

Comparing the Chlorhexidine Gluconate and Minocycline Hydrochloride as Local Drug Delivery Agents in the Management of Chronic Periodontitis

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| Received: 01.05.2019 | Accepted: 07.05.2019 | Published: 18.05.2019

DOI: 10.36347/sjds.2019.v06i05.001

Abstract

Original Research Article

Background: The idea of local delivery of antibacterial agents into periodontal pockets was developed to overcome the disadvantages of systemic antibiotic therapy. **Aim:** To compare the usefulness of chlorhexidine gluconate 2.5 mg and Minocycline hydrochloride 1 mg as local drug delivery agents in the management of chronic periodontitis. **Methods:** Group A received Chlorhexidine gluconate 2.5 mg and group B Minocycline hydrochloride. Follow up visits were made after 6 weeks and 3 months intervals from the visit zero to capture the plaque index, gingival index and probing depth. **Results:** Plaque scores were noted higher in both groups at 6 weeks as compared to 3 months. At 6 weeks scores were higher in group A and vice versa at 3 months. Gingival index scores were noted higher in both groups at baseline and reduced overtime in both the groups. At baseline and 6 weeks scores were higher in group A than group B. Mean probing depth were noted more in both groups at baseline as compared to 6 weeks and 3 months. At baseline and 6 weeks scores were higher in group A and vice versa at 3 months. **Conclusion:** Both chlorhexidine gluconate and Minocycline hydrochloride were equally efficacious in reducing the plaque scores and mean gingival index scores. For probing depths, minocycline was better at 6 weeks whereas chlorhexidine showed better results at 3 months.

Keywords: Chlorhexidine, Plaque scores, Gingival scores, Minocycline.

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INTRODUCTION

Bacteria play a key role in a dynamics of peri-implant mucositis and peri-implantitis. Considering the problems in decontaminating implants by mechanical means alone, the use of adjunctive antimicrobial components has been put forward for the management of peri-implant infection [1, 2]. Topical application of chlorhexidine is one treatment modality that has been proposed. A recent report did not find additional improvements following use of topical chlorhexidine to supplement mechanical debridement as compared with mechanical debridement alone [3].

Slow-release antibiotics in the form of adjunct to treatment of peri-implantitis lesions have shown promising results. Now a days an agent using microspheres containing minocycline hydrochloride (1mg) was developed. Studies on this agent indicate clinically beneficial effects when used as an adjunct to supra and subgingival mechanical debridement [4].

The idea of local delivery of antibacterial agents into periodontal pockets was developed to

overcome the disadvantages of systemic antibiotic therapy [5, 6]. The adverse effects are also less as amount of drug needed was less. Thus, this study was planned to compare the usefulness of chlorhexidine gluconate 2.5 mg and Minocycline hydrochloride 1 mg as local drug delivery agents in the management of chronic periodontitis.

METHODS

The study was conducted at a tertiary care teaching dental hospital of northern India. In this prospective study forty adult patients from both sexes fulfilling the inclusion criteria were included in the study. Subjects suffering from chronic periodontitis with almost similar probing depth bilaterally at the selected sites and exhibiting bleeding on probing; Subjects with no caries and restorations on the selected teeth; patients showing effective individual oral hygiene were included in this study.

Subjects with known systemic and debilitating diseases; Subjects presenting with known adverse reactions to any component of the test agent; Subjects

presenting with history of intake of local and/or systemic antibiotic therapy for the last 1 month were excluded from this investigation. Additionally current smokers, patients on anticoagulant therapy, pregnant and lactating females were also not included.

Every study subject was called for follow up 4 weeks after completion of supragingival scaling. It is taken as visit zero. Plaque scores, probing pocket depth and gingival index were captured. The treatment sites were then divided into two groups.

Group A: Periodontal pockets on the left side of maxillary or mandibular arch and were exposed to chlorhexidine gluconate 2.5 mg.

Group B: Periodontal pockets on the right side of maxillary or mandibular arch and received Minocycline hydrochloride 1 mg.

Follow up visits were made after 6 weeks and 3 months intervals from the visit zero to capture the plaque index gingival index and probing depth.

Written and informed consent was obtained from study subjects. Permission of ethical committee was obtained from the Institutional Ethics Committee. All the questionnaires were manually checked and edited for completeness and consistency and were then coded for computer entry. After compilation of collected data, analysis was done using Statistical Package for Social Sciences (SPSS), version 21 (IBM, Chicago, USA). The results were expressed using appropriate statistical variables.

RESULTS

The values of plaque scores for group A and group B noted at 6 weeks and 3 months intervals are presented below. Plaque scores were noted higher in both groups at 6 weeks as compared to 3 months. At 6 weeks scores were higher in group A and vice versa at 3 months. The difference in the mean plaque scores between group A and group B was found to be statistically insignificant (Table-1).

Table-1: Comparison of plaque scores for Group A and Group B at various time intervals

Follow up visits	Group A [Chlorhexidine gluconate 2.5 mg]	Group B [Minocycline hydrochloride 1 mg]	P value
6 weeks	2.82±1.34	2.57±1.61	>0.05
3 months	2.18±1.86	2.32±1.30	>0.05

The values of gingival index scores for group A and group B noted at baseline, 6 weeks and 3 months intervals are presented below. Gingival index scores were noted higher in both groups at baseline and reduced overtime in both the groups. At baseline and 6

weeks scores were higher in group A than group B. Vice versa was noted at 3 months. The difference in the mean gingival index scores between group A and group B was found to be statistically insignificant (Table-2).

Table-2: Comparison of gingival index scores for Group A and Group B at various time intervals

Follow up visits	Group A [Chlorhexidine gluconate 2.5 mg]	Group B [Minocycline hydrochloride 1 mg]	P value
Baseline	2.02±0.67	1.94±0.94	>0.05
6 weeks	1.25±0.88	1.12±0.43	>0.05
3 months	1.04±0.35	1.05±0.01	>0.05

The values of mean probing depth for group A and group B noted at baseline, 6 weeks and 3 months intervals are presented below. Mean probing depth were noted more in both groups at baseline as compared to 6 weeks and 3 months. At baseline and 6 weeks scores

were higher in group A and vice versa at 3 months. The difference in the mean probing depth between group A and group B was found to be statistically significant at baseline and 3 months (Table-3).

Table-3: Comparison of probing depths for Group A and Group B at various time intervals

Follow up visits	Group A [Chlorhexidine gluconate 2.5 mg]	Group B [Minocycline hydrochloride 1 mg]	P value
Baseline	6.02±0.60	5.77±0.68	>0.05
6 weeks	4.48±0.23	3.58±0.82	<0.05
3 months	3.01±0.35	3.06±0.73	>0.05

DISCUSSION

The prevention of periodontal disease requires a reduction of subgingival microbial plaque mass or at

least a suppression of periodontopathic bacteria. Successful treatment is dependent on the stoppage of tissue destruction by elimination or control of etiologic agents, together with a microbial shift toward one

typically present in health. In early periodontitis with pockets of ≤ 5 mm depth, scaling and root planing is usually effective in removing the calculus and plaque and, therefore, reduces the bacterial load and probing pocket depth. However, due to poor access to the base of deep pockets and anatomical complexities of teeth and furcation involvement, SRP alone may not always result in the complete elimination of the disease, which results in exacerbation of the disease. A significant number of periodontal pathogenic bacteria remain on the root surfaces and within the dentinal tubules of the teeth associated with these pockets. This encouraged the systemic use of antibiotics as an adjunct to mechanical therapy [7-9].

This study compared the usefulness of chlorhexidine gluconate 2.5 mg and Minocycline hydrochloride 1 mg as local drug delivery agents in the management of chronic periodontitis. Plaque scores, probing pocket depth and gingival index were measured. Regarding plaque scores, we observed that the values of plaque scores for group A and group B noted at 6 weeks and 3 months intervals are presented below. Plaque scores were noted higher in both groups at 6 weeks as compared to 3 months. At 6 weeks scores were higher in group A and vice versa at 3 months. We also observed that the values of gingival index scores for group A and group B noted at baseline, 6 weeks and 3 months intervals are presented below. Gingival index scores were noted higher in both groups at baseline and reduced overtime in both the groups. At baseline and 6 weeks scores were higher in group A than group B.

Another study by Grisi *et al.*, [10] is also in concordance with our observations. Author evaluated the effects of a controlled release CHX chip on the clinical and microbiological parameters of periodontal syndrome. They found no significant difference between the plaque scores over the entire study period of 9 months, but the gingival index scores at 6 weeks as well as at 3 months were found to be statistically significant; however, there was no statistically significant difference observed between the two groups.

The use of adjunctive minocycline microspheres resulted in improvements in both probing depths and bleeding scores. The reductions of bleeding scores, although greater than for the chlorhexidine group, were modest. This may be related to the fact that the bleeding scores included bleeding assessed after microbial sampling. This sampling was made using four paper points placed at the deepest sites, which may have increased the potential to provoke bleeding at these sites. The use of microspheres containing minocycline has previously been found to be effective as an adjunct to mechanical treatment of periodontal and peri-implantitis lesions [11, 12].

The result of this study is in agreement with previous study by Renvert *et al.*, [12] who evaluated

topical Minocycline microspheres versus topical CHX gel as an adjunct to mechanical debridement of incipient peri-implant infections. With respect to probing depth, a statistically significant difference was observed between the two groups from baseline to 6 weeks for both the drugs.

Rodrigues *et al.*, [13] studied the effect of CHX chip in periodontal maintenance therapy. The patients were assessed for plaque index, bleeding on probing, probing depth, clinical attachment level, and gingival recession at baseline, 6 weeks, 3 and 6 months. They concluded that CHX chip was more effective than SRP alone in reducing probing depth. Another study [14] also studied the adjunctive use of a subgingival controlled-release CHX chip and concluded that when it was used as an adjunct to SRP, it resulted in the reduction of probing depth and improvement in clinical attachment level, when compared with SRP alone.

CONCLUSION

On the basis of findings of this study, it can be stated that both chlorhexidine gluconate and Minocycline hydrochloride were equally efficacious in reducing the plaque scores and mean gingival index scores. For probing depths, minocycline was better at 6 weeks whereas chlorhexidine showed better results at 3 months. Further larger controlled trials are warranted to support our findings.

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