

## CASE REPORT

# Effectiveness of 980 nm Diode Laser Therapy on Recurrent Aphthous Stomatitis

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## ABSTRACT

Recurrent aphthous stomatitis (RAS) is the most common oral ulcerative lesion, often associated with stress, insomnia, trauma, etc. There are many different treatment modalities for but with partially effective treatment outcome. Therefore, the aim of this report is to review the low-level laser therapy (LLLT) for effectively relieving pain and its ability to aid in faster healing of ulcers. A 21-year-old male reported with intense pain due to RAS, was managed with LLLT with laser settings at 1 W power in continuous and noncontact mode. Immediately after the irradiation, patient was absolutely free from pain after 3 and 7 days of evaluation, there was absolutely no pain with partial healing and complete re-epithelization of ulcer respectively. It can be concluded that lasers at nonablative settings in the form of LLLT provides immediate relief from pain and discomfort and aids in the rapid healing of ulcer.

**Keywords:** Recurrent aphthous stomatitis, Low-level laser therapy, Nonablative, Re-epithelization, Analgesia.

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## INTRODUCTION

Ulcers in the oral cavity are painful lesions which make one's life dejected to a very extent and, when the source of these ulcers is recurrent aphthous stomatitis (RAS), it makes life all the more miserable, impairing basic necessities, such as mastication, swallowing, speech, etc.<sup>1</sup>

Recurrent aphthous stomatitis is considered the most common oral ulcerative lesion affecting much of the population.<sup>2</sup> The etiopathogenesis is neither viral nor bacterial, but most of the theories point toward an autoimmune mediated source of origin. Some studies have revealed an association of systemic illness, such as Crohn's disease, HIV, Behcet's disease. More often, the occurrence is associated with factors like stress, lack of sleep, trauma, folic acid and vitamin B deficiency.<sup>3-5</sup>

Recurrent aphthous stomatitis has three forms: minor (3 to 10 mm in size), major (>10 mm) and herpetiform (multiple small coalescing ulcers of 1 to 3 mm in size).<sup>2</sup> Dentists all over the world have tried different treatment modalities, such as topical anesthetic agents, topical steroids, multivitamin supplements, etc. but have got partially effective treatment outcome.<sup>6,7</sup> With the advent of technology, many researchers have focused on lasers with nonablative settings, i.e. low-level laser therapy (LLLT) which has shown some promise.

Low-level laser therapy is recognized with various terminologies, such as 'cold laser', 'soft laser', 'low intensity laser therapy', 'photobiomodulating lasers' and 'laser phototherapy', which has a wavelength that ranges from 630 to 910 nm. But, other wavelengths at nonablative settings too can be used for laser phototherapy to modulate and repair the tissues.<sup>8</sup> Hence, we preferred the 980 nm laser at nonablative settings as part of our case report and we were able to emphasize how effectively LLLT can be used to relieve pain and aid in rapid healing of ulcers compared to other forms of treatment.

## CASE REPORT

A 21-year-old patient reported to our private clinic with the chief complaint of pain and discomfort on mastication associated with clusters of small and isolated ulcers seen over lateral border of the tongue, right buccal mucosa and the lower lip. These aphthae were noticed by the patient 8 days ago involving the lower lip followed by the lateral border of the tongue and eventually on buccal mucosa, as shown in Figures 1 to 3. On further examination, numerous, small pin-head sized erosions were seen. Most of these ulcers had coalesced to form large central erosion and were surrounded by an erythematous halo; suggestive of herpetiform aphthous ulcers.<sup>9</sup> The medical

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Fig. 1: Herpetiform ulcers over the mucosa of the lower lip



Fig. 2: Herpetiform ulcers over the lateral border of the tongue



Fig. 3: Herpetiform ulcers over the buccal mucosa



Fig. 4: Laser parameters used for irradiation of aphthous ulcers

history of the patient was noncontributory. Patient had tried some self medication without much success.

To relieve the acute and intense pain complained by the patient, diode laser (DC lase, 980 nm, DC International) was used for the treatment. Laser handpiece without the tip in a defocused mode was used to simulate LLLT. Following the laser parameters set at a power of 1 W in a continuous and noncontact mode (defocused mode) as shown in Figure 4, irradiation of ulcers was done from a distance of 10 mm from ulcer and slowly approaching within 2 mm in a circumferential manner (moving laser handpiece from the periphery of the lesion toward the center), as shown in Figures 5 and 6. The irradiation was carried in three cycles of 20 seconds each. A resting interval time of about 10 seconds was given between each cycle. To analyze the patient's feedback related to discomfort (warmth) during the procedure, no anesthesia in any form was given.

Patient was immediately checked after the procedure for any pain or discomfort by moving head of ball burnisher over it, to our amazement the patient was completely free from pain (Fig. 7). The patient was

given the necessary instructions and recalled after 3 and 7 days. After 3 days, patient was evaluated again for pain by passing a ball burnisher over it and there was no pain and healing was partially complete. Complete re-epithelization of all the ulcers was seen after 7 days as seen in Figures 8 to 10.

### DISCUSSION

Many treatment modalities, such as topical corticosteroids, chlorhexidine and tetracycline rinses, multivitamin supplements, immune system boosting agents, etc. have been tried for the treatment of RAS with varied success.<sup>6,7</sup> With the advent of lasers, LLLT emerged as a viable option due to its biostimulation property for wound healing.

The primary reason for the introduction of laser in our treatment plan was to provide immediate analgesia to the patient and that is the area where LLLT is good at. Low-level laser therapy stimulates the production of  $\beta$ -endorphins, thereby relieving pain. Low-level laser therapy enhances ATP synthesis leading to a state of hyperpolarization and blocks the conduction of pain



**Fig. 5:** Aphthous ulcers irradiated with a 10 mm target distance



**Fig. 6:** Laser irradiation of aphthous ulcers within 2 mm range



**Fig. 7:** Evaluating pain by using a ball burnisher immediately after LLLT



**Fig. 8:** Complete healing of the ulcers over the inner aspect of lower lip



**Fig. 9:** Complete resolution of the ulcers over the lateral border of the tongue



**Fig. 10:** Complete resolution of the ulcers over the buccal mucosa

stimuli, thus aiding in a decrease of pain sensation. Laser therapy has also found to have a profound effect on C fibers leading to a decreased activity of these fibers and altering the pain threshold.<sup>10</sup>

Similar studies by De Souza<sup>11</sup> revealed that 75% of the study population reported reduction of pain immediately after a single session of laser treatment. Khademi H et al<sup>12</sup> in a double-blind clinical trial treated 12 patients with minor RAS using a diode laser and reported that, with the use of LLLT, there was a decrease in the healing time, pain intensity.

Extensive research has shown that LLLT tends to increase fibroblast proliferation by stimulating the production of basic fibroblast growth factor (bFGF), which supports fibroblast proliferation and differentiation which helps in rapid healing.<sup>13</sup> In addition, LLLT aids in the transformation of fibroblasts into myofibroblasts, which are responsible for wound contraction thus helping in the rapid healing of ulcer.<sup>14</sup>

Secondary clinical effects associated with LLLT are a decrease in the levels of histamine, bradykinins and substance SP which reduces the inflammation.<sup>10</sup> This was clearly evident as the erythematous halo surrounding the ulcers had completely resolved on the third day evaluation after LLLT.

## CONCLUSION

Treatment of recurrent aphthous stomatitis is quite challenging owing to the multifactorial etiology. With evolving technology, lasers have indeed proven to be a boon as they provide immediate analgesia and aid in rapid healing compared to any other treatment modalities. Our case report supports and showcases how effectively a surgical laser can be used at subablative laser settings for the treatment of RAS.

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