

Research Article

Comparative Effect of 1.2% Atorvastatin Gel And 1.2% Rosuvastatin as a Local Drug Delivery in Treatment of Intra-Bony Defects in Chronic Periodontitis

Ashish Soni¹, Swati Raj², Laxmikant Kashyap¹, Amit Upadhyay¹, Vikas Agrihari¹, Anil Sharma³, Anil Agrawal^{1*}

¹Department of Periodontics, New Horizon Dental College, Bilaspur, Chattishgath, India

²Department of Periodontics, Triveni Dental College, Bilaspur, Chattishgath, India

³Department of Periodontics, Maitri College of Dentistry and Research Center, Bilaspur, Chattishgath, India

Abstract

Background: The present study was aimed to evaluate the efficacy of 1.2% Atorvastatin with that of 1.2% Rosuvastatin as local drug delivery the treatment of chronic periodontitis.

Method and Material: 40 Patients were equally divided in 2 groups. Group A underwent scaling and root debridement and 1.2% Atorvastatin (ASV) gel (1.2 mg/0.1 mL) whereas group B received scaling and root debridement and Rosuvastatin (RSV) (1.2 mg/0.1 mL) g.

Results: The results showed that both the group showed improvement in all the recorded parameters and the results obtained were statistically significant. When comparison was made between the groups no significant difference was obtained

between atorvastatin and Rovustatin at baseline in all recorded parameters. However after six months significant improvement was recorded in CAL and PD. The plaque and gingival index score however showed improvement but it did not attain level of significance.

Conclusion: The present study shows improvement in clinical parameters with the use of ATV and ASV gel when used in combination with SRP in Chronic Periodontitis patients. Patients with RSV gel showed significantly better than the ones in which ATV gel was placed.

Keywords: Atorvastatin Gel; Chronic Periodontitis; Rosuvastatin

Introduction

Periodontitis is a multifactorial disease which is a result of the host immune inflammatory response to microbial complexes [1]. The endotoxins produced by these pathogens activates the defense cells thus leading to the production of various cytokines like IL-1 beta, TNF- alpha, IL-6 and MMPs. These chemical mediators lead to the increased osteoclastic activity thus affecting the supporting tissue of the periodontium i.e. cementum, periodontal ligament and alveolar bone [2-4].

The rationale of periodontal therapy is to prevent the progression of the disease and regenerate the lost tissue structures. Various treatment modalities such as scaling and root planning (SRP), in conjunction with local or systemic anti-inflammatory and antimicrobial agents can be used for tissue regeneration. Other treatment option that are known to decrease the intra-bony defects includes using various regenerative materials such as bone grafts, growth factors, bisphosphonates, statins, platelet analogues like platelet rich fibrin (PRF) and metformin [4,5]. Statins are competitive inhibitors that belong to a group of HMG CoA (3- hydroxyl -3- methyl glutaryl coenzyme A) and are most commonly employed to prevent the risk of major coronary events by to reducing the levels of low density lipoprotein cholesterol. Other than that it also has antioxidant, immunomodulatory, endothelium stabilization and antithrombotic actions. Statins have also been found to increase the expression of Bone Morphogenetic Protein-2 mRNA in osteogenic cells and thus triggering the bone

formation [5,6].

These bone stimulating and anti-inflammatory actions of statins can be used to treat the periodontal defects, especially hard tissue regeneration. The present study is aimed to evaluate the efficacy of 1.2% Atorvastatin with that of 1.2% Rosuvastatin as local drug delivery the treatment of chronic periodontitis.

Materials and Methods

The study was conducted in Department of Periodontics, and was approved by Institutional Ethical Review Board. 40 patients based on inclusion and exclusion criteria formed the part of the study.

Inclusion criteria

- Healthy patients with no systemic disease.
- Patients with probing depth (PD) \geq 4 mm.
- Subjects with \geq 20 teeth with no history of antibiotic and periodontal therapy six months prior to the initiation of the study.

Exclusion criteria

- Patients on statin therapy.
- Immuno-compromised patients.
- Patients using any form of tobacco.

- Pregnant and lactating female.

Patients were randomly and equally divided in 2 groups. Group A underwent scaling and root debridement and 1.2% RSV gel (1.2 mg/0.1 mL) whereas group B received scaling and root debridement and Atorvastatin gel (1.2 mg/0.1 mL) g.

LDD gel formulation

For preparation of Rosuvastatin and atorvastatin gels a biocompatible solvent was mixed with pre-measured quantity of methylcellulose which was then heated to 50-60°C in a vial. Mechanical shaker was used for constantly agitating the solution so that clear solution could be obtained after the solution became clear pre-weighed quantity of RSV or ATV were added.

Collection of data: Clinical parameters like Plaque Index (PI), Gingival index (GI), Clinical attachment level (CAL) and pocket probing depth (PD) were measured at different time intervals (at baseline, 1 month of gel placement and after 6 months). 21 gauge needle with blunt cannula was used for placing gel in the oral cavity. 0.25 ml of gel was placed into the periodontal pocket followed by Coe pack dressing. Radiographic assessment was done at baseline and after 6 months.

Results

Table 1 shows that there were 11 males and 9 females in group 1 and 8 males and 12 females in group 2 (Table 1).

Table 2 shows mean and standard deviation of the clinical parameter at baseline and at sixth month for patients treated with RSV (group A). The mean plaque index at baseline and after 6 months was 1.70 and 1.18 respectively, gingival index was 1.63 and 1.13 respectively, clinical attachment loss was 6.1 and 5.1 respectively and probing depth was 5.3 and 4.15 respectively. There was significant difference between baseline and after 6 months ($P < 0.05$) (Table 2).

Table 3 shows mean and standard deviation of the clinical parameter at baseline and at sixth month for patients treated with Atorvastatin (group B). The mean plaque index at baseline and after 6 months was 1.54 and 1.27 respectively, gingival index was 1.59 and 1.2 respectively, clinical attachment loss was 5.9 AND 5.3 respectively and probing depth was 5.1 and 4.6 respectively. There was significant difference between baseline and after 6 months ($P < 0.05$) (Table 3).

Table 1: Distribution of patients.

Groups	Group I	Group II
Method	SRP+1.2% RSV gel	SRP+Atorvastatin gel
Male:Female	11:9	8:12

Table 2: Clinical parameter at baseline and at sixth month for patients treated with RSV (group A).

Parameters	Baseline		6 months		t value	P value*
	Mean	SD	Mean	SD		
Plaque Index	1.70	.37	1.18	.35	4.5	0.000
Gingival Index	1.63	.45	1.13	.30	4.1	0.000
Cal	6.1	.55	5.1	.71	4.9	0.000
PD	5.3	.63	4.15	.74	2.3	0.01

*Significant at 5% level of significance ($P < 0.005$). SD: Standard deviation

Table 3: Clinical parameter at baseline and at sixth month for patients treated with Atorvastatin (group B).

Parameters	Baseline		6 month		t value	P value*
	Mean	SD	Mean	SD		
Plaque Index	1.54	0.42	1.27	.38	2.13	0.01
Gingival Index	1.59	0.50	1.2	.37	2.4	0.009
Cal	5.9	0.44	5.3	.59	3.07	0.001
PD	5.1	.83	4.65	.81	1.7	0.04

*Significant at 5% level of significance ($P < 0.005$). SD: Standard deviation

Table 4: Intergroup comparison between different parameters at different time interval.

Parameters	Time Interval	Group I	Group II	F Value	P Value*
		Mean ± SD	Mean ± SD	Mean ± SD	Mean ± SD
Plaque Index	Baseline	1.7 ± .37	1.54 ± .42	1.46	.23
	6 Month	1.18 ± .35	1.27 ± .38	0.62	.43
Gingival Index	Baseline	1.63 ± .45	1.59 ± .50	0.09	.76
	6 Month	1.13 ± .30	1.2 ± .37	1.19	.25
Cal	Baseline	6.1 ± .55	5.9 ± .44	1.58	.21
	6 Month	4.65 ± .74	5.3 ± .59	12.09	.001
PD	Baseline	5.3 ± .63	5.1 ± .83	0.71	.40
	6 Month	4.15 ± .74	4.65 ± .815	4.1	.04

*Significant at 5% level of significance ($P < 0.005$)

Table 4 shows intergroup comparison between different parameters at different time interval. The results showed that both the group showed improvement in all the recorded parameters and the results obtained were statistically significant ($P < 0.05$) (Tables 1 & 2). When comparison was made between the groups no significant difference was obtained between atorvastatin and Rosuvastatin at baseline in all recorded parameters. However after six months significant improvement was recorded in CAL and PD. The plaque and gingival index score however showed improvement but it did not attain level of significance (Table 4).

Discussion

Periodontal therapy aims to restore the periodontal tissue that has been lost due to periodontal diseases. Periodontitis is a condition in which there is collection of inflammatory cells, which produces cytokines that leads to activation of osteoclasts thereby resulting in resorption of alveolar bone and attachment loss.^{4,6} Statins have been suggested to have osteoblastic properties and have shown to stimulate the bone formation, thus can be useful for patients with periodontal infection [7,8]. The present study is aimed to evaluate the efficacy of 1.2% Atorvastatin with that of 1.2% Rosuvastatin as local drug delivery the treatment of chronic periodontitis.

The present study showed that significant improvement was seen plaque index, gingival index, probing depth and Clinical attachment level after six months of the treatment in both the groups. The results of the present study are in accordance with the study conducted by Sinjab *et al.* [9] who in their meta-analysis found that use of statin as a locally delivered drug in combination with mechanical SRP is useful in periodontal regeneration. There was improvement in the inflammatory condition seen. The Probing depth got reduced and there was gain in clinical attachment loss. Chatterjee *et al.* [10] in their study showed that 1.2% RSV gel when delivered locally into IBD improved periodontal clinical parameters such as PD and CAL and showed significant bone fill.

On comparing Rosuvastatin with atorvastatin it was seen that there was no significant difference observed in the plaque index and gingival index between both groups however the probing depth and clinical attachment levels showed significant difference after six months.

The mean reduction in the value of PD in group A in present study after six months was 0.45 ± 0.02 whereas for group B it was 0.5 ± 0.1 . The results were in accordance to the study conducted by Pradeep *et al.* [11] who also showed that RSV group showed significant improvement in all clinical parameters when compared to ATV group in treatment of mandibular class II furcation defects as an adjunct to SRP. Similar results were obtained by Garg *et al.* [12] who showed that Rosuvastatin is a better choice of statin and showed significant improvement than atorvastatin. Similarly Singh R *et al.* [13] found that antimicrobial effects of atorvastatin giving significant reduction in PI, GI, PPD and gain in CAL along with significant decrease in the microbial load.

Kanoriya *et al.* [14] assessed the effectiveness of 1.2% Rosuvastatin (RSV) gel in addition to SRP in smokers with chronic periodontitis (CP) in 60 patients which were divided into 2 treatment groups i.e SRP with placebo gel (Group 1) and SRP with 1.2% RSV gel (Group 2). Clinical parameters were determined at regular intervals (baseline, 3, 6, and 9 months). Authors found significant greater mean probing depth reduction and greater mean gain in clinical attachment level (CAL) in the RSV group at different time periods as compared to placebo. A greater mean defect depth reduction was obtained in the RSV group (23.91 ± 1.03 , 29.24 ± 0.834) after 6 and 9 months, respectively. Similar results were also found among different studies conducted by Praddep AR *et al.* [15] and Ramesh A *et al.* [16].

Cao *et al.* [17] assessed intrabony defect depth (IBD), pocket depth (PD), and clinical attachment level (CAL). It was observed that there was greater filling of IBD, reduction in PD, and gain in CAL for SRP treated in combination with statins when compared to SRP alone for treating CP without systemic diseases. In CP patients with type 2 diabetic (T2DM) or in smokers, additional benefits were observed from locally delivered statins.

Kumari *et al.* [18] determined utility of 1.2% atorvastatin (ATV) gel in the treatment of intrabony defects in chronic periodontitis (CP) in patients with type 2 diabetes mellitus in 75 patients who were categorized into 2 groups: 1) SRP plus 1.2% ATV and 2) SRP plus placebo. Results showed greater mean PD reduction and mean RAL gain in the ATV group than the placebo group at 3, 6, and 9 months. Furthermore, ATV group sites presented with a significantly greater percentage of radiographic defect depth reduction at 6 and 9 months. Similar results were also found among different studies conducted by Singh J *et al.* [19].

Conclusion

The present study shows improvement in clinical parameters with the use of ATV and ASV gel when used in combination with SRP in Chronic Periodontitis patients. Patients with RSV gel showed significantly better than the ones in which ATV gel was placed.

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Address of Correspondence: Dr. Anil Agrawal, Assistant Professor, Department of Periodontics, New Horizon Dental College, Sakri, Bilaspur (CG), India, Tel: +91 8959492999; E-mail: dranilagrwal2008@gmail.com

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