



Low Level Laser Therapy (LLLT) in the Effective Management of Recurrent Aphthous Ulcers (RAU): Clinical Case Reporting 3 Patients: A Case Series

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Low-Level Laser therapy (LLLT) was employed for the treatment of three patients diagnosed with recurrent aphthous ulcers (RAU's). The patients presented with recurrent aphthous ulcers in the region of floor of the mouth and buccal mucosa. The three patients with RAU's were provided with a wavelength of 946nm starting the use at 320µm fibre optic at a distance of 1-3 mm, peak power of 2W, frequency 10 Hz with no tissue contact in circular motion from outside to inside for 2 cycles with 100% duty for 30s for 3 consecutive days. The LLLT made possible an effective improvement in the reduction of pain and size associated with ulcers. It proved to be a safe and cost effective therapy in the management of recurrent aphthous ulcers.

KEYWORDS: Recurrent Aphthous Ulcers, Low Level Laser Therapy, Aphthae

INTRODUCTION

In terms of population, India is the second largest country in the world with more than 1.3 billion populations. Despite being fastest growing economy, it stands way behind in terms of education, standard of living and health.¹ Oral health is a critical but overlooked component of overall health and well-being among adults.² Despite being largely preventable, oral diseases are highly prevalent throughout the life course and have substantial negative effects on individuals.^{3,4,5} In modern society, a number of diseases have been on the rise with changing lifestyles or environmental influences including diet and psychoemotional stress. Such impact may continue to the development and prevalence of various diseases including arteriosclerosis, cancer, chronic liver disease/ cirrhosis, chronic obstructive pulmonary disease (COPD), diabetes, hypertension, heart diseases, stroke, recurrent aphthous stomatitis, asthma, obesity, depression and vascular dementia.^{6,7}

In an otherwise healthy individual, there are few conditions that develop in the oral mucosa. Aphthous ulcerations, commonly referred to as "canker sores," are the most prevalent oral mucosal lesions which affects the population more than 20%. The term "aphthous" is derived from a Greek word "aphtha" which means ulceration.⁸ Recurrent aphthous stomatitis (RAS) has been described under three different clinical variants as classified by Stanley in

1972. Mikulicz's aphthae are the mild RAS or mild aphthous ulcers, major RAS also known as periadenitis mucosa necrotica recurrens or Sutton's disease, and Herpetiform ulceration characterized by recurrent crops of multiple ulcers which may be up to 100 in number.⁹

It is a distinct oral condition of unknown etiology characterized by the spontaneous emergence of more than 2 bouts of oral ulcers per year, not associated with an underlying systemic abnormality.¹⁰ The outbreak of RAS are associated with hereditary, psychological and socioeconomic stresses; nutritional deficiencies; hormonal fluctuations; and immunologic deficiencies.¹¹⁻¹⁶ There is some evidence that suggests RAS ulcers are related to modified immunologic defenses or may be symptoms of several pathogens, rather than one. Due to the indeterminant aetiology of these lesions, it is often difficult to find a definitive cure.^{17,18,19}

Several agents are helpful in the management of aphthous ulcers including antibiotics, anti-inflammatory, immune modulators, anesthetics and alternative products.²⁰ In most patients, topical agents including over the counter preparation such as antiseptic mouthwashes are recommended.²¹ Topical agents enhances reparative and regenerative processes, contributes to activation of aerobic metabolic



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processes and oxidative phosphorylation, increases oxygen consumption in vitro and stimulate the transport of glucose into the cells.

Currently used topical antibacterial, anti-inflammatory, immunomodulatory or symptomatic treatments for the condition are neither 100% reliable nor efficacious. There is currently no single well-established treatment for these common mouth ulcers, and none of the existing treatments accelerate the healing process.²¹⁻²⁵

Recently, lasers have been used to treat various forms of oral lesions including RAS because of its biomodulation, analgesic effect by stimulation of healing process, promoting immediate relief of pain without an overdose of medication or side-effects and prevention of recurrence.^{8,26} Studies have suggested that low-level laser therapy (LLLT) has the potential to treat aphthous ulcer and related lesions. It is a safe and clinically effective therapy for treating RAS which also provides time benefit to the patients.⁸ This measure of treatment gives the dentist an interesting opportunity to expand the range of services offered in the practice and to alleviate the discomfort of patients quickly and easily.

The clinical case reports of the subjects reported with aphthous ulcer describes and analyzes the diagnosis and/or the management of one or two patients acts as the first line of evidence in health care. This case series is a powerful source to disseminate information on unusual clinical syndromes, disease associations, unusual side effects to therapy, or response to treatment. Case reports regarding aphthous ulcers and their treatment may be used as a means to teach health sciences students. Therefore, the aim of this paper is to critically appraise and epitomize clinical studies to ascertain whether laser therapy is an effective treatment option for treating aphthous ulcer through this case series.

CASE REPORTS

Three patients with the chief complaint of recurrent painful ulcers in the oral cavity came to the institutional department of Oral Medicine and Radiology. On clinical examination, oral ulcers of different dimensions were observed having erythematous halo on buccal mucosa, labial mucosa, tongue, floor of the mouth etc. The diagnosis of recurrent aphthous ulcers was made on the basis of detailed medical history and the clinical criteria given

by Natah et al. in 2004. A meticulous history was taken to eliminate other ulcerative conditions such as Crohn's disease, celiac disease, neutropenia, HIV infection, and Behcet's syndrome. An informed consent was taken and an information sheet consisting of all the details of the procedure was provided to all the patients.

All the patients reported with the recurrent history of aphthous ulcers were provided with Low Level Laser Therapy (LLLT) for three consecutive days of wavelength 940nm diode laser, which was started using 320µm fiber optic at a distance of 1-3 mm from the lesion. It was provided with circular motion from the periphery of the ulcer to the center for 2 cycles with 100% duty for 30 seconds. The estimation of reduction in pain was done using VAS score 0 to 10 and in size of the ulcer using divider and ruler with an accuracy of 1 mm. The recordings were made just before the treatment, the next day and third day of the laser therapy.

CASE I

A 78-year-old patient presented an 8 week history of episodes of recurrent aphthous ulcers on the labial mucosa [figure 1(a)]. Patient had difficulty in speech and while eating. The size of the ulcer was 2.5 mm in length and 5.5 mm in width. The ulcer was not associated with any type of discharge and was tender on palpation. The patient used various chemotherapeutic aids such as topical anaesthetics for the management of aphthous ulcer, but the lesion recurred. He was provided with the laser therapy and lesion was observed for healing [figure 1(b)]. The readings of the reduction in ulcer pain and size are given in table 1.

	SCORES		
	Day 1	Day 2	Day 3
Size of the ulcer (in mm)	2.5 x 5.5 mm	2.5 x 4.5 mm	1.5 x 4 mm
Pain perceived (scale 0-10)	10	7	0

Table 1. Ulcer pain and size score at three-point times (Case I)

CASE II

A 23-year-old patient presented a 3 months history of recurrent aphthous ulcers on the floor of the mouth [figure 2(a)]. She had difficulty while chewing and

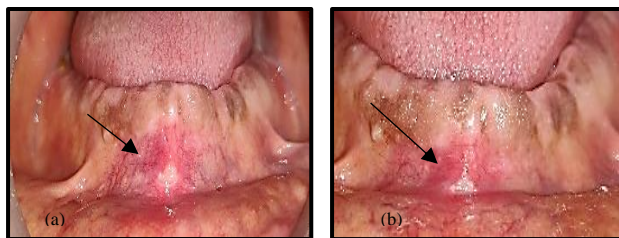


Figure 1. Case I (a) Pre-treatment and (b) Post-treatment

speaking. The size of the ulcer was 4 mm in length and 6 mm in width. The ulcer was very tender to palpate. She tried various home remedies for treating aphthous ulcers but it kept on recurring. She was provided with low level laser therapy. She reported that ulcer started to heal early than the previous times and also there was immediate reduction in pain after the first exposure to the laser therapy [figure 2(b)]. The readings of the reduction in ulcer pain and size are given in table 2.

	SCORES		
	Day 1	Day 2	Day 3
Size of the ulcer (in mm)	4 x 6 mm	3 x 5 mm	2.5 x 4 mm
Pain perceived (scale 0-10)	10	6	0

Table 2. Ulcer pain and size score at three-point times (Case II)

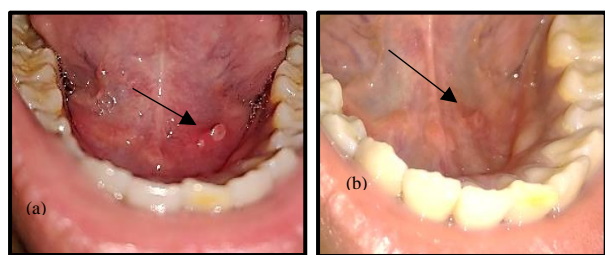


Figure 2. Case II (a) Pre-treatment and (b) Post-treatment

CASE III

A 42-year-old patient reported a history of 2 months recurrence of aphthous ulcers on the ventral surface of the tongue [figure 3(a)]. He faced difficulty to speak, drink and while chewing. The size of the ulcer was 6 mm in length and 3 mm in width. The ulcer was round with erythematous halo. It was not associated with any type of discharge and was highly tender to palpate. The medical and family history were not of any contribution. The patient used pharmacological modes such as topical application of lignocaine and systemic

vitamin B complex, which caused no improvement in discomfort and pain of the aphthous ulcer. He was given treatment using low level laser therapy to heal the lesion. He reported complete relief of pain and significant reduction in size of ulcer in 4 days and there was no discomfort. There were no side-effects reported of LLLT in the patient [figure 3(b)]. The readings of the reduction in ulcer pain and size are given in table 3.

	SCORES		
	Day 1	Day 2	Day 3
Size of the ulcer (in mm)	6 x 3 mm	4 x 2.5 mm	3 x 1.5 mm
Pain perceived (Scale 0-10)	10	3	0

Table 3. Ulcer pain and size score at three-point times (Case III)

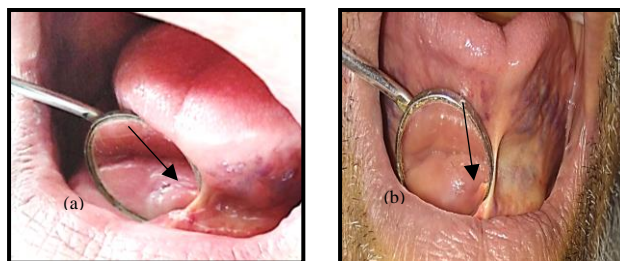


Figure 3. Case III (a) Pre-treatment and (b) Post-treatment

DISCUSSION

The aphthous ulcers may occur in the oral cavity due to differential reasons. While evaluating the patients with oral symptoms, Infection-causing ulceration in the mouth should also be considered. A common infection, particularly in patients with HIV infection and aphthae is herpes. Other viral, bacterial, treponemal and fungal agents have the potential to cause mouth ulcers. Several autoimmune diseases may mimic benign aphthous ulcers. Behçet's syndrome is an autoimmune vasculitis that causes recurrent oral and genital ulcerations, uveitis and retinitis. Lupus erythematosus, bullous pemphigoid and pemphigus vulgaris are other diseases that may involve ulceration of the mouth. In all of these conditions, the associated symptoms should be elicited to make a differentiation from benign recurrent aphthae.²⁷

Numerous agents aids in the management of aphthous ulcers including antibiotics, anti-inflammatory,

immune modulators, anaesthetics and alternative products.⁶ Topical agents enhances reparative and regenerative processes, provides to activation of aerobic metabolic processes and oxidative phosphorylation, increases oxygen consumption and stimulate the transport of glucose into the cells.⁷ Pertaining to pain relief, one mechanism that has been proposed is modulation of pain perception by modification of nerve conduction via the release of endorphins and enkephalins.⁸ The main purpose of treatment is to decrease pain and size of the ulcer.⁹ The results of the study conducted showed that Low Level Laser Therapy has the magnitude of reducing the pain intensity and size of aphthous ulcers. Healing is the main characteristic of LLLT including three main factors. First, there is an increment of adenosine triphosphate (ATP) production, as laser is considered to raise the production of ATP, leading to a boost in mitotic activity and to an increase in protein synthesis by mitochondria, resulting in greater tissue regeneration in the repair process. Second, there is a stimulus to microcirculation, which increases the delivery of nutritional elements associated with increased speed of mitosis, facilitating cell multiplication. Finally, new vessels are formed from pre existing vessels.⁹ A study conducted by De Souza et al. in 2010 revealed that 75% of the patients reported a reduction in pain in the same session after laser treatment and total regression of the lesion occurred after 4 days.²⁸ Khademi et al. found similar benefits of quicker healing and reduced pain after using low levels of laser treatment on RAS.²⁹ Similarly the LLLT study was effective in relieving pain and reducing the healing time during the treatment of aphthous ulcers conducted by Aggarwal et al.³⁰

Hence it summarizes, as there are no medications, the side effects and risk of overdosage could also be prevented. Hence, it can be concluded that LLLT is a safe and clinically effective therapy for treating RAUs, which also provides time benefit to the patients. The outcomes from the present study which stand out are, the immediate and lasting pain relief, and the accelerated ulcer healing. Limitation of the study includes subjective evaluation of pain perception. Though healing occurs through medications and laser therapy but mainly depends on host immune response and microbe interaction.

CONCLUSION

LLLT employed as a treatment measure for the management of recurrent aphthous ulcers in the

current case report not only provided instant pain relief but a rapid decrease in the size of the lesion was also seen. It is safe, clinically effective therapy for treating RAU, which also provides time benefit to the patients.

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