

## Evaluation of Effectiveness of Tetracycline Fibers as Local Drug Delivery in Patients with Periodontitis: A Clinical Study

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### ABSTRACT

**Background:** Putative pathogens associated with periodontal disease are susceptible to a variety of antiseptics and antibiotics. The present study was conducted to assess the effectiveness of tetracycline fibers in the management of periodontitis.

**Materials & Methods:** The study was conducted in the department of Periodontics on 60 patients of chronic periodontitis. Patients were divided into 2 groups. Group I comprised of 30 patients (control group) in which only scaling and root planning (SRP) was done. Group II comprised of 30 patients (study group) in which along with SRP, tetracycline fibers were used. Parameters such as probing depth and bleeding on probing (BOP) were recorded. The including pocket depth were recorded on Day 45 and day 60 in both the groups

**Results:** In group I, the number of sites with no BOP was 16 at day 30 and with BOP was 14. At day 90, sites with no BOP increased to 22 and sites with BOP decreased to 8. Similarly, in group II, the number of sites with no BOP was 24 at day 30 and with BOP was 6. At day 90, sites with no BOP increased to 28 and sites with BOP decreased to 2. There was significantly reduced in bleeding sites in group II as compared to group I ( $P < 0.05$ ). In group I, mean pocket depth at day 30 was 4.84 and at day 90 it reduced to 4.14. In group II, mean pocket depth at day 30 was 4.24 and at day 90 it reduced to 3.64. There was better reduction in probing depth in group II as compared to group I.

**Conclusion:** Local drug delivery is the effective method of controlling periodontitis. Tetracycline found to be beneficial in cases of periodontitis.

**Keywords:** Root planning, Scaling, Tetracycline.

### INTRODUCTION

Periodontitis refers to gingival inflammation that damages the soft tissue and the supporting structure of the tooth. This further leads to the destruction of alveolar bone surrounding the teeth. Being a multifactorial disease, the factor which plays a role in disease progression is dental plaque. The aim of periodontal therapy is the eradication of

the plaque bacteria and to remove granulation tissue from the periodontal pockets for proper healing. Periodontal diseases are considered as infections of periodontium with a bacterial etiology, an immune response and subsequent tissue destruction. Putative pathogens associated with periodontal disease are susceptible to a variety of antiseptics and antibiotics. The various periodontal

Received: May. 6, 2018; Accepted: July. 14, 2018

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pathogens which are susceptible in the disease progression includes *Aggregatibacter actinomycetemcomitans*, *Porphyromonas gingivalis*, *Prevotella intermedia*, *Tannerella forsythia* etc.<sup>1</sup>

Antibacterial agents have been used along with mechanical debridement in the management of periodontal infection. Methods employed to convey antimicrobial agents into periodontal pockets include rinsing, irrigation, systemic administration and local application using sustained and controlled delivery devices.<sup>2</sup>

The drug delivery system delivers the antimicrobial agents to the base of the pocket at a bacteriostatic or bactericidal concentration. For the success, it should remain there in the pocket to ensure efficacious results. Since local drug delivery can achieve the above requirements it is important to critically assess the ability of these treatment methods to attain or maintain periodontal health. The commonly used drug delivery systems are tetracycline fiber, metronidazole gel, chlorhexidine chip, minocycline gel and doxycycline polymer.<sup>3</sup> The present study was conducted to assess the effectiveness of tetracycline fibers in the management of periodontitis.

## MATERIALS & METHODS

The study was conducted in the department of Periodontics. It included 60 patients of chronic periodontitis. Patients were informed regarding the study and written consent was taken. Patients were divided into 2 groups. Group I comprised of 30 patients (control group) in which only scaling and root planning (SRP) was done. Group II comprised of 30 patients (study group) in which along with SRP, tetracycline fibers were used. Both premolars and molars were used for the study. Parameters such as probing depth and bleeding on probing (BOP) were recorded.

Tetracycline fibers are soaked in saline and packed into the periodontal pockets with a cotton forceps or curette until the pocket is filled upto or slightly below the gingival margin. The including pocket depth was recorded on Day 0, 45 and 60 days in both the groups. Results thus obtained subjected to statistical analysis. Student paired *t* test was used. *P* value less than 0.05 was considered significant.

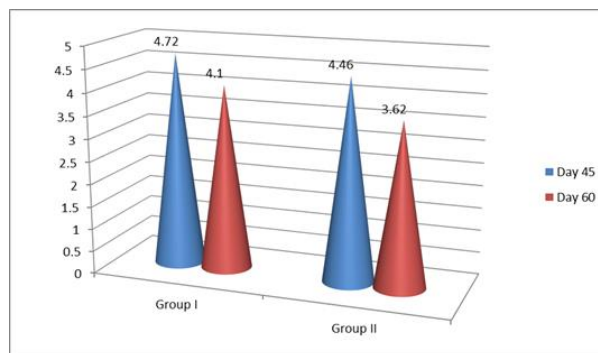
## RESULTS

Table 1: Comparison of bleeding on probing in both groups.

|                   | Group I |        | Group II |        |
|-------------------|---------|--------|----------|--------|
|                   | Day 45  | Day 60 | Day 45   | Day 60 |
| Sites with no BOP | 14      | 24     | 22       | 28     |
| Sites with BOP    | 16      | 6      | 8        | 2      |

Table I shows that in group I, the number of sites with no BOP was 14 at day 45 and with BOP was 16. At day 60, sites with no BOP increased to 24 and sites with BOP decreased to 6. The number of sites with no BOP was 22 at day 45 and with BOP was 8. At day 60, sites with no BOP increased to 28 and sites with BOP decreased to 2. There was significantly reduced in bleeding sites in group II as compared to group I ( $P < 0.05$ ).

Graph 1: Comparison of pocket depth in both groups



Graph I shows that in group I, mean pocket depth was 4.72 at day 45 and reduced to 4.10 at day 60. In group II, mean pocket depth was 4.46 at day 45 and it reduced to 3.62 on 60 day.

## DISCUSSION

The drug delivered can also be in the form of either natural or synthetic. Synthetic polymers have proved to be extremely interesting because they can be tailor-made to meet pharmacological or biological requirements. The periodic use of local delivery systems in reducing probing depths, stabilizing attachment levels and minimizing

bleeding would allow better control of the disease. Several antibiotics have been incorporated as local drug delivery which can be delivered to the site in periodically.<sup>4</sup> The present study was conducted to assess the efficacy of tetracycline fibers in the management of periodontal infection.

We evaluated bleeding on probing (BOP) around premolars and molars in both groups at day 45 and later on at day 60. In group I, the number of sites with no BOP was 14 at day 45 and with BOP was 16. At day 60, sites with no BOP increased to 24 and sites with BOP decreased to 6. The number of sites with no BOP was 22 at day 45 and with BOP was 8. At day 60, sites with no BOP increased to 28 and sites with BOP decreased to 2. Our results are in agreement with the results obtained in the study of Raju et al.<sup>5</sup>

The tetracyclines comprise a group of broad spectrum antimicrobial agents that were introduced into clinical practice in the late 1940's. These are primarily bacteriostatic agents that are effective against many Gram negative species such as *Actinobacillus actinomycetemcomitans*. The proven efficacy of this group of drugs in the management of periodontal diseases may be related not only to their antimicrobial actions but to a number of additional properties that have been recently identified.<sup>6</sup> These include collagenase inhibition, anti inflammatory actions, inhibition of bone resorption and their ability to promote the attachment of fibroblasts to root surfaces.

Panwar et al<sup>7</sup> in their study found that the number of sites with bleeding on probing were 12 in group A as compared to four in group B after 30 days. The mean decrease in probing depth was more in group B than group A after 30 and 90 days. General linear model showed that decrease in probing depth was statistically significant with both mechanical therapy as well as adjunctive use of tetracycline fibers. Arun et al<sup>8</sup> in his study demonstrated that use of tetracycline filled hollow fiber devices markedly changes the composition of the subgingival flora of initially diseased periodontal sites.

We also measured pocket depth in both groups. In group I, mean pocket depth was 4.72 at day 45 and reduced to 4.10 at day 60. In group II, mean pocket depth was 4.46 at day 45 and it reduced to 3.62 on

60 day.. There was better reduction in probing depth in group II as compared to group I. Our results are in agreement with Thomas et al.<sup>9</sup>

## CONCLUSION

Local drug delivery is the effective method of controlling periodontitis. Tetracycline found to be beneficial in cases of periodontitis.

## CONFLICT OF INTEREST

No potential conflict of interest relevant to this article was reported.

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