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Research Article

TREATMENT OF CHRONIC PERIODONTITIS PATIENTS WITH CHLORHEXIDINE CHIP AS AN ADJUNCT TO SCALING AND ROOT PLANING: A CRITICAL ANALYSIS

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A R T I C L E I N F O

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Chronic periodontitis, treatment, scaling and root planing, local drug delivery, chlorhexidine

A B S T R A C T

Background: Periodontal disease is a polymicrobial infection primarily caused by periodontal pathogens existing within the subgingival plaque. The conventional method of lowering the bacterial load in the periodontal pocket constitutes scaling and root planing, but to prevent recolonization the use of adjunctive methods has been advocated. The use of controlled release devices enables maintenance of concentration of antimicrobial agent within the pocket.

Aim: To assess the efficacy of chlorhexidine chip as an adjunct to scaling and root planing in chronic periodontitis patients.

Materials and Methods: A total of 40 chronic periodontitis patients (aged 35‑55 years) having pocket depth of ≥5 mm in molars were selected and randomly divided into following treatment groups: Group I: Scaling and root planing (SRP), Group II: SRP along with chlorhexidine chip. The clinical and microbial parameters were recorded at baseline and 1 and 3 months post treatment. **Stastical analysis used:** Mann-Whitney Test, Wilcoxon Signed Test, T-Test, Pearson's Chi square Test and Variability Test were used.

Results: Plaque index (PI), modified bleeding index (m-BI), probing pocket depth (PPD) and clinical attachment level (CAL) scores in selected teeth within the groups at different time intervals were highly significant ($P < 0.001$) after 3rd month. Although, the comparison between groups for specific microbiota in selected sites at different intervals was not statistically significant at baseline and 1 month, it reached statistical significance at 3rd month post treatment in both groups.

Conclusion: Local drug delivery using chlorhexidine chip enhances the benefit of scaling and root planing in the treatment of chronic periodontitis.

INTRODUCTION

Oral cavity offers diverse habitats wherein different species of microorganisms can prosper and an aggregation of which is referred to as dental plaque. Microbes in dental plaque flourish in niche to adhere to the tooth surfaces and multiply in shielded environment like periodontal pockets and tooth crevices. In 1998, Socransky *et al*. suggested that most of the pathogenic of all complexes comprised of *Porphyromonas gingivalis, Tannerella forsythia* and *Treponema denticola* also collectively known as "Red Complex". These red complex bacteria have shown to be most important periodontal pathogens in causing periodontal disease.[1]

Therapeutic approach for periodontitis is to remove the bacteria, either with hand instrumentation or with electronic instrumentation. Another approach is to use chemotherapeutic agents systemically or locally to limit the bacteria.

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The systemic antibiotic therapy has various disadvantages like, hypersensitivity reactions, organ toxicity and development of resistant bacteria.[2] There are various local drug delivery systems available, but since long, chlorhexidine has been one of the most effective topical antimicrobial agent and is on World Health Organization's list of essential medicines.[3] It is used as a controlled subgingival local drug delivery. The bactericidal effect of the drug is due to the cationic molecule binding to extra microbial complex and negatively charged microbial cell walls, thereby altering the osmotic equilibrium of cells. It also inhibits plaque formation by binding to anionic groups on salivary glycoproteins thus, reducing pellicle formation. The main advantage of using chlorhexidine chip over mouthwash is that it allows sustained release of this agent at the infection site thus, prolonging its bactericidal effect.

STUDY AND METHODS

The present study was carried out in the Department of Periodontology and Oral Implantology in our institution from moderate to severe periodontitis of an age group of 35-55 years and having bilateral pockets of 5-7mm in molars were selected for the study. However, patients having any systemic

disease or undergoing any local or systemic antimicrobial and anti-inflammatory therapy for last 6 months or periodontal therapy other than standard prophylaxis during previous 6 months were excluded from the study. Pregnant, lactating women, tobacco chewers and alcoholics were also excluded from the study and the study was approved from Institutional Ethical Committee prior to start of the study.

Study design

A 3 months simple randomized, clinical study was conducted comparing the effect of SRP with and without chlorhexidine chip in chronic periodontitis patients. A total of 40 patients with 80

Sites were randomly divided into following two groups

i. Group I: Patients treated with scaling and root planing (SRP).
ii. Group II: Patients treated with scaling and root planing (SRP) along with placement of chlorhexidine chip.

The nature and design of the clinical study was explained and informed consent was obtained from all the participants. The clinical parameters recorded in the proforma that included plaque index (PI), modified bleeding index (m-BI), probing pocket depth (PPD) and clinical attachment levels (CAL).One molar site on each arch with pocket depth of ≥5mm was selected in each patient for the study and scaling and root planing (SRP) was performed for both groups. The subgingival placement of chlorhexidine chip was done after proper isolation of the area in Group II. All patients were given oral hygiene instructions and clinical parameters were recorded at baseline, 1st month and 3rd month using a simple UNC (university of north Carolina) probe.

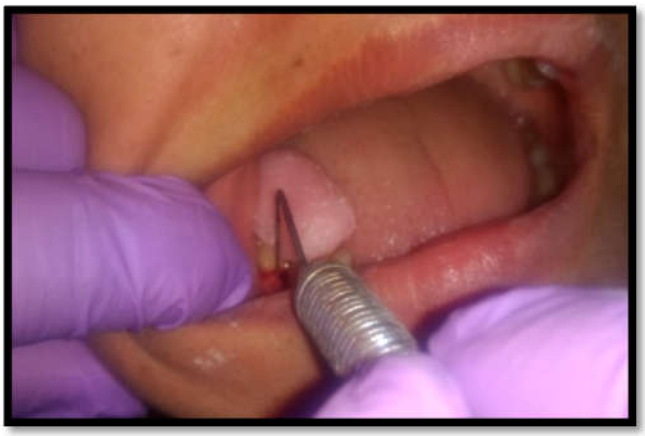


Fig 1 Probing depth of Group I at baseline

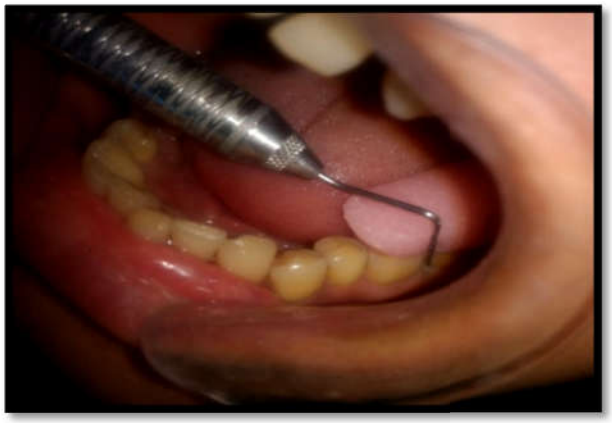


Fig 2 Probing depth of Group II at baseline

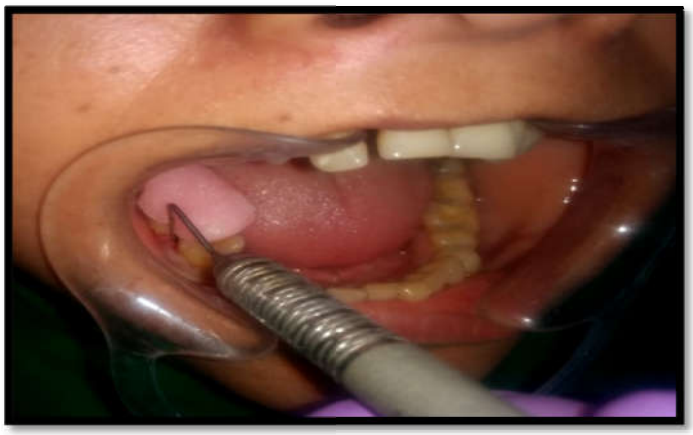


Fig 3 Probing depth of Group I at 1st month.

Fig 4 Probing depth of Group II at 1st month

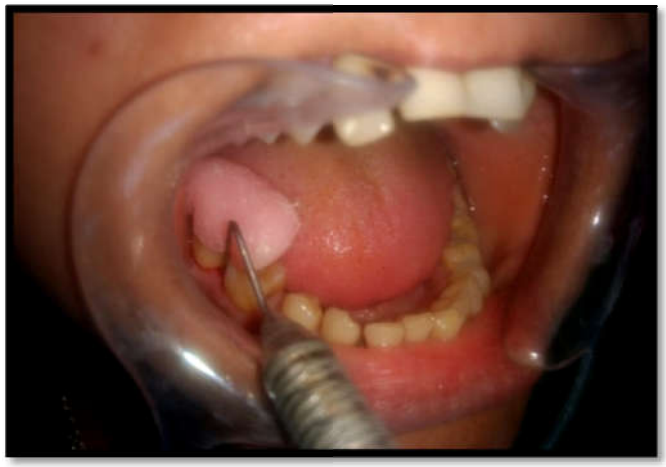


Fig 5 Probing depth of Group I at 3rd month.

Fig 6 Probing depth of Group II at 3rd month

RESULTS

All patients (37 males and 13 females with mean age of 35 ± 5 years) completed the study. Clinical recordings were carried out at baseline and 1 and 3 months post-treatment. All recordings were subjected for statistical analysis by using Mann-Whitney, Wilcoxon Test, T-test, Pearson Chi-square test and Variability test.Plaque index, Modified bleeding index, Probing pocket depth and Clinical attachment levels scores between both the groups were similar at baseline and 1st month. However, there was significant reduction in pocket depth and gain in clinical attachment levels in Group II as compared to Group I at the end of 3rd month. These have been described in the form of Tables and Graphs (1, 2, 3 and 4 for plaque index, modified bleeding index, probing pocket depth and clinical attachment level respv.).

Table 1 Mean Plaque Index

Parameters	Baseline		1st month		3rd month	
	Mean	Sd	Mean	Sd	Mean	Sd
Group I (SRP)	2.536	0.404	1.762	0.412	1.084	0.370
Group II (SRP+CHX)	2.599	0.391	1.500	0.359	0.709	0.267
SIGNIFICANCE (Mann-Whitney Signed Rank Test) (P)	0.608		0.039*		0.001**	

Table 1 Mann-Whitney Signed Rank was performed for intergroup comparison for mean plaque index in Group I and Group II at baseline, 1st month and 3rd month. Mean of plaque index was statistically significant (P value <0.05) in both Group I and Group II.
* : P value significant.
**: P value highly significant.

Table 2 mean modified bleeding index

Parameters	Baseline		1st month		3rd month	
	Mean	Sd	Mean	Sd	Mean	Sd
Group I (srp)	2.787	0.407	1.470	0.276	0.495	0.313
Group ii (srp+chx)	2.987	0.171	1.182	0.399	0.632	0.297
Significance (mann - whitney signed rank test) (p)	0.076		0.017*		0.001**	

Table 2 Mann-Whitney Signed Rank was performed for intergroup comparison for mean modified bleeding index in Group I and Group II at baseline, I st month and 3rd month. Mean of modified bleeding index was statistically significant (P value <0.05) in both Group I and Group II.
* : P value significant.
**: P value highly significant.

Table 3 Mean Probing Pocket Depth

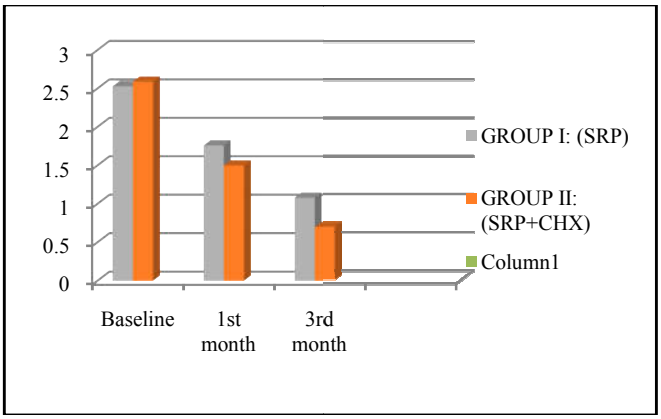
Parameters	Baseline		1st month		3rd month	
	Mean	Sd	Mean	Sd	Mean	Sd
Group i (srp)	6.630	0.882	5.330	0.875	4.900	0.640
Group ii (srp+chx)	7.070	0.725	5.120	0.489	4.250	0.550
Significance (t-test) (p)	0.126		0.378		0.001**	

Table 3 T-test was performed for intergroup comparison for mean plaque index in Group I and Group II at baseline, I st month and 3rd month. Mean of pocket depth was statistically significant (P value <0.05) in both Group I and Group II.
**: P value highly significant.

Table 4 Mean Clinical Attachment Level

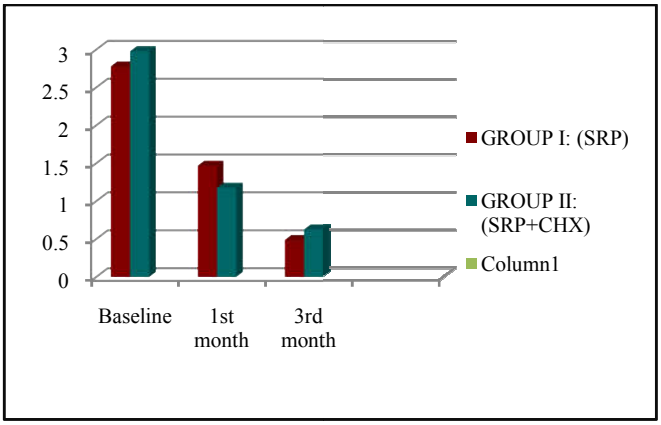
Parameters	Baseline		1st month		3rd month	
	Mean	Sd	Mean	Sd	Mean	Sd
Group i (srp)	7.350	0.966	6.150	1.089	5.450	0.933
Group ii (srp+chx)	7.850	0.850	5.800	0.833	4.550	0.638
Significance (t-test) (p)	0.091		0.261		0.001**	

Table T-test was performed for intergroup comparison for mean plaque index in Group I and Group II at baseline, I st month and 3rd month. Mean of clinical attachment level was statistically significant (P value <0.05) in both Group I and Group II.
**: P value highly significant.



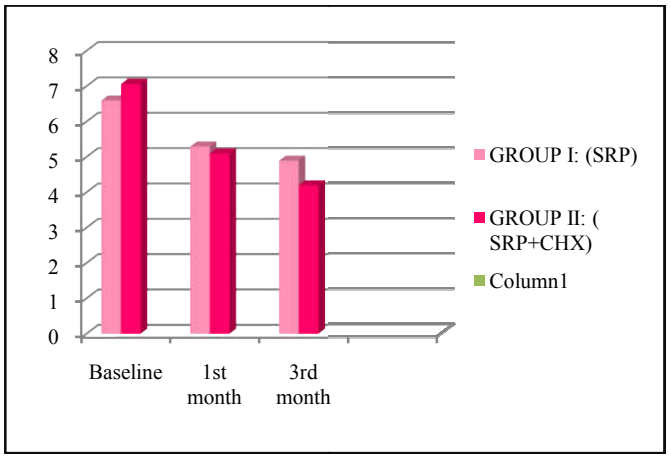
Graph 1 comparison of plaque index in group i and ii at baseline, 1st month and 3rd month.

Graph 1. Shows the comparison of plaque level at baseline, 1st month and 3rd month at X-axis. Y-axis shows mean values of plaque (PI) for both Group I (SRP) and Group II (SRP+ CHX).



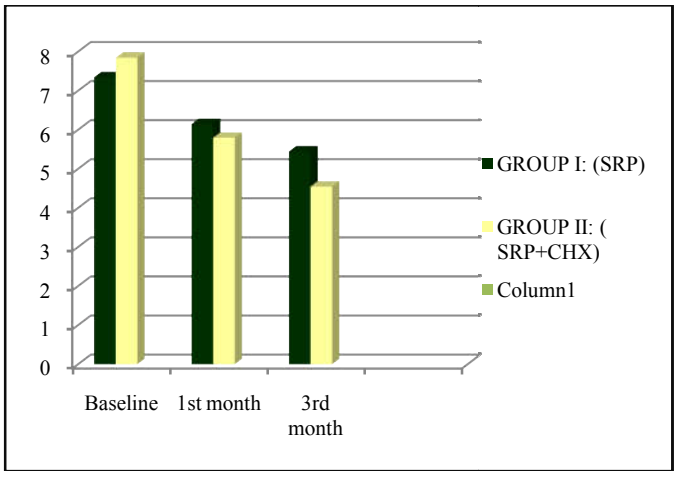
Graph 2 comparison of modified bleeding index in group i and ii at baseline, 1st month and 3rd month

Graph 2. Shows the comparison of modified bleeding index at baseline, 1st month and 3rd month at X-axis. Y-axis shows mean values of modified bleeding index (m-BI) for both Group I (SRP) and Group II (SRP+ CHX).



Graph 3 comparison of periodontal probing pocket depth in group i and ii at baseline, 1st month and 3rd month.

Graph 3. Shows the comparison of Probing pocket depth at baseline, 1st month and 3rd month at X-axis. Y-axis shows mean values of pocket depth (PD) for both Group I (SRP) and Group II (SRP+ CHX).



Graph 4 comparison of clinical attachment levels in group i and ii at baseline, 1st month and 3rd month.

Graph 4. Shows the comparison of clinical attachment level at baseline, 1st month and 3rd month at X-axis. Y-axis shows mean values of clinical attachment level (CAL) for both Group I (SRP) and Group II (SRP+ CHX).

DISCUSSION

Periodontal disease is a polymicrobial infection primarily caused by periodontal pathogens existing within the subgingival plaque. The conventional method of lowering the bacterial load in the periodontal pocket constitutes scaling and root planing, but to prevent recolonization the use of adjunctive methods has been advocated. The use of controlled release devices enables maintenance of concentration of antimicrobial agent within the pocket.The study was conducted to evaluate the clinical efficiency of chlorhexidine chip and assess the specific microbial changes associated with chronic periodontitis patients. The study was conducted for 3 months period because, effects of controlled release chlorhexidine have been shown to be evident up to 11 weeks after administration of the chip and 3 months study period corresponds to typical recall interval for periodontal patients.[4,5]

All patients showed statistically and clinically significant improvements in plaque index at the follow up visits when compared to the baseline level. Table 1 and graph 1 shows that the plaque index of Group I changed from 2.52 ± 0.40 at baseline to 1.56 ± 0.41 in 1st month and to 1.06 ± 0.37 in 3rd month. For Group II, it changed from 2.58 ± 0.39 at baseline to 1.30 ± 0.35 in 1st month and to 0.68 ± 0.26 in 3rd month. The reduction in plaque index could be due to proper oral hygiene maintenance and thoroughness of scaling and root planing. The reduction in plaque index in Group II was significantly more when compared to Group I. Similar reduction in plaque index between chlorhexidne group and scaling and root planing group has been shown in study conducted by *Puri K et al*.[6] The reduction in plaque index for chlorhexidine group is attributed to the fact that the 2.5 mm chip delays reproduction of bacteria by inhibiting their proteolytic and gycosidic activities.[7]

The bleeding index scores also reduced in both groups. Bleeding index scores of Group I changed from 2.78 ± 0.40 at baseline to 1.45 ± 0.27 in 1st month and to 0.97 ± 0.97 in 3rd month. For Group II, it changed from 2.98 ± 0.17 at baseline to 1.62 ± 0.39 in 1st month and to 0.61 ± 0.29 in 3rd month and is shown in table 1 and graph 1. The reduction in bleeding scores in group II was significantly more than Group I. Similar results of reduction in bleeding index between chlorhexidne group and scaling and root planing group has been shown in study conducted by *Paolantonio M et al.*[8] The reduction in bleeding on probing could be attributed to the elimination of local factors with scaling and root planing in Group I & II respectively, which is in conjunction with study conducted by *Carvalho J et al.*[5]

Increased probing depth and loss of clinical attachment loss are pathognomic for periodontitis and hence pocket probing is crucial and mandatory procedure in diagnosing periodontitis and evaluating the success of periodontal therapy. The probing depth also reduced in both groups. Probing depth of Group I changed from 6.60 ± 0.83 at baseline to 5.35 ± 0.87 in 1st month and to 4.90 ± 0.64 in 3rd month. For Group II, it changed from 7.00 ± 0.72 at baseline to 5.15 ± 0.48 at 1st month and to 4.25 ± 0.55 in 3rd month and this was shown Table 1 and graph 1. This was in accordance with the study conducted by *Sosklone et al.*[9] The reduction in pocket depth could be attributed to soft tissue shrinkage following scaling and root planing as well as resolution of gingival inflammation due to antimicrobial agent.[10]

The clinical attachment level (CAL) also reduced in both groups. CAL of Group I changed from 7.25 ± 0.96 at baseline to 6.15 ± 1.08 in 1st month and to 5.65 ± 0.93 in 3rd month. For Group II, it changed from 7.75 ± 0.85 at baseline to 5.80 ± 0.83at 1st month and to 4.75 ± 0.63 in 3rd month. This was shown table 4 and graph 4 and was in accordance the study conducted by *Rodrigues et al.*[11] The greater gain in clinical attachment level in Group II could be attributed to the absence of bacterial challenge, caused by retained antimicrobial agent during critical initial phase of healing following scaling and root planing.[12]

CONCLUSION

Periodontal disease is a polymicrobial infection primarily caused by periodontal pathogens existing within the subgingival plaque. The conventional method of lowering the bacterial load in the periodontal pocket constitutes scaling and root planing, but to prevent recolonization the use of adjunctive methods has been advocated. The use of controlled release devices enables maintenance of concentration of antimicrobial agent within the pocket. In the sites where chlorhexidine chip was placed along with conventional scaling and root planing saw reduction in all clinical parameters and no adverse events were reported with the use of same hence, it is safe and effective when used as adjunct to scaling and root planing in treatment of periodontits.

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Conflicts of interest: None to declare.

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