Calculus Scores and Pocket Depth of Group 1 at different time intervals

Scores	N	Mean \pm S.D					P- Value	Sig.
		Day 0	Day 7	Day 21	Day 42	Day 90		
Plaque Score	20	1.3 \pm 0.3	1.1 \pm 0.2	1.0 \pm 0.2	0.9 \pm 0.2	0.7 \pm 0.1	<0.001	HS
Gingival Score		1.2 \pm 0.3	0.9 \pm 0.2	0.8 \pm 0.2	0.7 \pm 0.1	0.6 \pm 0.2	<0.001	HS
Calculus Score		1.2 \pm 0.4	0.0 \pm 0.0	0.0 \pm 0.0	0.4 \pm 0.2	0.7 \pm 0.3	<0.001	HS
Pocket Depth (M)		6.0 \pm 0.8		3.7 \pm 1.4	3.3 \pm 1.3	3.4 \pm 1.1	<0.001	HS
Pocket Depth (B)		4.4 \pm 0.6		2.7 \pm 0.6	2.4 \pm 0.6	2.4 \pm 0.8	<0.001	HS

Table 2: Showing comparison of Mean Plaque Scores, Mean Gingival Scores, Mean Calculus Scores and Pocket Depth of Group 2 at different time intervals

Scores	N	Mean \pm S.D					P- Value	Sig.
		Day 0	Day 7	Day 21	Day 42	Day 90		
Plaque Score	20	1.4 \pm 0.5	1.2 \pm 0.3	1.3 \pm 0.3	1.2 \pm 0.3	1.1 \pm 0.3	0.121	NS
Gingival Score		1.4 \pm 0.3	1.2 \pm 0.3	1.1 \pm 0.3	1.0 \pm 0.3	1.0 \pm 0.3	0.004	HS
Calculus Score		1.0 \pm 0.4	0.0 \pm 0.0	0.0 \pm 0.0	0.2 \pm 0.05	0.3 \pm 0.07	<0.001	HS
Pocket Depth (M)		5.8 \pm 1.3		4.7 \pm 1.2	4.8 \pm 1.1	4.8 \pm 1.1	0.026	HS
Pocket Depth (B)		3.9 \pm 0.9		3.1 \pm 0.8	3.2 \pm 0.9	3.2 \pm 0.9	<0.001	HS

Table 3: Showing comparison of Mean Plaque Scores between Group 1 and Group 2 at different time intervals

Group	N	Mean ± S.D					P- Value	Sig.
		Day 0	Day 7	Day 21	Day 42	Day 90		
1	20	1.3±0.3	1.1±0.2	1.0±0.2	0.9±0.2	0.7±0.1	0.001	HS
2	20	1.4±0.5	1.2±0.3	1.3±0.3	1.2±0.3	1.1±0.3		

Table 4: Showing comparison of Mean Gingival Scores between Group 1 and Group 2 at different time intervals

Group	N	Mean ± S.D					P- Value	Sig.
		Day 0	Day 7	Day 21	Day 42	Day 90		
1	20	1.2±0.3	0.9±0.2	0.8±0.2	0.7±0.1	0.6±0.2	0.0	HS
2	20	1.4±0.3	1.2±0.3	1.1±0.3	1.0±0.3	1.0±0.3		

Table 5: Showing comparison of Mean Calculus Scores between Group 1 and Group 2 at different time intervals

Group	N	Mean ± S.D					P- Value	Sig.
		Day 0	Day 7	Day 21	Day 42	Day 90		
1	20	1.2±0.4	0.0±0.0	0.0±0.0	0.4±0.2	0.7±0.3	0.26	NS
2	20	1.0±0.4	0.0±0.0	0.0±0.0	0.2±0.05	0.3±0.07		

Table 6: Showing comparison of Mean Periodontal Pocket Depth Scores (in mm) between Group 1 and Group 2 at different time intervals

GROUP	Side	N	MEAN±S.D				P VALUE	Sig.
1	M	20	Day 0	Day 21	Day 42	Day 90	0.001	HS
			6.0±0.8	3.7±1.4	3.3±1.3	3.4±1.1		
2	B	20	Day 0	Day 21	Day 42	Day 90	0.045	S
			5.8±1.3	4.7±1.2	4.8±1.1	4.8±1.1		
1	B	20	Day 0	Day 21	Day 42	Day 90	0.045	S
			4.4±0.6	2.7±0.6	2.4±0.6	2.4±0.8		
2	B	20	Day 0	Day 21	Day 42	Day 90	0.045	S
			3.9±0.9	3.1±0.8	3.2±0.9	3.2±0.9		

S: Significant
 HS: Highly Significant
 NS: Non Significant

M: Pocket Depth (Mesial)
 D: Pocket Depth (Distal)

DISCUSSION

Dental plaque, a biofilm, defined as a sessile community of micro-organisms organized with an exopolymer on a solid surface. Biofilm micro-organisms may show much greater resistance to antibiotics, antiseptics and components of host defenses than their free-living counterparts. Limited diffusion within biofilms and unique biofilm phenotypes of the bacterial species reduce the effectiveness of systemic antimicrobial agents.⁷ Destructive periodontal disease is largely preventable, caused by dental plaque, requiring complex and frequent intervention by the dental professional.⁷ The rationale for the treatment of inflammatory periodontal diseases is based upon the concept that the primary cause of these diseases is dental plaque, so the removal of dental plaque is the ultimate goal of the periodontal therapy.^{8,9} Scaling and root planing has proved to be of limited value in deep periodontal pockets and anatomical variations. So, to augment the effects of scaling and root planing either systemic or topical antibiotics or local irrigations with a variety of antimicrobial agents have been used.¹⁰ Indiscriminate use of systemic antibiotics can interfere with normal body microflora and cause significant adverse reactions.¹⁰ Hence this limits the use of antimicrobial agents for oral care.¹¹ So, local antimicrobial agents have been used that offers a “site specific” approach to periodontal therapy. The local drug

delivery methods include the use of oral irrigators, varnishes, gels, rinses etc.¹¹ Irrigating devices make it possible to apply chemically active agents to the more difficult to reach interproximal gingival crevice. Oral irrigators have been shown to deliver a solution into approximately half the depth of periodontal pockets. Various antimicrobial agents can be used as irrigating solutions like povidone-iodine, chlorhexidine etc.¹² The present study aims towards determining the “efficacy of 0.12% Chlorhexidine and Water as oral irrigants in the treatment of chronic periodontitis”.

Chlorhexidine (Group 1)

Chlorhexidine is a cationic bisbiguanide with broad antibacterial activity, low mammalian toxicity and a strong affinity for binding to skin and mucous membranes.¹⁵ The first report of its anti-plaque activity was given by Loe and Schiott in 1970.¹⁶ Chlorhexidine has a wide spectrum of activity encompassing gram-positive and gram-negative bacteria, yeasts, dermatophytes and some lipophilic viruses.¹⁴ Chlorhexidine has been shown to reduce pellicle formation and plaque accumulation by binding to salivary glycoproteins and interfering with adsorption of bacteria to the tooth surface.¹⁵ **Chaves ES (1994)**¹⁷ concluded that irrigation with CHX led to decrease in mean plaque index, bleeding on probing and gingival

index. The results of this study are in accordance with results of the study conducted by **Ravindra Reddy N et al (2012)** during which he found that 0.12% chlorhexidine irrigation with the help of WaterPik resulted in decrease in plaque index, gingival index. **Flemmig TF et al (1990)**¹⁸ they found that chlorhexidine irrigation resulted in decrease in gingival index, bleeding on probing, plaque index, pocket depth but increase in the calculus index and staining of teeth.

Distilled Water (Group 2)

The results of this group are in accordance with results of the study conducted by **Chaves ES et al (1994)**¹⁷ and it was found that water irrigation resulted in decrease in plaque index, gingival index, pocket depth.

Group 1 showed better results for plaque, gingival score, calculus and probing depths as compared to group 2 and were statistically highly significant ($p=0.001$). These results are in accordance with the study conducted by **Jolkovsky DL et al (1990)**¹⁹ he found that at 3 months, the gingival index, plaque index & pocket probing depths were reduced in all irrigation groups but better results were seen with chlorhexidine irrigation. **In the present study**, irrigating solutions Chlorhexidine and distilled water were used. Out of the these subgingival irrigating solutions, good results were seen with Chlorhexidine than for distilled water as an irrigating solution. Chlorhexidine has shown improvement in all the clinical parameters that are, Plaque index, Calculus index, Gingival index and Periodontal pocket depth from baseline to day 90 as compared to other group. Chlorhexidine shows different effect at different concentrations; at low concentration the agent is bacteriostatic, whereas at higher concentration the agent is rapidly bactericidal.¹⁴ Chlorhexidine binds electrostatically to the acidic protein groups such as phosphates, sulphates, carboxyl ions, therefore reduces adsorption of salivary glycoproteins. It also decreases binding of bacteria to the tooth surface, by binding to the extracellular polysaccharide.²¹ Chlorhexidine has an affinity for bacteria because of an interaction between the positively charged chlorhexidine molecule and negatively charged groups on the bacterial cell wall which increases the permeability of bacterial cell wall and thus permits the agent to penetrate into the cytoplasm and cause death of the micro-organism.²¹ Its efficacy to inhibit dental plaque and gingivitis has been well established and there was no evidence of bacterial resistance.²¹

Although local irrigants can be used but it has its own limitations. Chlorhexidine is a potent antimicrobial irrigating solution but with its long term use there are some adverse reactions like taste alterations, staining of teeth, increased calculus formation, tongue-tip irritation, nasal congestion, swollen glands etc.

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