



EFFICACY OF 980NM DIODE LASER AS AN ADJUNCT TO NON-SURGICAL PERIODONTAL TREATMENT IN CHRONIC PERIODONTITIS: A 9-MONTH CLINICAL STUDY.

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ABSTRACT

BACKGROUND: Subgingival plaque is the initiating factor for Chronic Periodontitis (CP). Therefore initial measures consist of Non-Surgical Periodontal Therapy (NSPT). The use of lasers as adjuvants to NSPT has gained preference for many years now. However it has not been completely validated. So, we studied the efficacy of diode laser (DL), as adjunct to NSPT. **MATERIALS AND METHODS:** In 50 subjects, aged 35-65 years with moderate CP (5-8 mm pocket depth), based on inclusion and exclusion criteria, 25 patients were selected and randomly allocated to two groups; the first group, control group (CG), treated by NSPT; and 25 in the second test group, (TG), received NSPT followed by DL irradiation. Assessment was conducted for gingival index (GI), bleeding on probing (BOP), clinical attachment level (CAL), and probing pocket depth (PPD) at baseline (B/L), 1, 3, 6, and 9 months. **RESULTS:** There was improvement of all clinical parameters in both the groups, but was more statistically significant in the TG. **CONCLUSIONS:** The application of adjunctive 980nm DL improves clinical parameters including GI, CAL, PPD and most markedly, BOP.

KEYWORDS : Chronic Periodontitis, Laser, and NonSurgical Periodontal Therapy

INTRODUCTION

Severe periodontitis is the sixth most prevalent disease worldwide and it is projected to continue the upward trend.¹ Subgingival plaque is recognised as an initiating factor for periodontitis, so the first step to treatment is plaque limitation, carried out conventionally by Non-Surgical Periodontal Therapy (NSPT), rightly attributed as cornerstone of periodontal treatment.² Often this basic approach may not give expected outcomes, in which case, further methods like local drug delivery, systemic antibiotics or open flap procedures; are advocated. In addition, recent advances in the field of periodontics for sulcular debridement include the use of lasers. Lasers offer advantages including that they are economical, less invasive, painless, bloodless therapy, and greater patient acceptability over surgical treatment.³ There are differing opinions regarding Lasers with respect to their integration as adjuvants to Non-Surgical Periodontal Therapy (NSPT).⁴

MATERIALS AND METHODS

This randomized controlled clinical trial was conducted at the Department of Periodontics, Albadar Rural Dental College and Hospital, Kalaburagi. Fifty patients, both male and female, aged 35-65 year with generalised CP were selected. Ethical approval was obtained from the institutional ethical committee.

Verbal and written informed consent forms, duly signed by patients were obtained. Test and control subjects were chosen by coin toss randomization.

Inclusion criteria:

1. Patients with moderate to advanced CP with minimum PPD 5mm involving at least 30% teeth.
2. At least 20 teeth present.
3. Systemically Healthy patients.
4. Patients between 35 and 65 years of age.

Exclusion criteria:

1. History of systemic conditions like diabetes mellitus, hypertension, cardiac patients etc.
2. History of any surgical therapy within last 6 months.
3. Patients with aggressive periodontitis characterised by

arc-shaped bone loss, involvement of first molars and central incisors and family history of periodontal disease.

4. Patients who had taken antibiotics and/or antivirals during the past six months were also excluded.
5. History of tobacco-chewing, alcoholism and current or former smokers.
6. Patients on steroid therapy and oral contraceptives. Any medication affecting periodontal tissue like phenytoin sodium etc
7. Pregnant /Lactating females.
8. Acute oral lesions.

Clinical periodontal parameters

Full-mouth periodontal charting and detailed case-histories were recorded at baseline. Gingival Index (GI) was recorded as per the criteria given by Loe and Silness (1963). Probing Pocket Depth (PPD) and Clinical Attachment Level (CAL) measurements were made using the UNC-15 probe (Hu-Friedy, Chicago, IL). Bleeding on probing (BOP) was recorded by evaluating the presence or absence of bleeding, up to 30 seconds after probing with the periodontal probe. Clinical measurements of BOP, PPD and CAL were recorded at six sites (mesiobuccal, mid-buccal, distobuccal, mesiolingual, mid-lingual, and distolingual) for each tooth, whereas GI was recorded at four sites per tooth. Data was recorded for all patients at baseline, and after 1, 3, 6, and 9 months of treatment. All periodontal variables were recorded by a single trained examiner to prevent inter-examiner variability.

Study Design

Total 50 patients were selected and randomly allotted, chosen by coin toss randomization, 25 each, to the following two groups:

O Group 1: Patients treated with NSPT only. (Controls)

Patients in Group 1 served as controls; after diagnosis and recording baseline data, received NSPT alone. NSPT was performed with ultrasonic instruments and currettes, under local anesthesia (2% Lignocaine, Spray or gel), using the ultrasonic instrument (Cavitron Select, Dentsply Cavitron, Long Island, NY, USA) and Gracey Curettes (Hu-Friedy

Instruments, Chicago, IL, USA).

O Group 2: Patients treated with NSPT followed by irradiation with 980nm diode Laser (Test group)

In this group, NSPT was performed, followed immediately by lasing with 980 nm Diode Laser (Sirona®) at 1 W power setting using a continuous wave with a 320micron fibre for 10 sec. The fiber was introduced by 1 mm less than the value obtained through the probing procedure. For this, an endodontic stop was placed on the fiber to control this irradiation depth. The fiber was cleaved before use and introduced into the pocket parallel to the cemental surface and irradiated with apico – cervical scanning movements. This was done mesially, distally, buccally and lingually. The treatment was repeated till the entire pocket was irradiated. Irrigation with saline solution followed each session of irradiation. For all patients, after initial therapy oral hygiene instructions were given and follow-up was done at 1, 3, 6 and 9 months.

Table 1: Mean and standard deviation (SD) of Gingival Index for two groups. P value to compared by student, unpaired t test

	baseline		1 month		3 months		6 months		9 months	
	Mea	SD	Mea	SD	Mea	SD	Mea	SD	Mea	SD
Group 1	2.38	0.28	1.08	0.21	0.94	0.21	1.06	0.19	2.29	0.24
Group 2	2.40	0.24	0.96	0.16	0.84	0.15	0.87	0.17	2.26	0.26
p value	0.4359(NS)		0.0273(S)		0.0484(S)		0.0002(S)		0.6961(NS)	

Table 2: Number of patients according to Gingival Bleeding Index

	Control Group(25)	Test Group(25)	P value
Baseline	22	24	0.2983(NS)
1 months	7	0	0.0044(S)
3 months	10	0	0.0004(S)
6 months	14	2	0.0003(S)
9 months	17	4	0.0002(S)

Table 3: Mean and standard deviation (SD) of Probing pocket depth for two groups. P value to compared by student, unpaired t test

	baseline		1 month		3 months		6 months		9 months	
	Mea	SD	Mea	SD	Mea	SD	Mea	SD	Mea	SD
Group 1	7.56	1.04	4.80	1.35	5.20	1.44	6.56	1.47	7.28	1.43
Group 2	7.60	1.05	3.24	0.88	3.21	0.88	3.84	0.99	4.68	1.25
p value	0.4463(NS)		<0.00001(S)		<0.00001(S)		<0.00001(S)		<0.00001(S)	

Table 4: Mean and standard deviation (SD) of CAL for two groups. P value to compare by student, unpaired t test

	baseline		1 month		3 months		6 months		9 months	
	Mea	SD	Mea	SD	Mea	SD	Mea	SD	Mea	SD
Group 1	7.60	0.86	4.40	1.12	4.64	1.32	5.16	1.59	6.24	1.89
Group 2	7.52	1.01	2.64	0.57	2.64	0.57	3.24	0.78	4.20	1.15
p value	0.7643(NS)		<0.00001(S)		<0.00001(S)		<0.00001(S)		<0.00001(S)	

RESULTS

Assessment was done at 1, 3, 6 and 9 months using standardized tables. Mean and standard deviation were calculated for the two groups. Paired T- test with Pair wise comparison was done within the groups. Unpaired T- test, to assess parameters between groups.

The P values are <0.05 so the null hypothesis was rejected. It means that the difference among the GI, PPD, CAL and BOP in the TG is statistically significant with respect to CG.

DISCUSSION

A versatile property of DL is that, it does not interact with dental hard tissues, making it convenient for soft tissue operations like cutting and coagulating the gingival and oral mucosae, soft tissue curettage, or sulcular debridement. ⁵ Therefore DL is being used more commonly by periodontists. The present study, evaluated the efficacy of DL (980nm) used as adjunct to NSPT with a 9-month follow-up.

Crispino A et al. ⁶ evaluated the effect of a 940-nm DL as an adjunct to SRP in patients affected by periodontitis in sixty-eight patients with moderate-to-severe periodontitis with regard to GI, PI and PPD. The patients were randomly divided into two Groups with 34 patients each. The first received SRP treatment alone, the control group received SRP and 940-nm DL. Both groups reported statistically significant differences compared to basal values. They concluded that both procedures were effective in improving GI, PI and PD, but the use of diode laser was associated with more evident results. Our study also showed similar results.

Caruso U et al. ⁷ compared the effectiveness of DL used as adjunctive therapy of SRP to that of SRP alone for NSPT in patients with chronic periodontitis. Nineteen pairs of teeth with untreated chronic periodontitis were selected in 13 patients and randomly treated by SRP alone (control group) or by SRP + laser irradiation (test group). Clinical measurements PPD, CAL, BOP, GI, PI were performed before treatment at baseline (T0) and at T1 (after 4 weeks), T2 (8 weeks), T3 (12 weeks), T4 (6 months). Subgingival plaque samples were taken at baseline and after treatment and examined for 8 periopathogens. They showed that the additional treatment with DL may lead to a slight improvement of clinical parameters, whereas no significant differences between test and control group in reduction of periodontopathogens were found.

Chandra S et al ⁸ evaluated whether diode laser helps improvement of periodontal outcome and reduction in anaerobic bacteria in forty elderly diabetic patients with CP. Patients were randomized into group A (control), treated with SRP only and group B (test), in whom SRP was followed by soft tissue dental DL (808 nm) application. Clinical parameters and plaque samples were evaluated at both baseline and 90 days post-treatment. Improvement in clinical and microbiological parameters were noted in the group that received SRP as well as SRP + LANAP (laser-assisted new attachment procedure). They concluded that Laser as an adjunct to SRP is an effective procedure for improving clinical and microbiological parameters in maturity onset diabetes mellitus patients with CP. The findings of our study are similar. Balsubramaniam et al. ⁹ compared the clinical efficiency of DL as an adjunct to SRP in the treatment of thirty CP patients by clinical parameters including PPD, BOP, plaque-index and CAL; and blood reactive oxygen metabolites. The patients were randomly assigned into two groups of 15 patients each, as the control group, who received only conventional SRP and the test group received conventional SRP and DL (GaAlAs)-assisted pocket debridement. The clinical parameters were recorded at baseline, day 30, and day 60. They found no statistically significant changes between the two groups from baseline to day 60 and concluded that use of DL as an adjunct to SRP did not provide any significant difference compared to use of SRP alone.

Limitations of the Study

This was a totally clinical study with a follow-up of nine months. Some studies have tried to correlate clinical findings with microbiological and immunological aspects. Further studies using microbiological parameters may be done in

collaboration with the clinical observations.

CONCLUSIONS

Our study demonstrates that 980nm Diode Laser application as an adjunct to NSPT appears to improve the clinical parameters including PPD, CAL, GI and most markedly BOP. The results presented improvement in clinical parameters in both Control and Test groups after treatment, establishing the role of NSPT. But, of statistical significance was, in the TG of clinical parameters, remarkably, BOP was most evident.

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