Assessment Of Effect Of Low- Level Laser Therapy As An Adjunct To Non- Surgical Periodontal Treatment

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Abstract

Background: Periodontitis is a chronic inflammatory disease that affects the supporting structures of teeth, resulting in tooth loss. The present study was conducted to assess the effect of low- level laser therapy as an adjunct to non- surgical periodontal treatment.

Materials & Methods:54 patients of moderate to advance periodontitis of both genders were divided into 2 groups of 27 each. Group I comprised of patients who receivedLLLT 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 onsixsitespertoothat baseline, 1, 3, and 6 months after the treatment.

Results: Group I had 17 males and 10 females and group II had 12 males and 15 females. The mean PI at baseline was 1.82 and 1.80, at 1 month was 0.68 and 1.02, at 3 months was 0.65 and 0.74 and at 6 months was 0.64 and 0.72 in group I and II respectively. The mean SBI at baseline was 1.81 and 1.80, at 1 month was 0.32 and 0.50, at 3 months was 0.21 and 0.52 and at 6 months was 0.17 and 0.38 in group I and II respectively. The mean CAL at (mm) baseline was 4.53 and 4.65, at 1 month was 3.45 and 3.70 and at 3 months was 3.40 and 3.54 and at 6 months was 3.32 and 3.50 in group I and II respectively. The mean PD (mm) at baseline was 3.90 and 4.02, at 1 month was 2.58 and 3.04, at 3 months was 2.52 and 2.98 and at 6 months was 2.46 and 2.83 in group I and II respectively. The difference was significant ($P< 0.05$).

Conclusion: Authors observed statistically significant differences on clinical parameter changes when laser was used as an adjunct to non-surgical periodontal treatment. Thus, LLLT application may be useful in reduced gingival inflammation in patients of moderate to severe periodontitis.

Key words: gingival inflammation, laser therapy, periodontitis.

INTRODUCTION

Periodontitis is a chronic inflammatory disease that affects the supporting structures of teeth, resulting in tooth loss. Conventional periodontal therapy includes both surgical and non-surgical approaches that involve instrumentation of the inflamed dentogingival complex.[1]Non-surgical periodontal treatment by subgingival scaling and root planing (SRP) remains the most effective approach to eliminating the source of infection. However, as an invasive approach, conventional mechanical SRP creates a wound in the already inflamed periodontal tissue, and the restoration of this tissue depends largely on favourable cellular and molecular responses.[2]

Low-level laser therapy (LLLT) is recommended for its pain-reducing, wound healing promoter and anti-inflammatory effects.[3] It is suggested that LLLT alters cellular behavior by affecting the mitochondrial respiratory chain or membrane calcium channels, and that it can facilitate collagen synthesis, angiogenesis, and growth factor release, which eventually accelerate wound healing.[4]LLLT functions via the mitochondrial respiratory chain, resulting in the increased production of adenosine triphosphate and subsequently facilitating the proliferation of fibroblasts, release of growth factors and synthesis of collagen.[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-a), interleukin-1b (IL-1b) and prostaglandin E2.[6]The present study was conducted to assess the effect of low- level laser therapyas an adjunct to non- surgical periodontal treatment.

MATERIALS & METHODS

The present study comprised of 54 patients of moderate to advance periodontitis of both genders. All were included after obtaining their written consent.

Data such as name, age, gender etc. was recorded. Patients were divided into 2 groups of 27 each. Group I comprised of patients who receivedLLLT after scaling and root planning and group II patients received scaling and root planning only. All patients received oral hygiene instructions and supragingival scaling in two appointments 1 week apart before treatment. Full-mouth subgingival scaling and root planing under local anesthesia was performed. Laser therapy was performed three times on the first, second, and seventh days after treatment.Plaque index (PI), sulcus bleeding index (SBI), PD, and clinical attachment level (CAL) were recorded onsixsitespertooth(mesio-,mid-,anddisto-vestibular; mesio-, mid-, and disto-palatal) at baseline, 1, 3, and 6 months after the treatment. All parameters were measured with a periodontal Williams probe. 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	17:10	12:15

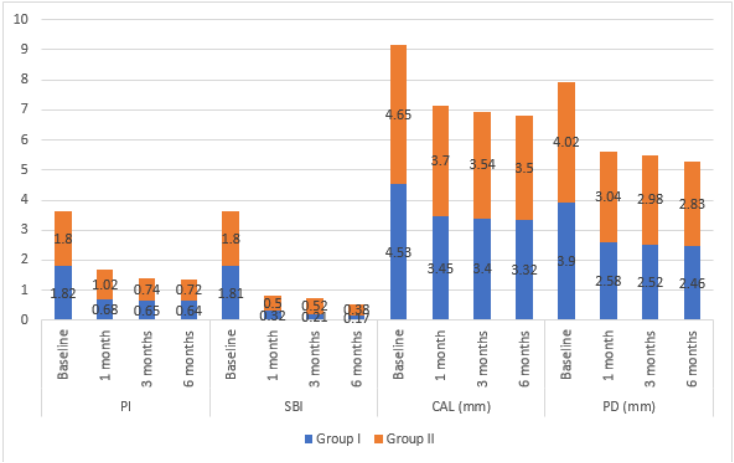
Table I shows that group I had 17 males and 10 females and group II had 12 males and 15 females.

Table II Assessment of clinical parameters

Parameters	Variables	Group I	Group II	P value
PI	Baseline	1.82	1.80	0.91
	1 month	0.68	1.02	0.02
	3 months	0.65	0.74	0.05
	6 months	0.64	0.72	0.05
SBI	Baseline	1.81	1.80	0.94
	1 month	0.32	0.50	0.05
	3 months	0.21	0.52	0.02
	6 months	0.17	0.38	0.01
CAL (mm)	Baseline	4.53	4.65	0.05
	1 month	3.45	3.70	0.02
	3 months	3.40	3.54	0.05
	6 months	3.32	3.50	0.01
PD (mm)	Baseline	3.90	4.02	0.05
	1 month	2.58	3.04	0.02
	3 months	2.52	2.98	0.04
	6 months	2.46	2.83	0.03

Table II, graph I shows that mean PI at baseline was 1.82 and 1.80, at 1 month was 0.68 and 1.02, at 3 months was 0.65 and 0.74 and at 6 monthswas 0.64 and 0.72 in group I and II respectively. The mean SBI at baseline was 1.81 and 1.80, at 1 month was 0.32 and 0.50, at 3 months was 0.21 and 0.52 and at 6 months was 0.17 and 0.38 in group I and II respectively. The mean CAL at (mm) baseline was 4.53 and 4.65, at 1 month was 3.45 and 3.70 and at 3 months was 3.40 and 3.54 and at 6 months was 3.32 and 3.50 in group I and II respectively. The mean PD (mm) at baseline was 3.90 and 4.02, at 1 month was 2.58 and 3.04, at 3 months was 2.52 and 2.98 and at 6 months was 2.46 and 2.83 in group I and II respectively. The difference was significant (P< 0.05).

Graph I Assessment of clinical parameters



DISCUSSION

Non-surgical therapy by mechanical instrumentation is the primary recommended approach to control periodontal infection.[7,8] 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.[9] 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. The present study was conducted to assess the effect of low- level laser therapyas an adjunct to non- surgical periodontal treatment.[10,11] The present study was conducted to assess the effect of low- level laser therapyas an adjunct to non- surgical periodontal treatment.

We found that group I had 17 males and 10 females and group II had 12 males and 15 females. Aykol et al[12]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 mean PI at baseline was 1.82 and 1.80, at 1 month was 0.68 and 1.02, at 3 months was 0.65 and 0.74 and at 6 months was 0.64 and 0.72 in group I and II respectively. The mean SBI at baseline was 1.81 and 1.80, at 1 month was 0.32 and 0.50, at 3 months was 0.21 and 0.52 and at 6 months was 0.17 and 0.38 in group I and II respectively. The mean CAL at (mm) baseline was 4.53 and 4.65, at 1 month was 3.45 and 3.70 and at 3 months was 3.40 and 3.54 and at 6 months was 3.32 and 3.50 in group I and II respectively. The mean PD (mm) at baseline was 3.90 and 4.02, at 1 month was 2.58 and 3.04, at 3 months was 2.52 and 2.98 and at 6 months was 2.46 and 2.83 in group I and II respectively. Ren C et al[13] determined whether an additional benefit exists for the application of LLLT compared with scaling and root planing (SRP) alone. After independent screening of 354 initial records, eight publications (seven RCTs) were included. However, six were rated as 'having a high risk of bias' as a result of major methodological weakness in 'allocation concealment' and 'blinding of key personnel'. Meta-analysis showed that LLLT-mediated SRP demonstrated significant short-term benefits over SRP monotherapy in the improvement of the probing pocket depth ($p = 0.0009$ at 1 month; $p = 0.03$ at 2 months) and the level of interleukin-1b in the gingival crevicular fluid ($p = 0.01$ at 1 months). Nevertheless, LLLT failed to show significant additional intermediateterm (3 and 6 months) effects in terms of clinical parameters and alveolar bone density.

The effects of LLLT are mainly shown as photochemical and photobiological, which may play a larger role in the maintenance and healing processes of periodontitis. Thus, LLLT palay a key indicator for the outcome of non-surgical periodontal treatment.[14]

The limitation the study is small sample size.

CONCLUSION

Authors observed statistically significant differences on clinical parameter changes when laser was used as an adjunct to non-surgical periodontal treatment. Thus, LLLT application may be useful in reduced gingival inflammation in patients of moderate to severe periodontitis.

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