

Original Research

Low- level laser therapy as an adjunct to non- surgical periodontal treatment

¹Jyoti Gupta, ²Amit Singh, ³Shetty Rajeet Sesappa, ⁴Dhamma Gadpal

¹Senior Resident (Registrar), Department of Periodontology, GDC Jammu, India;

²Senior Lecturer, Department of Oral Surgery, Purvanchal Institute of Dental Sciences, Gida, Gorakhpur, Uttar Pradesh, India;

³Professor, Department of Oral and Maxillofacial Surgery, Srinivas Institute of Dental Sciences, Mukka, Mangalore, Karnataka, India;

⁴Post Graduate student, Department of Oral and Maxillofacial Surgery, Rungta College of Dental Sciences and Research, Bhilai, Chhattisgarh, India

ABSTRACT:

Background: Periodontitis damages the tooth's supporting components and eventually leads to tooth loss. The present study evaluated the effect of low- level laser therapy as an adjunct to non- surgical periodontal treatment. **Materials & Methods:** 70 patients of periodontitis of both genders were divided into 2 groups of 35 each. Group I received LLLT after scaling and root planning and group II patients received scaling and root planning only. Plaque index (PI), sulcus bleeding index (SBI), PD, and clinical attachment level (CAL) were recorded at baseline, 1, 3, and 6 months after the treatment. **Results:** Group I had 18 males and 17 females and group II had 20 males and 15 females. The mean plaque index at baseline was 1.84 and 1.82, at 1 month was 0.69 and 1.04, at 3 months was 0.67 and 0.72 and at 6 months was 0.65 and 0.73 in group I and II respectively. The difference was significant ($P < 0.05$). The mean SBI at baseline was 1.84 and 1.83, at 1 month was 0.35 and 0.53, at 3 months was 0.24 and 0.55 and at 6 months was 0.20 and 0.41 in group I and II respectively. The mean CAL (mm) at baseline was 4.56 and 4.68, at 1 month was 3.48 and 3.73 and at 3 months was 3.43 and 3.57 and at 6 months was 3.35 and 3.53 in group I and II respectively. The mean PD (mm) at baseline was 3.93 and 4.05, at 1 month was 2.61 and 3.07, at 3 months was 2.55 and 3.01 and at 6 months was 2.49 and 2.86 in group I and II respectively. The difference was significant ($P < 0.05$). **Conclusion:** LLLT application may be useful in reduced gingival inflammation in patients of moderate to severe periodontitis.

Key words: laser therapy, periodontitis, scaling and root planing

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Corresponding author: Amit Singh, Senior Lecturer, Department of Oral Surgery, Purvanchal Institute of Dental Sciences, Gida, Gorakhpur, Uttar Pradesh, India

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INTRODUCTION

A chronic inflammatory condition called periodontitis damages the tooth's supporting components and eventually leads to tooth loss.¹ Instrumentation of the inflammatory dento-gingival complex is a component of both surgical and non-surgical methods used in conventional periodontal therapy.² The best method for removing the source of infection is still scaling and root planing (SRP), a non-surgical periodontal treatment. Conventional mechanical SRP, on the other hand, causes a wound in the already inflammatory periodontal tissue as a result of its intrusive nature,

and the recovery of this tissue depends primarily on favourable cellular and molecular responses.³

Low-level laser therapy (LLLT), also known as low-level laser treatment or cold laser therapy, is a non-invasive medical procedure that utilizes low-intensity lasers or light-emitting diodes (LEDs) to stimulate cellular function. In periodontics, LLLT has been used as an adjunctive treatment for various conditions related to the gums and supporting structures of the teeth.⁴ LLLT has shown promise in the treatment of periodontal disease, which is characterized by inflammation and infection of the gums and

supporting structures. The laser energy can penetrate the gum tissues, promoting tissue regeneration, reducing inflammation, and aiding in the healing process.⁵ LLLT suppresses inflammation in periodontal tissue by modulation of the local immune response and by reducing the production and release of certain proinflammatory cytokines, such as tumour necrosis factor alpha (TNF- α), interleukin-1b (IL-1b) and prostaglandin E2.⁶ The present study evaluated the effect of low-level laser therapy as an adjunct to non-surgical periodontal treatment.

MATERIALS & METHODS

The present study comprised of 70 patients of periodontitis of various intensity of both genders. All

gave their written consent for participation in the study.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 35 each. Group I patients received LLLT after scaling and root planning and group II patients received scaling and root planning only. Laser therapy was performed three times on the 1st, 2nd and 7th days post-operatively. Plaque index (PI), sulcus bleeding index (SBI), PD, and clinical attachment level (CAL) were recorded at baseline, 1, 3, and 6 months after the treatment. Data thus obtained were subjected to statistical analysis. P value < 0.05 was considered significant.

RESULTS

Table I Distribution of patients

Groups	Group I	Group II
Method	SRP+ LLLL	SRP
M:F	18:17	20:15

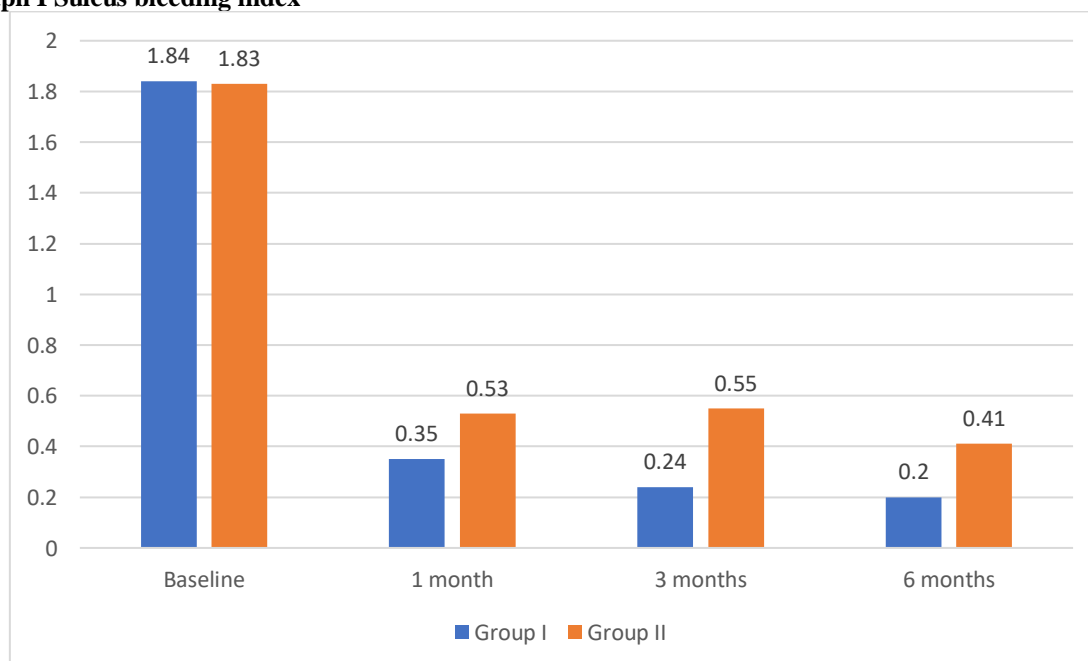
Table I shows that group I had 18 males and 17 females and group II had 20 males and 15 females.

Table II Assessment of plaque index

Plaque index	Group I	Group II	P value
Baseline	1.84	1.82	0.94
1 month	0.69	1.04	0.93
3 months	0.67	0.72	0.04
6 months	0.65	0.73	0.05

Table II shows that mean plaque index at baseline was 1.84 and 1.82, at 1 month was 0.69 and 1.04, at 3 months was 0.67 and 0.72 and at 6 months was 0.65 and 0.73 in group I and II respectively. The difference was significant (P < 0.05).

Graph I Sulcus bleeding index



Graph I shows that the mean SBI at baseline was 1.84 and 1.83, at 1 month was 0.35 and 0.53, at 3 months was 0.24 and 0.55 and at 6 months was 0.20 and 0.41 in group I and II respectively.

Table III Assessment of parameters

CAL (mm)	Parameters	Group I	Group II	P value
	Baseline	4.56	4.68	0.05
	1 month	3.48	3.73	0.03
	3 months	3.43	3.57	0.06
	6 months	3.35	3.53	0.02
PD (mm)	Baseline	3.93	4.05	0.05
	1 month	2.61	3.07	0.03
	3 months	2.55	3.01	0.05
	6 months	2.49	2.86	0.03

Table III shows that the mean CAL at (mm) baseline was 4.56 and 4.68, at 1 month was 3.48 and 3.73 and at 3 months was 3.43 and 3.57 and at 6 months was 3.35 and 3.53 in group I and II respectively. The mean PD (mm) at baseline was 3.93 and 4.05, at 1 month was 2.61 and 3.07, at 3 months was 2.55 and 3.01 and at 6 months was 2.49 and 2.86 in group I and II respectively. The difference was significant ($P < 0.05$).

DISCUSSION

Non-surgical therapy by mechanical instrumentation is the primary recommended approach to control periodontal infection.^{7,8,9} Because conventional therapies result in wounding of the already inflamed periodontal tissues, the consequence of such therapeutic procedures depends largely on the cellular and molecular events associated with wound healing.¹⁰ Although surgical and non-surgical approaches, such as scaling and root planing, are still regarded as important and useful modalities, it is essential to improve further possibilities.¹¹ The present study compared low-level laser therapy as an adjunct to non-surgical periodontal treatment.

We found that group I had 18 males and 17 females and group II had 20 males and 15 females. Liu et al¹² compared the effects of Nd:YAG laser treatment versus scaling/root planing (SRP) treatment on crevicular IL-1beta levels in 52 sampled sites obtained from 8 periodontitis patients. One or 2 periodontitis-affected sites with a 4 to 6 mm probing depth and horizontal bone loss from 3 adjacent single-root teeth in each of 4 separate quadrants were selected from patients for clinical documentation and IL-1beta assay. Sampling site(s) from each diseased quadrant was randomly assigned to one of the following groups: 1) subgingival laser treatment (20 pps, 150 mJ) only; 2) SRP only; 3) laser treatment first, followed by SRP 6 weeks later; or 4) SRP first, followed by laser therapy 6 weeks later. The GCF was collected and the amount of IL-1beta was assayed by enzyme-linked immunosorbent assay (ELISA). Clinical parameters and GCF were measured at baseline and biweekly after therapy for 12 weeks. An obvious clinical improvement (marked decrease in the number of diseased sites with gingival index ≥ 2) and reduction of crevicular IL-1beta were found in all groups. The level of IL-1beta was significantly lower in the SRP group ($P = 0.035$) than in the laser therapy group for the duration of the 12 weeks. The laser combined SRP therapy group showed a further

reduction of IL-1beta (6 to 12 weeks after treatment) than either laser therapy alone or SRP combined laser therapy.

We observed that the mean plaque index at baseline was 1.84 and 1.82, at 1 month was 0.69 and 1.04, at 3 months was 0.67 and 0.72 and at 6 months was 0.65 and 0.73 in group I and II respectively. We observed that the mean SBI at baseline was 1.84 and 1.83, at 1 month was 0.35 and 0.53, at 3 months was 0.24 and 0.55 and at 6 months was 0.20 and 0.41 in group I and II respectively. The mean CAL at (mm) baseline was 4.56 and 4.68, at 1 month was 3.48 and 3.73 and at 3 months was 3.43 and 3.57 and at 6 months was 3.35 and 3.53 in group I and II respectively. Aykol et al¹³ evaluated the effect of low-level laser therapy (LLLT) as an adjunct to non-surgical periodontal therapy of smoking and non-smoking patients with moderate to advanced chronic periodontitis. All 36 systemically healthy patients who were included in the study initially received non-surgical periodontal therapy. The LLLT group ($n = 18$) received GaAlAs diode laser therapy as an adjunct to non-surgical periodontal therapy. The primary outcome variable in this study was change in gingival bleeding and inflammation. At all time points, the LLLT group showed significantly more improvement in sulcus bleeding index (SBI), clinical attachment level, and probing depth (PD) levels compared to the control group ($P < 0.05$).

We found that the mean PD (mm) at baseline was 3.93 and 4.05, at 1 month was 2.61 and 3.07, at 3 months was 2.55 and 3.01 and at 6 months was 2.49 and 2.86 in group I and II respectively. Ren C et al¹⁴ figured out if LLLT treatment offers any further advantages over scaling and root planing (SRP) alone. Eight articles (seven RCTs) were included after 354 initial records underwent independent review. However, due to significant methodological flaws in "allocation concealment" and "blinding of key personnel," six were evaluated as "having a high risk of bias." The improvement of the probing pocket depth and the amount of interleukin-1b in the gingival crevicular fluid were both significantly improved by LLLT-mediated SRP over SRP monotherapy, according to a meta-analysis. Nevertheless, in terms of clinical indicators and alveolar bone, LLLT failed to demonstrate any additional substantial intermediate term effects at 3 and 6 months.

The limitation the study is small sample size.

CONCLUSION

Authors found that LLLT application may be useful in reduced gingival inflammation in patients of moderate to severe periodontitis.

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