

## The Effect of Low-Level Laser Therapy as an Adjunct to Non-Surgical Periodontal Treatment

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**Background:** The aim of this study is to evaluate 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.

**Methods:** 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. A diode laser with a wavelength of 808 nm was used for the LLLT. Energy density of 4 J/cm<sup>2</sup> was applied to the gingival surface after periodontal treatment on the first, second, and seventh days. Each of the LLLT and control groups was divided into two groups as smoking and non-smoking patients to investigate the effect of smoking on treatment. Gingival crevicular fluid samples were collected from all patients and clinical parameters were recorded on baseline, the first, third, and sixth months after treatment. Matrix metalloproteinase-1, tissue inhibitor matrix metalloproteinase-1, transforming growth factor-β1, and basic-fibroblast growth factor levels in the collected gingival crevicular fluid were measured.

**Results:** 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 ( $P < 0.001$ ). There were clinically significant improvements in the laser-applied smokers' PD and SBI levels compared to smokers to whom a laser was not applied, between the baseline and all time points ( $P < 0.001$ ) (SBI score: control group 1.12, LLLT group 1.49; PD: control group 1.21 mm, LLLT group 1.46 mm, between baseline and 6 months). Transforming growth factor-β1 levels and the ratio of matrix metalloproteinase-1 to tissue inhibitor matrix metalloproteinase-1 decreased significantly in both groups at 1, 3, and 6 months after periodontal therapy ( $P < 0.001$ ). Basic-fibroblast growth factor levels significantly decreased in both groups in the first month after the treatment, then increased in the third and sixth months ( $P < 0.005$ ). No marker level change showed significant differences between the groups ( $P < 0.05$ ).

**Conclusion:** LLLT as an adjunctive therapy to non-surgical periodontal treatment improves periodontal healing. *J Periodontol* 2011;82:481-488.

### KEY WORDS

Dental scaling; laser therapy, low level; matrix metalloproteinase-1; periodontitis; root planing; smoking.

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.<sup>1</sup> Non-surgical therapy<sup>2</sup> by mechanical instrumentation is the primary recommended approach to control periodontal infection. 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.<sup>3</sup> 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.<sup>4</sup>

In the last decade, applying lasers as an adjunctive

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