

## Laser Biostimulation of Oral Ulcers in Children

Jatinder Kaur Dhillon, Gauri Kalra, Vijay Prakash Mathur

### ABSTRACT

Oral ulcers in children are a frequent complaint of patients reporting to a dental professional. These can be very painful and may cause difficulty during eating, speaking and brushing. Several modalities have been proposed for management of oral ulcers, such as topical anesthetics, antiseptic mouthwashes, etc. However, these have not been proven very efficacious. Low level laser therapy (LLLT) has been suggested as a means of accelerating healing of oral ulcers. This case report presents a case of two painful aphthous ulcers in a 13-year-old child treated with LLLT using soft tissue diode laser. Immediately after the laser therapy, the pain reduced significantly and the healing occurred substantially in 72 hours.

**Keywords:** Children, Diode, Laser, LLLT, Oral, Ulcer.

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### INTRODUCTION

Oral ulcers can be very painful and debilitating lesions in children. An ulcer is a well-circumscribed depressed lesion over which the epidermal layer has been lost.<sup>1</sup> They may be classified on the basis of their number (single or multiple), the duration of the ulcer (acute or chronic) and occurrence of the disease in the past (primary or recurrent). Most common causes of oral ulcers are trauma, recurrent aphthous stomatitis, microbial infections, mucocutaneous disease, systemic disorders and drug therapy.<sup>2</sup> Recurrent aphthous ulcers (canker sores) and herpes-induced stomatitis are the most commonly occurring ulcerative conditions in children. Recurrent aphthous ulcers present as painful, solitary or multiple ulcerations of the oral mucosa. Other symptoms include paresthesia, malaise, low-grade fever, localized lymphadenopathy, loss of appetite and mucus-containing vesicular lesions. It is mostly associated with severe pain lasting up to 6 or more days. There is no specific etiology for aphthous ulcers. However, they may precipitate due to trauma, stress, hormonal changes, microorganisms and vitamin and trace element deficiencies.<sup>3</sup> Systemic conditions include genetic predisposition, immunodeficiency and family history. Prevalence of recurrent aphthous ulceration was reported in Third National Health and Nutrition Examination Survey, 1988 to 1994 (NHANES III) to be 1.64% in a sample of children aged 2 to 17 years of the United States.<sup>4</sup> Various treatment modalities have been

suggested for oral ulcers. The treatment is mainly focussed on palliative care till it heals by itself. However, natural healing may take up to 2 weeks which can cause major distress for children.

The effect of low levels of laser energy was first discovered by Dr Endre Mester in 1967.<sup>5</sup> Since then it has been used for various applications in the field of medicine and dentistry and is broadly termed 'low level laser therapy' (LLLT) or 'biostimulation' or 'phototherapy'. It is defined as a 'non-thermal' laser light application using photons (light energy) from the visible and infrared spectrum for tissue healing and pain reduction (North American Association of Laser Therapy-NAALT).<sup>6</sup> Several *in vitro* studies<sup>7,8</sup> have demonstrated that the effects of laser light on wound healing are much greater than obtained with light from other sources, such as light-emitting diodes (LEDs).

The proposed mechanism of LLLT is as follows:<sup>9-11</sup>

1. It acts on mitochondria to cause increased ATP production which increases oxygen consumption on the cellular level which promotes tissue repair.
2. It stimulates the release of serotonin and endorphins which produces an analgesic effect.
3. It reduces prostaglandin synthesis which produces anti-inflammatory effects.
4. Improved blood circulation to the skin and mucosa.
5. It causes hyperpolarization by decreasing permeability of the membrane of the nerve cells for Na/K.
6. It decreases edema by increasing the lymphatic flow.

The major advantage of LLLT is that the effect is localized, resulting in no harm to adjacent structures. It also produces immediate pain relief. This is attributed to the disruption in the action of Na-K pump in the cell membrane and serotonin release. There have been numerous studies on the effect of LLLT on pain which demonstrates that after LLLT the urinary excretion of 5-hydroxyindoleacetic acid, the degradation product of serotonin increases significantly.<sup>11,12</sup>

### CASE REPORT

A 13-year-old male child reported to the Pedodontics OPD at CDER, AIIMS with the complaint of pain and burning sensation on eating for last 2 days. On clinical examination it was found that the patient had two shallow non-indurated ulcers with an erythematous border. One of the ulcers was located in the buccal-attached gingival region of the left upper premolars measuring about 1.5 cm at its maximum

diameter (Fig. 1) and the other ulcer was located on lower labial mucosa measuring about 1 cm at its maximum diameter (Fig. 2) and both were accompanied by painful symptoms. There was no tenderness at the site and it showed no limitation in freedom of movement. There was no malaise or speech restriction experienced by the child which ruled out viral stomatitis and a provisional diagnosis of aphthous ulcer was made. After an informed consent, it was decided to use a diode laser (940 nm, Ezlase, Biolase Technology Inc.) to facilitate healing (Fig. 3). A 400 nm tip was used in defocused mode without activation in continuous mode at 0.10 W. Pulse length and pulse interval were used for 0.50 microseconds. No local anesthesia was used. The tip was moved in a non-contact mode just over the lesion to prevent heating of the tissue around the lesion for 3 minutes (Figs 4 and 5). The average power used was 3.5 Joules per site. The patient experienced immediate pain relief and a visible alteration was observed in the size of the lesion (Figs 6 and 7).

The patient was recalled after 24 hours, 72 hours (Figs 8 and 9) and 1 week. The lesion had significantly decreased and completely healed after 1 week (Figs 10 and 11).



Fig. 3: Soft tissue Diode laser unit with 940 nm wavelength



Fig. 1: Preoperative view of ulcer in the buccal-attached gingiva adjoining tooth no. 24

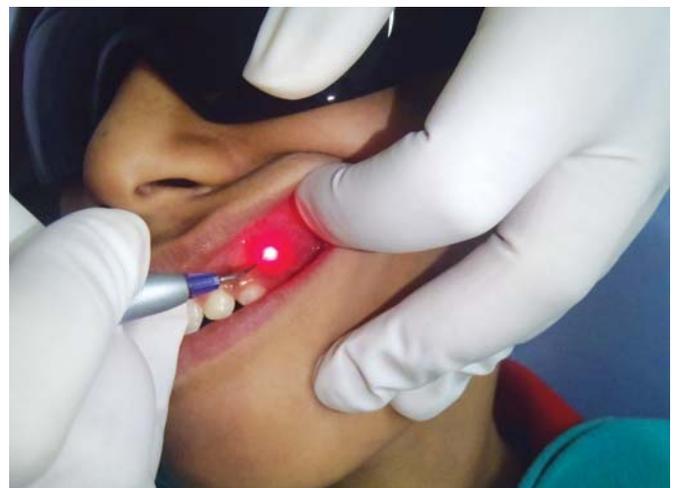


Fig. 4: Intraoperative photograph showing non-contact mode



Fig. 2: Preoperative view of ulcer located on lower labial mucosa opposite tooth no. 43



Fig. 5: Intraoperative photograph showing non-contact mode at the other site



**Fig. 6:** Immediate postoperative view of ulcer in the buccal-attached gingiva adjoining tooth no. 24



**Fig. 9:** Seventy-two hours postoperative view of ulcer located on lower labial mucosa opposite tooth no. 43 with only remnants of ulcer visible



**Fig. 7:** Immediate postoperative view of ulcer located on lower labial mucosa opposite tooth no. 43



**Fig. 10:** One week postoperative view of ulcer in the buccal-attached gingiva adjoining tooth no. 24 with complete healing



**Fig. 8:** Seventy-two hours postoperative view of ulcer in the buccal-attached gingiva adjoining tooth no. 24 with only remnants of ulcer visible



**Fig. 11:** One week postoperative view of ulcer located on lower labial mucosa opposite tooth no. 43 with complete healing

## DISCUSSION

Numerous methods have been proposed for treatment of oral ulcers, such as use of topical anesthetic, mouthwashes,

such as chlorhexidine gluconate, sucralfate, interferon  $\alpha$ , etc.<sup>13</sup> with limited success. Biostimulation with diode laser can be a suitable alternative for oral ulcers.

The advantages of diode lasers are:

- Immediate pain relief
- High patient acceptance
- No harm to surrounding tissues.

In this case, it was found that the patient experienced instantaneous symptomatic relief and accelerated healing.

## CONCLUSION

Soft tissue diode lasers can be considered as a safe and effective treatment modality for oral ulcers in children. It is a non-threatening technique which can be very helpful in treating patients especially children.

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