

Original Article

Assessment of Changes in Clinical Parameters in Aggressive Periodontitis Patients with Diode Laser Treatment

Abid Majid

MDS Periodontics and Implantology, Senior Dental Surgeon, J & K Health Department, J & K, India

ABSTRACT:

Background: Due to the effect that wavelengths (diode and Nd: YAG lasers) have on pigmented tissues, they can be used by periodontists for removal of gingival pigmentation and/or reduction of periodonto pathogenic black-pigmented bacteria. **Aim of the study:** To assess changes in clinical parameters in Aggressive Periodontitis Patients with diode laser treatment. **Materials and methods:** The study was conducted in the department of periodontics of the dental institute. For the study, we randomly selected patients reporting to the outpatient department seeking treatment of aggressive periodontitis. A total of 20 patients were included in the study. Prior to scaling and root planning at baseline, (day 1) the selected teeth with the site were subjected to assessment of gingival index, plaque index and probing pocket depth which was followed by full mouth scaling and root planning. Patients were recalled after 1 week again for the second application of laser to the test site. The patients were then appointed to attend the dental clinic on the 30th day and plaque index, gingival index and probing pocket depth were assessed. **Results:** A total of 20 patients with aggressive periodontitis were included in the study. The mean age of the patients was 40.89 years. The number of male patients was 8 and the number of female patients was 12. The number of smokers in the group was 7. The mean plaque index on day 1 was 2.33 ± 0.89 and on day 30 was 1.02 ± 0.56 . The mean gingival index on day 1 was 2.35 ± 0.39 and on day 30 was 1.26 ± 0.71 . The mean pocket depth at day 1 was 4.64 ± 0.78 mm and at day 30 was 3.12 ± 0.29 mm. **Conclusion:** Within the limitations of the study we conclude that the diode laser used as an adjunct therapy to scaling and root planning helps in reduction of inflammation in the periodontal pockets and improves clinical parameters.

Keywords: periodontal pocket, laser, scaling, root planning.

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Corresponding Author: Dr. Abid Majid, MDS Periodontics and Implantology, Senior Dental Surgeon, J & K Health Department, J & K, India

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INTRODUCTION:

The word "laser" is an acronym for "light amplification by stimulated emission of radiation." It refers to a device that emits light that is spatially coherent and collimated; a laser beam can remain narrow over a long distance, and it can be tightly focused.^{1,2} When directed at tissues, different interactions result. The absorption, reflection, transmission, and scattering of the laser light vary depending on the wavelength of the laser and the characteristics of the tissue. Lasers have various periodontal applications including calculus removal (Er: YAG, Er, Cr: YSGG lasers); soft tissue excision, incision and ablation; decontamination of root and implant surfaces; biostimulation; bacteria reduction; and last but not least bone removal (osseous surgery).³ Certain laser wavelengths (i.e. Er: YAG, Er, Cr:

YSGG) are highly absorbed by hydroxyapatite and can be used for bone removal more efficiently than others. In contrast, diode and Nd: YAG lasers are more highly absorbed by hemoglobin and thus should be used when coagulation is desirable.⁴ In addition, due to the effect that these wavelengths (diode and Nd: YAG lasers) have on pigmented tissues, they can be used by periodontists for removal of gingival pigmentation and/or reduction of periodonto pathogenic black-pigmented bacteria.^{5, 6} Hence, we planned the study to assess changes in clinical parameters in Aggressive Periodontitis Patients with diode laser treatment.

MATERIALS AND METHODS:

The study was conducted in the department of periodontics of the dental institute. The ethical clearance for the study was obtained from the ethical board of the institute prior to commencement of the study. For the study, we randomly selected patients reporting to the outpatient department seeking treatment of aggressive periodontitis. A total of 20 patients were included in the study.

Inclusion criteria

- No history of periodontal surgical or non-surgical periodontal therapy for previous six months
- Willing to sign informed written consent for the study

Exclusion criteria

- Current smoking habit
- History of alcohol abuse
- Systemic diseases such as diabetes
- Pregnant and nursing mothers

Prior to scaling and root planning at baseline, (day 1) the selected teeth with the site were subjected to assessment of gingival index, plaque index and probing pocket depth which was followed by full mouth scaling and root planning. The hard tissue side of the pocket was first debrided with ultrasonic scalers and hand instruments. This was followed by laser bacterial reduction and coagulation of the soft tissue side of the pocket. The laser fiber was measured to a distance of one mm short of the depth of the pocket. Methylene blue was used as a photosensitizer. The fiber was used in light contact with a sweeping motion that covers the entire epithelial lining, starting from the base of the pocket and moving upward. Patients were recalled after 1 week again for the second application of laser to the test site. The patients were then appointed to attend the dental clinic on the 30th day and plaque index, gingival index and probing pocket depth were assessed.

The statistical analysis of the data was done using SPSS version 20.0 for windows. The Student’s t-test and Chi-square test were used to check the significance of the data. The p-value less than 0.05 was predetermined as statistically significant.

RESULTS:

A total of 20 patients with aggressive periodontitis were included in the study. Table 1 shows the demographic data of the group. The mean age of the patients was 40.89 years. The number of male patients was 8 and the number of female patients was 12. The number of smokers in the group was 7. Table 2 shows the comparison of clinical parameters at Day 1 and Day 30 after laser treatment. The mean plaque index on day 1 was 2.33±0.89 and on day 30 was 1.02±0.56. The mean gingival index on day 1 was 2.35±0.39 and on day 30 was 1.26±0.71. The mean pocket depth at day 1 was 4.64±0.78 mm and at day 30 was 3.12±0.29 mm. The results were statistically significant (p<0.05) [Fig 1].

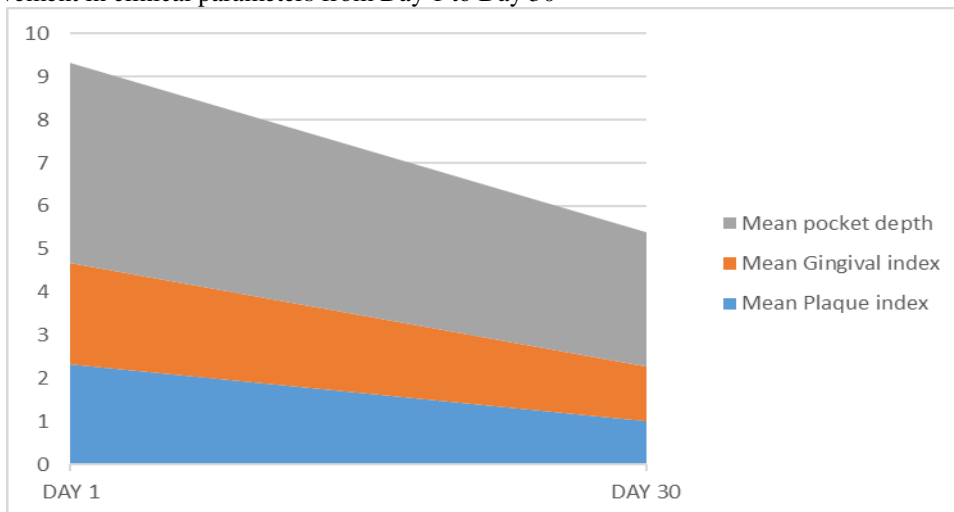
Table 1: Demographic details of the aggressive periodontitis patients

Parameters	Aggressive periodontitis patients
Mean Age (years)	40.89
Number of male patients	8
Number of female patients	12
Number of smokers	7
Mean bleeding on probing	87.8

Table 2: Comparison of clinical parameters at Day 1 and Day 30 after laser treatment

Clinical Parameters	Aggressive periodontitis patients	
	DAY 1	DAY 30
Mean Plaque index	2.33±0.89	1.02±0.56
Mean Gingival index	2.35±0.39	1.26±0.71
Mean pocket depth	4.64±0.78	3.12±0.29

Figure 1: Improvement in clinical parameters from Day 1 to Day 30



DISCUSSION:

In the present study we assessed changes in clinical parameters in Aggressive Periodontitis Patients with diode laser treatment. We observed that the clinical parameters like plaque index, gingival index and pocket depth were significantly reduced in patients following laser treatment on 30th day. The results were statistically significant. The results were compared with previous studies and results were consistent with previous studies. Kamma JJ et al compared the effect of scaling and root planing (SRP) alone, diode laser treatment (LAS) alone, and SRP combined with LAS (SRP + LAS) on clinical and microbial parameters in patients with aggressive periodontitis. Thirty patients with aggressive periodontitis were assessed for plaque, bleeding on probing (BOP), probing pocket depth (PPD), and clinical attachment level (CAL). Four plaque samples were randomly obtained, one from each quadrant that was randomly assigned to SRP alone, SRP + LAS, LAS alone, and control (CRL). A 980-nm diode laser was used in continuous mode at 2 W power. Plaque samples were collected 2 wk, 12 wk, and 6 mo post-treatment. The levels of *Porphyromonas gingivalis*, *Tannerella forsythia*, *Aggregatibacter actinomycetemcomitans*, *Treponema denticola*, and total bacterial load (TBL) were evaluated using *ssrRNA* probes. Bacterial counts were decreased with all three treatment modalities and they did not reach baseline levels at 6 mo post-treatment. The SRP + LAS group showed statistically significantly lower TBL and bacterial levels of *P. gingivalis* and *T. denticola* at 6 mo post-treatment compared to SRP or LAS treatments alone. At the end of the observation period significant differences were observed for PPD and CAL between the SRP + LAS group and both the SRP alone and LAS alone groups. No differences were detected for percentage of plaque and percentage of BOP between any of the treatment groups at 6 mo post-treatment. They concluded that diode laser-assisted treatment with SRP showed a superior effect over SRP or LAS alone for certain microbial and clinical parameters in patients with aggressive periodontitis over the 6-mo monitoring period. Angelov N et al assessed the effects of low-level laser treatment in combination with scaling and root planing (SRP) in patients with periodontitis. Sixty subjects with chronic advanced periodontitis were assigned randomly to three treatment groups (n = 20) after collecting gingival clinical parameters. Group A received SRP on a single quadrant per day for four consecutive days; on the fifth day, all quadrants were rescaled. Group B received the same treatment as Group A, followed by laser application for five days. Group C received the same treatment as Group B but the laser treatment was administered for a total of 10 days. For Groups B and C, a low-level diode laser (630 to 670 nm) was used. The plaque index, gingival index, and sulcular bleeding index were recorded for all groups. For all clinical parameters, all three groups reported statistically significant differences compared to baseline data. Compared to Group A, Groups B and C showed

statistically significant improvement for all clinical parameters. These findings suggest that a low-level diode laser can have a beneficial effect for treating inflammatory chronic advanced periodontitis.^{7,8}

Matarese G et al investigated and compared the clinical, microbial, and inflammatory effects of a diode laser as an adjunct to scaling and root planing (SRP) versus SRP alone for the treatment of generalized aggressive periodontitis (GAgP). Using a split-mouth design, 31 patients with GAgP were enrolled in the study. The maxillary right and left quadrants were randomly assigned to SRP+diode laser or SRP alone. Patients were examined on a regular basis for clinical, microbiological, and inflammatory mediator changes over a 1-year period. Clinical attachment level (CAL) was the primary outcome variable chosen. In addition, subgingival biofilm samples and gingival crevicular fluid (GCF) inflammatory mediators were analyzed at each follow-up session. Compared to baseline, both treatments demonstrated an improvement in periodontal parameters at 1 year. However, SRP+diode laser produced a significant improvement in probing depth and CAL values compared to SRP alone. Similarly, in the SRP+diode laser group, the bacteria of orange complex group were significantly reduced at 30 and 60 days compared to SRP alone. Moreover, SRP+diode laser determined a reduction in mean GCF level of interleukin (IL)-1 β and IL-1 β /IL-10 ratio at 15 and 30 days compared to SRP alone. They concluded that at 1 year, SRP+ diode laser yielded a significant reduction in some clinical parameters, while microbial and inflammatory mediator changes were not significantly reduced compared to SRP alone. Birang R et al evaluated the impact of adjunctive laser therapy (LT) and photodynamic therapy (PDT) on patients with chronic periodontitis. Twenty patients with at least three quadrants involved and each of them presenting pockets 4-8 mm deep were included in the study. Periodontal treatment comprising scaling and root planing (SRP) was accomplished for the whole mouth. Applying a split-mouth design, each quadrant was randomly treated with SRP alone (group A), SRP with LT (group B), and SRP with PDT (group C). The clinical indices were measured at baseline 6 weeks and 3 months after treatment. Microbiological samples were taken and evaluated at baseline and 3-month follow-up. All groups showed statistically significant improvements in terms of clinical attachment level (CAL) gain, periodontal pocket depth (PPD) reduction, papilla bleeding index and microbial count compared to baseline. The results showed more significant improvement in the 6-week evaluation in terms of CAL in groups B and C than in group A. Group B also revealed a greater reduction in PPD than the other treatment modalities. The obtained data suggested that adjunctive LT and PDT have significant short-term benefits in the treatment of chronic periodontitis.^{9,10}

CONCLUSION:

Within the limitations of the study we conclude that the diode laser used as an adjunct therapy to scaling and root planning helps in reduction of inflammation in the periodontal pockets and improves clinical parameters.

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