INTERNATIONAL JOURNAL OF CURRENT MEDICAL AND PHARMACEUTICAL RESEARCH
ISSN: 2395-6429, Impact Factor: 4.656
Available Online at www.journalcmpr.com
Volume 5; Issue 07(A); July 2019; Page No. 4392-4395
DOI: http://dx.doi.org/10.24327/23956429.ijcmpr201907704

Research Article

COMPARATIVE EVALUATION OF SCALING AND ROOT PLANING WITH AND WITHOUT SUB-ANTIMICROBIAL DOSE DOXYCYCLINE IN THE TREATMENT OF PATIENTS WITH CHRONIC PERIODONTITIS

Gaurav Chahal[1], Roseka[2], Hitesh Gupta[3], Abhiney Puri[4], Paras Gupta[5] and Shweta Gupta[6]

[1]Department of Periodontics and Implantology, Carreer Post Graduate Institute of dental Sciences & Hospital, Lucknow
[2]Department of Conservative Dentistry & Endodontics, Himachal institute of Dental Sciences
[3]Department of Conservative Dentistry & Endodontics, Himachal institute of Dental Sciences,Paonta Sahib
[4]Department of Oral & Maxillofacial Pathology, Himachal institute of Dental Sciences, Paonta Sahib
[5]Department of Conservative Dentistry & Endodontics, Uttaranchal Dental & Medical Research institute, Dehradun
[6]Department of Prosthodontics, Uttaranchal Dental & medical research institute, Dehradun

ARTICLE INFO

Article History:
Received 12th April, 2019
Received in revised form 23rd May, 2019
Accepted 7th June, 2019
Published online 28th July, 2019

Key words:
Matrix metalloproteinases, Sub-antimicrobial dose doxycycline, Pocket Probing Depth, Clinical Attachment Level.

ABSTRACT

Background: Periodontal disorder is a complex interaction of microbial factors and a susceptible host. Bacterial biofilm was able to directly cause destruction of periodontal tissues but the greatest destruction of connective tissue and bone structures are because of immunoinflammatory response of the host. It involves increased numbers of inflammatory and tissue destructive molecules like prostaglandins, cytokines and matrix metalloproteinases (MMPs).
Aim: This study was aimed to assess the role of sub-antimicrobial dose of doxycycline (SDD) as an adjunct to scaling and root planing (SRP) in the treatment of chronic periodontitis.
Materials & method: A total of 40 subjects having chronic periodontitis, with pockets depths ranging from 3 to 6 mm were selected.
Results: Were evaluated on the basis of clinical parameters such as GI, PI, GBI, OHI-S, PPD and CAL, in both the groups recorded at baseline, 1, 3 & 6 months.
Conclusion: SRP alongwith SDD showed significant reduction in almost all periodontal parameters when compared with SRP alone.

INTRODUCTION

Periodontal disease is a complicated interaction between microbial factors and a susceptible host.[1] While bacterial plaque was able to cause destruction of periodontal tissues but the greatest destruction of connective tissue and bone structures are caused by immunoinflammatory response of susceptible host. So bacteria doesnot cause signigicant periodontitis. Vulnerable host is important for the progression of periodontitis.[2] The increased proportion and severity of periodontal destruction is because of the release and activation of increased amount of inflammatory and tissue damaging molecules like prostaglandins, cytokines and matrix metalloproteinases (MMPs).[3]

Some studies have shown that scaling and root planing is effective in reducing the progression of periodontal disease.[1] But after SRP, the result of this procedure may not be acceptable especially in deep pockets and in patients with risk factors.[4] SRP does not completely eliminate bacterial invasion completely. In these approaches the interface between host bacteria and the host is considered, which make the possibility of modifying or reducing destruction from chronic inflammatory response. In this method, excessive and pathologic inflammatory response are modified to enhance wound healing and periodontal stability.[5]

MATERIALS AND METHODS

A randomized clinical control study was performed on a total of 40 patients in the age group of 35 to 50 years with pockets and clinical attachment loss in the range of 3-6 mm, diagnosed as cases of chronic periodontitis. Subjects were randomly divided into two groups i.e. Test group & Control group which consisted of 20 patients each. All the 40 patients were subjected to SRP and oral hygiene instructions were given. Patients in the test group were administered 20 mg doxycycline hyclate b.i.d for 6 months. Gingival bleeding

Corresponding author:* **Gaurav Chahal
Department of Periodontics and Implantology, Carreer Post Graduate Institute of dental Sciences & Hospital, Lucknow

index (Ainamo and Bay, 1975) (GBI), Gingival Index (Loe and Silness, 1963) (GI), Plaque Index (Silness and Loe, 1964) (PI), Simplified Oral Hygiene Index (Greene & Vermillion in 1964) (OHI-S), Pocket Probing Depth (PPD) & Clinical Attachment Level (CAL) were measured.

Inclusion Criteria: Patients in the age group of 35-50 years, Patients with at least 25 teeth, Patients with pockets and clinical attachment loss in the range of 3-6 mm.

Exclusion Criteria: Subjects who had undergone oral prophylaxis or any kind of periodontal therapy within 90 days of reference line visit, subjects with pregnancy, lactation or serious and chronic medical conditions, like diabetes mellitus, kidney or liver disease, subjects who were hypersensitive to tetracycline and patients requiring chronic antibiotic treatment or who had participated in a periodontal clinical trial within 12 months of baseline.

The subjects were then divided into 2 groups of 20 patients each. Group A: [Test group Fig.1,2,3],Group B: [Control groupFig.4,5,6]

SRP was performed in all the patients in 2 visits which were scheduled within a span of 24 hours and oral hygiene measures were given. Test group patients were administered to 20 mg SDD for a period of 6 months. All the clinical considerations were recorded from baseline for 1,3 & 6 months. Student's "t" test (paired & unpaired) were used to analyze the data.

RESULTS

The mean percentage of GBI score in test group was 75.53±16.30,24.31±9.57, 14.47±5.8, and 14.20±5.73at baseline, 1, 3 & 6 months. In control group, the mean percentage of GBI score at baseline was 84.99±13.44, and 25.28±10.20, 22.84±7.73and23.85±7.93at 1,3 &6 months. Also, when intergroup comparisons were evaluated between successive time intervals, the value was significant between 3 to 6 months.(Fig7)

The mean GI score in test group at baseline was 1.83±0.307, at 1 month 1.11±0.254, at 3 months .973±0.301and.945±.298 at 6 months. In control group at baseline it was 1.80±0.22, at 1 month 1.197±0.411, at 3 months 1.134±0.34 and1.19±.36at 6 months.

The mean PI score in test group at baseline was 1.68±0.195 and1.258±0.178, 1.144±.213, 1.170±.230 at 1,3 & 6 months. In control group the mean PI score at baseline was 1.62±0.231 at 1month 1.061±0.347, at 3 months1.04±.327 and at 6 months it was1.08±.317.

The mean OHI-S score in test group at baseline was 3.365±0.660, at 1month 1.023±0.539 ,at 3months.699±.484and at 6 months it was .710±.458. In control group the mean OHI-S score at baseline was 3.619±0.472 &1.679±0.486, 1.761±.430, 1.771±.405 at 1, 3 & 6 months.

The mean PPD score in test group at baseline was 3.54±0.284, at 1month 2.626±0.284, at 3months2.217±.264and at 6 months it was 2.082±.261. In control group the mean PPD score at baseline was 3.36±0.600, at 1 month 2.839±0.451, at 3 months2.817±.405 and at 6 months it was2.843±.411.

The mean CAL score in test group at baseline was 3.918±0.376, at 1 month 2.64±0.624,at 3 months2.318±.458and at 6 months itwas2.231±.443. In control group, the mean CAL score at baseline was 3.76±0.814, at 1 month 3.14±0.641,at 3 months3.160±.550 and at 6 months it was2.183±.563.

Experimental Group Photographs

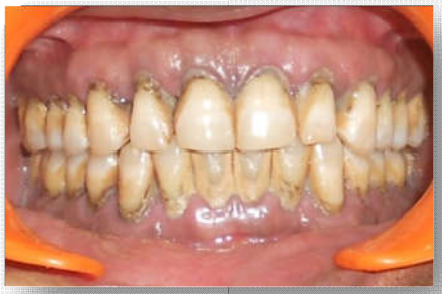

Fig 1 Preoperative

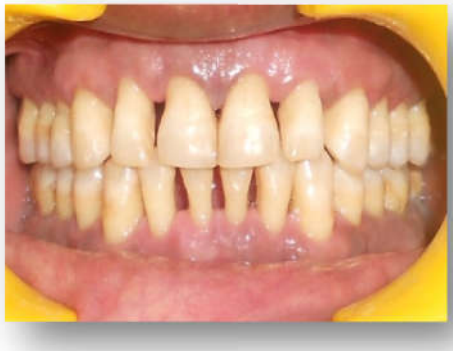

Fig 2 Postoperative (1 month follow up)

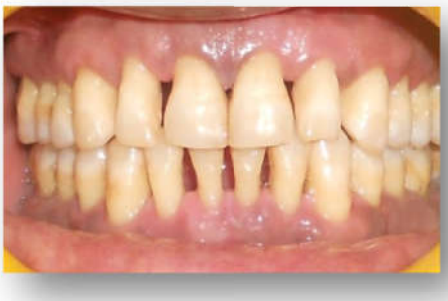

Fig 3 Postoperative (After 6 months)

Control Group Photographs

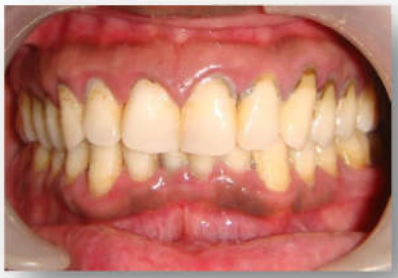

Fig 4 Preoperative

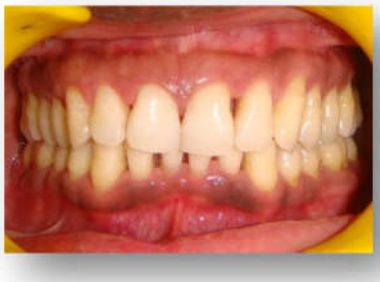

Fig 5 Postoperative(1month follow up)

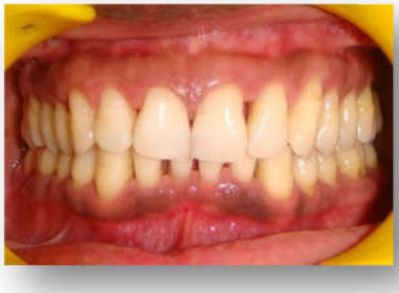

Fig 6 Postoperative (after 6 months)

Thus when all the periodontal parameters were considered as a whole it was observed that reduction in pocket depth was significant in both the groups but when intergroup comparisons were made the test group showed better results in comparison with control group, also the CALdecreased significantly after 6 months whereas in the control group it decreased after 1 month but after this no significant difference was observed for the further time period.

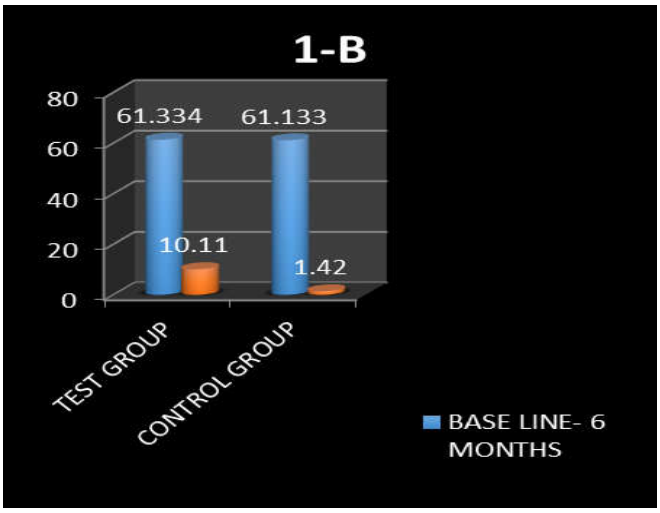

Fig 7 mean & standard deviation of differences b/w successive time intervals and the comparison b/w them (by paired"t"test) for g.b.i. in test group & control group, red color is months in graph.

DISCUSSION

In host modulation therapies, adjunctive to common periodontal treatment like SRP and periodontal surgery, applying such drugs, for instance drugs from tetracycline family systemically or topically has offered a new perspective in periodontal treatment.[6] Tetracyclines inhibit collagenase activity mechanism which is independent to its anti-microbial effect.[4] Tetracyclines block MMP activity by various mechanisms, for example they can prevent osteoclasts and osteoblast-derived MMP activity and inhibits the bone resorption. Doxycycline was able to inhibit MMP activity derived from epithelial cells by preventing the release of enzymes which are within the cells. The drug also decreases tissue damage by reducing the pro-inflammatory mediators such as interleukin 1(IL-1) and tumor necrosis factor alpha (TNFα) expression. It also increases collagen production & osteoblast activity and ultimately bone formation. It is the only MMP inhibitor that has been accepted for clinical use in America, Canada and Europe and has also been used for the therapy of periodontitis. It is a member of the tetracycline family compounds called SDD with the old name of low dose of doxycycline. Hence, any means of modulating production of MMPs in the host tissue is likely to have clinical benefits in the treatment of periodontal disease.[2]Pascale *et al*[7] proved that doxycycline has significant advantages over tetracycline hydrochloride. Tetracycline hydrochloride treatment commonly results in more gastrointestinal side-effects than most other orally administered antibiotics. Therefore a study conducted on 75 adult men and women over a period of 36 weeks by Mandell and Socransky[8] proved that improvements in periodontal disease parameters occurred without the occurance of doxycycline-resistant micro-organisms. On the other hand Al-Ali *et al*[9] used TCP (tri-calcium phosphate) graft combined with doxycycline and concluded that the use of TCP could support the prevention of crestal resorption and the enhancement of bone fill. The grafted sites (combination) and sites treated with doxycycline alone had approximately equivalent number of new connective tissue attachment and new cementum.

Kulkarni *et al*[10], concluded that the chances of detection was unchanged in the placebo group but was significantly reduced in doxycycline group when patients were administrated either doxycycline at a dosage of 200mg to start with and 100 mg per day for 3 weeks, or a placebo. Decline in prevalence scores for all pathogens summed together and for combinations of indicator organisms suggested that doxycycline exerts significant short-term (1 week) antimicrobial activity. Whereas Walker *et al*[11] in their study, conducted over a period of 3 months concluded that SDD exerts no antibacterial effect on the subgingival microflora with adult periodontitis. Their results proved that the microbial differences observed were because of anticollagenase & anti-inflammatory properties of low dose SDD and not to an antimicrobial effect. LDD is used frequently for PPD reduction in smokers. In a study on smokers by Machion *et al*[12] who also used doxycycline as LDD and their results showed an average increase of 1.63mm in attachment level in smokers in comparison with 1.08mm in patients receiving only SRP whereas in the present study an attachment gain of 2.082±.261mm in CAL was observed. There was also reduction in probing depth of about 1.73mm in test group as compared to 1.18mm in the control group. Likewise in the present study PPD decreased from 3.54±.284 to 2.082±.261mm in the test group. Crout *et al*[13] concluded that both probing depth and attachment loss (the latter assessed by the constant-pressure probe) showed significant improvement in the LDD treated, but not in the placebo-treated patients. The probing depths in the LDD group reduced approximately 26%, 39% & 30%, at 2, 4, and 6 months respectively. Similarly in the present study an improvement of 26%, 16%, 6% in PPD & a gain from 32%, 12%, 4% in CAL was observed during 1, 3 & 6 months

SDD with a dose of 20 mg twice a day, its brand name is Periostat® and is effective for at least three months. Periostat® is the only drug approved by the FDA which prevents the action of MMPs involved in the damage of collagen in the connective tissue as a result of periodontal disease.

CONCLUSION

Findings from the present study suggested that when 20 mg SDD along with SRP was administered in patients with chronic periodontitis and in patients undergoing SRP alone, the results thus obtained showed a significant reduction in almost all periodontal parameters.

Bibliography

1. Lee JY, Lee YM, Shin SY, Seol YJ, Ku Y, Rhyu I *et al* Effect of subantimicrobial dose doxycycline as an effective adjunct to scaling and root planing. *J Periodontol* 2004; 75:1500-1508
2. Caton J, Ryan ME Clinical studies on the management of periodontal diseases utilizing subantimicrobial dose doxycycline (SDD). *Pharmacol Res* 2011;63:114-120
3. Page RC, Kornman KS The pathogenesis of human periodontitis: An introduction. *Periodontol* 2000;32:1997;9-11
4. Preshaw PM, Hefti AF, Novak MJ, Michalowicz BS, Pihlstrom BL, Schoor R *et al* Subantimicrobial dose doxycycline enhances the efficacy of scaling and root plan-ning in chronic periodontitis: a multicenter trial. *J Periodontol* 2004; 75:1068-1076
5. Preshaw PM, Hefti AF, Bradshaw MH Adjunctive subantimicrobial dose doxycycline in smokers and non-smokers with chronic periodontitis. *J Clin Periodontal* 2005; 32: 610-616
6. I-Ali W, Bissada NF, Greenwell H The effect of local doxycycline with and without Tricalcium phosphate on the regenerative healing potential of periodontal osseous defects in dogs. *J Periodontol* 1989; 60:582-589
7. Pascale D, Gordon J, Lamster I, Mann P, Seiger M, Arndt W Concentration of Doxycycline in Human gingivalfluid. *J Clin Periodontol* 1986; 13: 841-844
8. Mandell RL, Socransky SS Microbiological and clinical effects of surgery plus doxycyclineon juvenile Periodontitis. *J Periodontol* 1987;59: 373-379
9. AI-Ali W, Bissada NF, Greenwell H The effect of local doxycycline with and without Tricalcium phosphate on the regenerative healing potential of periodontal osseous defects in dogs. *J Periodontol* 1989; 60:582-589
10. Kulkarni GV, Lee WK, Aitken S, Birek P, McCulloch CA A randomized, placebo controlledtrial of doxycycline: Effect on the microflora ofrecurrent Periodontitis lesions in high-risk patients. *J Periodontol* 1991; 62:197-202
11. Walker C, Thomas J, Nangó S, Lennon J, Wetzel J, Powala C Long-Termtreatment with Sub-antimicrobial dose doxycycline exerts noantibacterial effect on the sub-gingival microflora Associatedwith adult Periodontitis. *J Periodontol* 2000; 71:1465-147
12. Machion L, Andia DC, Benatti BB, Carvalho MD, Nogueira-Filho GR, Casati MZ *et al* Locally Delivered Doxycycline as anadjunctive therapy to scaling and root planing in the treatment of smokers: A Clinical Study *J Periodontol* 2004; 75:464-469
13. Crout RJ, Lee HM, Schroeder K, Crout H, Ramamurthy NS, Wiener M *et al* The cyclicregimen of low-dose doxycycline for adult Periodontitis: Apreliminary study. *J Periodontol* 1996; 67:506-514

How to cite this article:

Gaurav Chahal *et al* (2019) 'Comparative Evaluation of Scaling And Root Planing With And Without Sub-Antimicrobial Dose Doxycycline In The Treatment of Patients With Chronic Periodontitis', *International Journal of Current Medical and Pharmaceutical Research,* 05(07), pp 4392-4395.

****