

Original Research

Assessment of effects of Photodynamic therapy in chronic periodontitis patients receiving initial periodontal therapy

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ABSTRACT:

Background: Periodontitis is “an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms, or group of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with increased probing depth, recession or both”. Therefore, the aim of the present clinical study was effects of Photodynamic therapy (PDT) in chronic periodontitis patients receiving initial periodontal therapy. **Materials & methods:** Randomized controlled 20 subjects, with mild to moderate for of chronic periodontitis were selected. Detailed medical and dental examination of the study subjects was done before their enrollment into the study. On the basis of the clinical examinations of the study subjects (n=20), patients were randomly assigned to any one of the two groups: Group 1 (n=10): Scaling and Root planing alone. Group 2 (n=10): Scaling and Root planing plus Photodynamic therapy using diode laser. The explorer is passed across the tooth surface in the cervical third near the entrance of the gingival sulcus. All the observations were recorded and put to statistical analysis. **Results:** While comparing the clinical attachment level and periodontal pocket in between group 1 and group 2 at baseline, non-significant results were obtained. After 6 weeks, mean clinical attachment level and periodontal pocket among the patients of group 2 was found to be significant lower in comparison to patients of group 1. Among the patients of group 1, non-significant results were obtained while comparing mean clinical attachment level and periodontal pocket at baseline and after 6 weeks. However; among the patients of group 2, mean clinical attachment level and periodontal pocket after 6 weeks was found to be significantly lower in comparison to its baseline value. **Conclusion:** In managing chronic periodontitis patients, photodynamic therapy combined with laser might prove to be significantly useful as an adjunct to scaling and root planning therapy.

Key words: Photodynamic therapy, Periodontitis

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INTRODUCTION

Periodontitis is “an inflammatory disease of the supporting tissues of the teeth caused by specific microorganisms, or group of specific microorganisms, resulting in progressive destruction of the periodontal ligament and alveolar bone with increased probing depth, recession or both”.¹ Scaling and root planing (SRP) is regarded as the gold standard of periodontal therapy. However, although SRP can decrease periodontopathogenic bacteria, often below the detection limits, it is unable to obtain a complete eradication of these microorganisms and to prevent their systemic spreading.²⁻⁴

An alternative approach to chemotherapeutics consists in the use of medical lasers. Various lasers are used in periodontics like Er:YAG laser is used to target bone,

dental hard tissues, and calculus, whereas CO₂, Nd:YAG and diode lasers are prevalingly used for soft tissue surgery because of their superior ability to induce tissue ablation/vaporization, hemostasis, and sterilization. In particular, Nd:YAG and diode lasers have been used in photoablative mode for subgingival curettage and periodontal pocket decontamination, although with uneven results.⁵⁻⁷

The use of antimicrobial Photodynamic therapy (aPDT) for the management of inflammatory periodontal disease, based on the concept that a photosensitizer, usually a phenothiazine compound, that absorbs light, can be preferentially taken up by bacteria, and subsequently activated by a light of appropriate wavelength, in the presence of oxygen, to generate singlet oxygen and free radicals that are

cytotoxic to microorganisms. These cytotoxic species can damage plasma membranes and DNA, resulting in cell death. Cell membranes are destroyed by multiple mechanisms, like lipid peroxidation, inactivation of membrane transport system and inhibition of plasma membrane enzyme activities.⁸⁻¹⁰ Therefore, the aim of the present clinical study was effects of PDT in chronic periodontitis patients receiving initial periodontal therapy.

MATERIALS & METHODS

Randomized controlled 20 subjects, with mild to moderate for of chronic periodontitis were selected. Detailed medical and dental examination of the study subjects was done before their enrollment into the study. On the basis of the clinical examinations of the study subjects (n=20), patients were randomly assigned to any one of the two groups:

- Group 1 (n=10): Scaling and Root planing alone.
- Group 2 (n=10): Scaling and Root planing plus Photodynamic therapy using diode laser.

An optimal photosensitizer must possess photo-physical, chemical, and biological characteristics. On the day of the visit a complete medical and dental history of the patient was taken followed by intraoral and extraoral hard and soft tissue examination. Clinical parameters were measured. Patients of both the groups were recalled for follow up after 6 weeks from baseline for recording clinical parameters. Patients were also instructed to contact the department in case of sensitivity, swelling, local pain or any other adverse reaction. The tooth is air dried and examined visually. When no plaque is visible an explorer is used to test the surface. The explorer is passed across the tooth surface in the cervical third near the entrance of the gingival sulcus. All the observations were recorded and put to statistical analysis.

RESULTS

Mean age of the patients of group 1 and group 2 was 42.3 years and 45.2 years respectively. Both the groups were comparable in terms of age-wise distribution of patients. 70 percent of the patients of group 1 and 60 percent of the patients of group 2 were males while the remaining were females. Among the patients of group 1, mean periodontal pocket depth at baseline and after 6 weeks was 4.71 and 4.65 respectively. Among the patients of group 2, mean periodontal pocket depth at baseline and after 6 weeks was 4.51 and 3.12 respectively. While comparing the periodontal pocket depth in between group 1 and group 2 at baseline, non-significant results were obtained. After 6 weeks, mean periodontal pocket depth among the patients of group 2 was found to be significant lower in comparison to patients of group 1. Among the patients of group 1, non-significant results were obtained while comparing mean periodontal pocket depth at baseline and after 6 weeks. However; among the patients of group 2, mean periodontal pocket depth after 6 weeks was found to be significantly lower in comparison to its baseline value. Among the patients of group 1, mean clinical attachment level at baseline and after 6 weeks was 4.43 and 4.08 respectively. Among the patients of group 2, mean clinical attachment level at baseline and after 6 weeks was 4.12 and 2.52 respectively. While comparing the clinical attachment level in between group 1 and group 2 at baseline, non-significant results were obtained. After 6 weeks, mean clinical attachment level among the patients of group 2 was found to be significant lower in comparison to patients of group 1. Among the patients of group 1, non-significant results were obtained while comparing mean clinical attachment level at baseline and after 6 weeks. However; among the patients of group 2, mean clinical attachment level after 6 weeks was found to be significantly lower in comparison to its baseline value.

Table 1: Probing pocket depth

Probing pocket depth	Group 1		Group 2		p- value
	Mean	SD	Mean	SD	
At baseline	4.71	0.28	4.51	0.25	0.11
After 6 weeks	4.65	0.24	3.12	0.39	0.00 (Sig)
p- value	0.28		0.00 (Sig)		-

Sig: Significant

Table 2: Clinical attachment level

Clinical attachment level	Group 1		Group 2		p- value
	Mean	SD	Mean	SD	
At baseline	4.43	0.76	4.12	0.71	0.35
After 6 weeks	4.08	0.71	2.52	0.95	0.00 (Sig)
p- value	0.85		0.00 (Sig)		-

Sig: Significant

DISCUSSION

There are various limitations of nonsurgical therapy in deep periodontal pockets. In addition to being less accessible for mechanical debridement, deeper sites are

difficult to maintain and harbour more anaerobic microorganisms than shallower pockets. Therefore treatment outcome differs between shallow and deep periodontal pockets even with the same treatment

modality.⁶⁻⁹ Therefore, the aim of the present clinical study was effects of PDT in chronic periodontitis patients receiving initial periodontal therapy.

Mean age of the patients of group 1 and group 2 was 42.3 years and 45.2 years respectively. Both the groups were comparable in terms of age-wise distribution of patients. 70 percent of the patients of group 1 and 60 percent of the patients of group 2 were males while the remaining were females. Among the patients of group 1, mean periodontal pocket depth at baseline and after 6 weeks was 4.71 and 4.65 respectively. Among the patients of group 2, mean periodontal pocket depth at baseline and after 6 weeks was 4.51 and 3.12 respectively. While comparing the periodontal pocket depth in between group 1 and group 2 at baseline, non-significant results were obtained. After 6 weeks, mean periodontal pocket depth among the patients of group 2 was found to be significant lower in comparison to patients of group 1. Among the patients of group 1, non-significant results were obtained while comparing mean periodontal pocket depth at baseline and after 6 weeks. However; among the patients of group 2, mean periodontal pocket depth after 6 weeks was found to be significantly lower in comparison to its baseline value. Sethi KS et al conducted a randomized clinical trial, on 30 subjects who were equally divided into two groups i.e. test group (SRP + Photodynamic therapy) & control group (SRP). Clinical parameters evaluated at baseline and 3 month follow up were, Plaque index, Sulcus Bleeding Index, Probing Pocket Depth, Clinical Attachment Level, Gingival Recession. Significant reductions were seen in all the clinical parameters in the test group. Anaerobic culture of plaque samples of test group also revealed significant reduction of microorganisms in comparison with control group. The study concluded that Indocyanine Green can act as an alternative to other photosensitizers in photodynamic therapy as an adjunct to SRP in the treatment of chronic periodontitis.¹¹

Among the patients of group 1, mean clinical attachment level at baseline and after 6 weeks was 4.43 and 4.08 respectively. Among the patients of group 2, mean clinical attachment level at baseline and after 6 weeks was 4.12 and 2.52 respectively. While comparing the clinical attachment level in between group 1 and group 2 at baseline, non-significant results were obtained. After 6 weeks, mean clinical attachment level among the patients of group 2 was found to be significant lower in comparison to patients of group 1. Among the patients of group 1, non-significant results were obtained while comparing mean clinical attachment level at baseline and after 6 weeks. However; among the patients of group 2, mean clinical attachment level after 6 weeks was found to be significantly lower in comparison to its baseline value. Oktawati S et al aimed their study to assess the effectiveness of photodynamic therapy (PDT) as adjunctive to scaling and root planing therapy (SRP)

in the nonsurgical treatment of chronic periodontitis. They concluded that treatment with SRP + PDT as adjunctive therapy should be recommended as a modality for the treatment of chronic periodontitis during the maintenance stage in the nonsurgical periodontal treatment.¹² Sukumar K et al evaluated 33 patients with bilateral periodontal destruction in mandibular posterior sextants who were randomly treated with either test (SRP + multiplePDT) or control (SRP) intervention. PDT was employed with diode laser (810 nm) and Indocyanine green (ICG) dye at baseline, 1st, 2nd and 4th week post SRP. Probing pocket depth (PPD), clinical attachment level (CAL), plaque index (PI), gingival index (GI), gingival bleeding index (GBI) were recorded at baseline, 3 and 6 months. The outcomes of the study suggested that adjunctive multiple applications of PDT to SRP showed a significant reduction in periodontal pathogens over SRP alone.¹³

CONCLUSION

In managing chronic periodontitis patients, photodynamic therapy combined with laser might prove to be significantly useful as an adjunct to scaling and root planing therapy.

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