

# Assessment of Tetracycline as an Adjunct to Scaling and Root Planing in Periodontitis Patients

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## A B S T R A C T

**Introduction:** The conventional treatment method of scaling and root planning (SRP) remains the gold standard for the nonsurgical management of chronic periodontitis. However, access to periodontal pockets cannot be achieved through the SRP and these pockets provide an ideal environment for the growth and proliferation of anaerobic pathogenic bacteria. The present study was planned and commenced out to compare the efficacy of Tetracycline application as an adjunct to scaling and root planing.

**Materials and Methods** A total of 60 sites from 30 patients with probing depth measuring  $> 5$  mm and  $< 8$  mm. Group I comprised of 30 sites which was treated with scaling and root planning followed by local application of tetracycline gel and group II comprised of 30 control sites that were only treated with scaling and root planning. Statistical analysis were carried using paired t test and  $p$  value  $< 0.05$  was considered as the level of significance.

**Results:** The mean reduction in plaque index score from day 0-90, for Group I was  $0.74 \pm 0.14$  and for Group II was  $0.62 \pm 0.20$ . The values were statistically significant ( $P < 0.05$ ). The mean reduction in the gingival index from day 0 to 90 for Group I was  $0.68 \pm 0.15$  and for Group II was  $0.57 \pm 0.22$ . The values were statistically significant ( $P < 0.05$ ). The mean reduction in probing pocket depth from day 0 to 90 for Group I was  $1.47 \pm 0.54$  and for Group II was  $1.39 \pm 0.49$ . The values were statistically significant ( $P < 0.05$ ).

**Conclusion:** The results concluded that treatment with tetracycline in adjunct to SRP improves clinical parameters in periodontitis patients as compared to SRP alone.

**Key words:** Antibiotics; Periodontitis; Tetracycline

## INTRODUCTION

Periodontal disease is an inflammatory disease of the supporting tissues of teeth caused by an array of microorganisms, resulting in progressive destruction of periodontal ligament and alveolar bone with pocket formation, recession or both. The host defense system aggravates production of cytokines and other mediators which progresses towards alveolar bone resorption and irreversible bone loss.<sup>1</sup>

The conventional treatment method of scaling and root planning (SRP) remains the gold standard for the nonsurgical management of chronic periodontitis. However, access to periodontal pockets cannot be achieved through the SRP and these pockets provide an ideal environment for the growth and proliferation of anaerobic pathogenic bacteria.<sup>2</sup> The pathogenic bacteria that cause periodontitis are mainly gram-negative anaerobic or microaerophilic bacteria and the main organisms implicated are *Actinobacillus actinomycetemcomitans*, *Porphyromonas gingivalis*, and *Prevotella intermedia*. Eliminating these infections, thereby preventing disease progression, is a primary goal of periodontal therapy.<sup>3</sup>

The use of locally delivered antimicrobials is a relatively new addition in the management of periodontitis. The treatment method is primarily the result of more than

twenty years of research pioneered by Goodson of Forsyth's Dental Research Center.<sup>4</sup> Tetracycline has been used to treat periodontal disease due to its unique ability to reduce degeneration of collagenous matrix by inhibiting to reduce degradation of collagenous matrix by inhibiting the matrix metalloproteinases (MMPs). The present study was planned and commenced out to compare the efficacy of Tetracycline application as an adjunct to scaling and root planing.

## MATERIAL AND METHODS

Thirty patients aged 30-55 years, were selected for the study who visited clinic for the treatment of chronic periodontitis. A total of 60 sites were selected from thirty patients with probing depth measuring  $> 5$  mm and  $< 8$  mm. Two teeth were selected in each patient that readily bleed on the initial visit. Patients who have not undergone any form of periodontal treatment for the last 6 months were enrolled for the study. Informed consent was taken from all the subjects. Patients who were current smokers, had history of alcohol intake, had systemic diseases such as diabetes, had taken systemic or topical antibiotic therapy within the last 3 months, known to be hypersensitive to tetracycline, pregnant and nursing mothers were excluded from the study. Of the selected 60 sites, 30 were test sites (group I) and 30 were control sites (group II). Group I comprised of 30 sites

Variable	Time point compared	Group I (Tetracycline + SRP) Mean±SD	Group II (SRP alone) Mean±SD	P Value
Plaque Index	Day 0 to day 30	0.53±0.21	<b>0.41±0.08</b>	<0.0001
	Day 0 to day 60	0.69±0.28	<b>0.52±0.15</b>	
	Day 0 to day 90	0.74±0.14	<b>0.62±0.20</b>	
Gingival Index	Day 0 to day 30	0.42±0.17	<b>0.29±0.19</b>	
	Day 0 to day 60	0.54±0.13	<b>0.39±0.18</b>	
	Day 0 to day 90	0.68±0.15	<b>0.57±0.22</b>	
Probing pocket depth	Day 0 to day 60	1.69±0.50	<b>1.24±0.53</b>	
	Day 0 to day 90	1.47±0.54	<b>1.39±0.49</b>	
<b>Table-1: Comparison of Mean±SD of clinical parameters</b>				

which was treated with scaling and root planning followed by local application of tetracycline gel and group II comprised of 30 control sites that were only treated with scaling and root planning. Plaque index, gingival index and probing pocket depth were assessed before scaling and root planning at baseline. Following scaling and root planning, tetracycline gel was injected into the pockets with a syringe with blunt needle around the selected teeth in the treatment test sites. Patients were recalled to dental clinic on 7<sup>th</sup> day again for the second application for the test site. The patients were then appointed to attend the dental clinic on the 30<sup>th</sup>, 60<sup>th</sup> and 90<sup>th</sup> day and during this visit, the clinical parameters were assessed in control and test groups.

## STATISTICAL ANALYSIS

Statistical analysis were carried using paired t test and *p* value <0.05 was considered as the level of significance.

## RESULTS

The mean reduction in plaque index score from day 0 to 30 for Group I was 0.53±0.21 and for Group II was (0.41±0.08). On day 0-60, mean reduction for Group I was (0.69±0.28) and for Group II was 0.52±0.15. On day 0-90, for Group I was 0.74±0.14 and for Group II was 0.62±0.20. The values were statistically significant ( $P < 0.05$ ) (Table 1 and graph 1).

The mean reduction in the gingival index from day 0 to 30 for Group I was,0.42±0.17 and Group II was 0.29±0.19. The values were statistically significant ( $P < 0.05$ ). On day 0-60, for Group I was 0.54±0.13 and for Group II was 0.54±0.13. The values were statistically significant ( $P < 0.05$ ). The mean reduction in gingival index score from day 0 to 90 for Group I was 0.68±0.15 and for Group II was 0.57±0.22. The values were statistically significant ( $P < 0.05$ ) (Table 1 and graph 2). The mean reduction in probing pocket depth was from day 0 to 60 for Group I was 1.69±0.50 and Group II was 1.24±0.53. The values were statistically significant ( $P < 0.05$ ). The mean reduction in probing pocket depth from day 0 to 90 for Group I was 1.47±0.54 and for Group II was 1.39±0.49. The values were statistically significant ( $P < 0.05$ ) (Table 1 and graph 3).

## DISCUSSION

Dental plaque which is a primary etiological factor for periodontal disease is composed of bacterial aggregates that

are adherent to one another and to surfaces and interfaces. Mechanical therapy which disrupts plaque biofilm is effective for the majority of patients with mild to moderate periodontitis. But mechanotherapy is a blind procedure performed in a closed environment and instruments may not reach the base of deeper pockets due to tooth or pocket morphology. Hence antimicrobial agents can be used as an adjunct to conventional therapy.<sup>4</sup>

The present study was planned and commenced out to compare the efficacy of tetracycline application as an adjunct to scaling and root planning and found significant mean reduction in plaque index score, gingival index and reduction in probing pocket depth in patients who were treated with scaling and root planning followed by local application of tetracycline gel than with patients who were treated with scaling and root planning. Trombelli L et al<sup>5</sup> carried out a study in which one experimental site received supplemental irrigation with 15 mL of a 100-mg/mL tetracycline solution, while the other received a tetracycline-loaded fiber after mechanical instrumentation. Reevaluation 30 and 60 days after treatment showed that all three treatment modalities were effective in improving clinical parameters. Darhous MS et al<sup>6</sup> commenced bacteriological and clinical assessment of tetracycline as root conditioning in adjunct to periodontal surgery and on comparing the two treatment modalities the tetracycline-HCl root conditioning showed a better improvement in all the clinical parameters tested. Tetracycline irrigation gave less bacterial counts than the control group right after irrigation, however after two weeks the bacterial counts increased again and were insignificantly different in the two groups.

Heijl L et al<sup>7</sup> carried out a comparative study of periodontal treatment using tetracycline-containing drug delivery fibers and scaling and found that the combination of fiber therapy with scaling was particularly effective, suggesting a possible synergy between these forms of therapy. The combined therapy eliminated bleeding on probing, and black-pigmented Bacteroides, and produced the greatest mean reduction in pocket depth. Cattabriga M et al<sup>8</sup> evaluated the 6-month clinical response to sustained-release tetracycline fibers used alone or with scaling and root planing in 25 adult periodontal maintenance patients and reported that tetracycline fibers clearly decreased clinical signs of periodontal inflammation. Addition of scaling and root planing at the time of fiber placement further decreased,

although not significantly, the degree of inflammation. Silverstein L et al<sup>9</sup> found that tetracycline and scaling and root planing treatment modalities resulted in statistically significant clinical and microbiological improvements when compared with the control. Tetracycline irrigation alone and SC/RP alone had a similar effect in changing the subgingival microflora from one associated with disease to one associated with health. Thus, these treatment modalities are effective methods of producing statistically significant alterations in the subgingival microflora. Christersson LA et al<sup>10</sup> suggested that tetracycline irrigation of root surfaces for long periods of time (5 min) results in a subsequent release of active antibiotic into the gingival fluid at therapeutic levels for at least 1 week. Tetracycline irrigation resulted in significantly greater attachment gain as compared to scaling and root planing alone over at least a month period of healing.

Wilson TG et al<sup>11</sup> presented 5-year data pertaining to a subgroup of patients from a previous investigation who were treated with scaling and root planing plus tetracycline fibers. The parent study demonstrated that 6 months after therapy, scaling and root planing plus tetracycline fiber therapy was significantly better at reducing probing depth and gaining clinical attachment than scaling and root planing alone. However, the long-term data presented here show a regression from the original gains in clinical attachment levels in the fiber group.

The principal objective of both tetracycline fiber therapy and scaling is to arrest disease progression by allowing the subgingival microbiota and creating a healthier periodontal environment, and the same is manifested clinically as gain in CAL.<sup>12</sup>

## CONCLUSION

The results concluded that treatment with tetracycline in adjunct to SRP improves clinical parameters in periodontitis patients as compared to SRP alone.

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