

Effectiveness of Low-Level Lasers in the Management of Recurrent Aphthous Stomatitis: An Original Research

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ABSTRACT

Aim: This current study is intended to assess the effectiveness of low level lasers in the management of recurrent aphthous stomatitis.

Materials and Method: The current study was undertaken on 30 healthy individuals who were diagnosed with recurrent aphthous stomatitis and were managed with low level laser therapy. Subjects were categorized into 3 groups randomly. Group I included 10 patients who were diagnosed with minor aphthae while Group II included 10 patients who were diagnosed with major aphthae and Group III included 10 patients who were diagnosed with herpetiform aphthae. All the patients were managed with low level laser therapy. In due course, the pain was evaluated with the aid of VAS scale regularly at periodic intervals postoperatively and analyzed.

Results: Majority of the lesions in Group I were noted on the labial mucosa while in Group II majority of the lesions were noted on the labial mucosa and tongue while in Group III majority of the lesions were noted on the upper attached gingiva. The results of this study revealed that the pain in the immediate phase and late phase was significantly less in all patients following the use of low level lasers.

Conclusion: Low level lasers could be employed as a viable treatment option considering its confined effects in addition to causing no harm to the surrounding tissues.

Keywords: Low level lasers, aphthous ulcers, pain

Introduction:

It is a well-known fact that a high level laser exhibits photothermal properties resulting in therapeutic effects like surgical cutting and hemostasis while the low level lasers exhibit properties like analgesic, anti-inflammatory and biostimulation.^{1,2} Low level Lasers are employed in numerous clinical scenarios like mucositis, neural regeneration, postherpetic

neuralgia, synovitis, arthritis, problems of the temporomandibular joint, acute swelling, periapical granuloma, chronic orofacial pain, gingival depigmentation, and bone regeneration.^{3,4,5} The analgesic effect of LLLT causes neural conduction blockade by stimulating the synthesis of endogenous endorphins (beta-endorphin), reducing inflammatory cytokines and enzymes, altering the pain threshold, inducing changes in morphological neurons, reducing the mitochondrial membrane potential, and blocking rapid axon flow.⁶ The anti-inflammatory effect occurs due to the increase in the phagocytic activity, the number and the diameter of lymphatic vessels, diminished permeability of blood vessels and microcapillary blood circulation restoration, normalization of blood vessel permeability along with diminished edema.^{6,7} Recurrent aphthous stomatitis (RAS) encompasses a set of long standing, inflammatory, ulcerative disease affecting the oral mucosa, the prevalence of which is 21.7%.^{8,9} Clinically, three kinds of RAS have been advocated in the form of Minor aphthae, major aphthae, and herpetiform aphthae.¹⁰ This current study is intended to assess the effectiveness of low level lasers in the management of recurrent aphthous stomatitis.

Materials & Method:

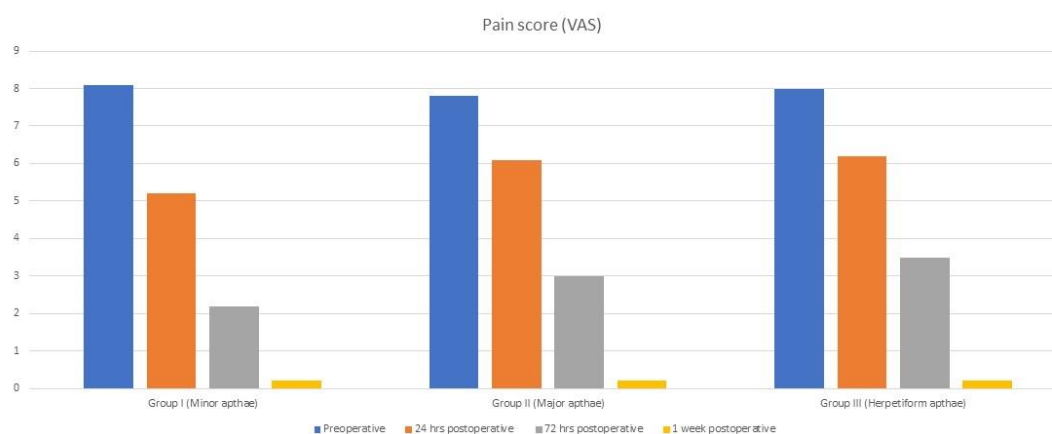
A prospective clinical study was conducted on 30 healthy individuals who were diagnosed clinically with recurrent aphthous stomatitis. Only healthy individuals with the age group of 18 to 60 were included. Subjects with prior history of recurrent aphthous stomatitis and subjects who already used any kind of medication or underwent any kind of treatment for the management of their recurrent aphthous stomatitis were excluded. Institutional ethical committee clearance was taken and patient consents were obtained for carrying out the study. Subjects were categorized into 3 groups randomly. Group I included 10 patients who were diagnosed with minor aphthae and were treated with LLLT using an 808 nm diode laser (Sunny, MSI, Bangalore). A hand piece with a 600 nm beam diameter is employed in these patients in a defocused mode. The laser was used at 1W in a continuous mode which is considered to be the biostimulation mode. The laser was passed over the ulcer in a scanning motion in a defocused mode from about 8 mm away and eventually approaching within 2 mm range of the ulcer for about 30 s. Group II included 10 patients who were diagnosed with major aphthae and were treated with a diode laser (Picasso, Dentsply) with an 810 nm wavelength and a 400 µm fiber and a noninitiated tip. The laser was employed at 0.6W in a defocused mode, at 10 mm away from the lesion and slowly approaching the lesion within a range of 2 mm for about 30 s for the first application. Two more applications at 0.7W and 0.8W with duration of 30 s each are then applied. Group III included 10 patients who were diagnosed with herpetiform aphthae and were treated with diode laser (Ezlase, Biolase) with a 940 nm wavelength. The tip of the laser was removed, and only the hand piece was used, thus increasing the beam diameter from 300 µm to 4 mm. The laser was used at 1W in a continuous defocused mode in a scanning motion, starting at a distance of 8-10 mm away from the lesion and slowly approaching the lesion within a range of 2 mm for about 30-40 s initially. A second application at 1.2W power, after a 20 s interval, for about 30-40 s was employed. All patients were evaluated for pain using VAS score the pain was evaluated regularly at periodic intervals postoperatively at 24hrs, 72hrs and at 1 week and the efficacy of low level lasers for the management of recurrent aphthous stomatitis was analyzed.

Results:

This study included 30 healthy subjects belonging to the age group of 18 to 60 years with a mean age of 31.2 years. Amongst the 30 subjects, 24 were female and 16 were male. Majority of the

lesions in Group I were noted on the labial mucosa while in Group II majority of the lesions were noted on the labial mucosa and tongue while in Group III majority of the lesions were noted on the upper attached gingiva. The results of this reveal that the mean VAS score in all the 3 groups at 24hrs postoperative was less compared to the preoperative period. At 72hrs patients in all the 3 groups revealed a considerable reduction in the mean VAS score for pain when compared to the preoperative period and immediate postoperative period. At 1 week all the patients revealed a minimal or nil VAS score for pain as shown in Figure - 1.

Figure 1: Figure showing the pain scores in all the groups following the application of lasers



Discussion:

It is a well-known fact that recurrent aphthous stomatitis is categorized with frequent spells of single or numerous shallow, small, rounded painful ulcers that occur at intervals of few months to few days.^{10,11} These lesions would invariably interfere with speech and mastication thereby influencing an individual's quality of life.¹² The etiology of this condition remains still unclear. However, stress, mechanical injury, hormonal changes, gastrointestinal diseases, vitamins, and trace element deficiencies are considered as precipitating factors.² Systemically genetic predisposition and immunodeficiency are also considered. The management of this condition is intended to lessen pain sensation and reduce the wound healing time in addition to reducing the frequency and acute phases.¹³ Conventionally topical or systemic interventions with the aid of analgesics, systemic immunomodulators, anti-inflammatory drugs and chemical cauterizers were employed. Numerous medical modalities in the form of steroids, mouthwashes, etc., have been used with varied success. In addition to this, the side effects they are associated with and the patient compliance that is required have made this option a less reliable option.² However, literature evidence suggesting the positive effects of lasers on the cell metabolism, inflammatory modulation, edema reduction, tissue regeneration, healing time, and pain relief makes their use a viable option in the management of recurrent aphthous stomatitis.^{13,14,15} Low-level laser therapy

off late is being considered as the first line of treatment for managing these conditions. The results of this study revealed that patients in all the groups had experienced immediate pain relief and enhanced healing of the lesions following the application of lasers. This could be attributed to the fact that LLLT arouses the generation of β -endorphins, thereby resulting in pain relief. It even has a deep effect on C fibers causing to a reduced activity of these fibers and altering the pain threshold.¹⁶ A previous study advocated that the usage of low level lasers inhibits the conduction of nerve fibers.¹⁷ Another study revealed that patients experienced immediate pain reduction following a single application of laser.¹⁸ Another study showed that patients with minor aphthae when treated using a diode laser showed a decrease in the healing time and pain intensity.¹⁹ The results of this study reveal that the time required for complete healing of the lesions was around 3-4 days which was significantly faster when compared to the other studies that employed medical management regimes. The results of this study are in accordance with previous studies.²⁰ This could be attributed to the fact that low level lasers enhance the healing by improving the ATP synthesis leading to an enhanced mitotic activity which increases the protein synthesis by mitochondria, resulting in greater tissue regeneration in the repair process.² It can be concluded based on the results of this study along with the evidence from the existing literature that low level lasers application on recurrent aphthous stomatitis would reduce the healing time, pain intensity, and frequency of the lesion. Hence it can be considered as the most appropriate treatment modality for the management of this condition.

Conclusion:

Numerous treatment options are advocated in the literature for the management of RAS but they have varied success. The optimal choice with regards to the management of RAS still remain as a continuous deliberation. The results of this study reveal that LLLT definitely has an advantage over the other available treatment regimens as a result of to its localized effects in addition to causing no harm to the surrounding tissues. It even eliminated the option of systemic toxicity associated with other treatment regimens. LLLT being noninvasive has good patient compliance allowing it to be employed multiple times without any risk. However, long-term comparative studies are still essential to further substantiate the benefits of LLLT in the management of such clinical scenarios.

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