

Treatment of recurrent aphthous stomatitis biology essay

[Science](#), [Biology](#)



Assistant professor Muthenna Shaban RajabAbstractThis study aimed to evaluate the effect of the diode laser irradiation on the duration and pain sensation of the recurrent aphthous stomatitis. Materials and methods: Thirty two ulcers were subjected to 940nm laser irradiation, in addition to same number of ulcers serve as control. Pain scores were recorded before and after laser treatment. The patient subjected to follow-up visits until complete healing of the ulcers. Results: There are immediate changes in the pain scores of the experimental group just after diode laser application. The duration of the control group lesions ranged between 7-14 days, while the lesion in the experimental group subsided with a range between 4-12 days. Conclusions1. Single session of diode laser irradiation can be used to produce immediate, dramatic and sustained analgesic effect on RAS lesion. 2. The lesion duration were significantly reduced to about 40% from that of control lesion. Keywords: Diode laser, Aphtous, Ulcer,

RASIntroductionAphthous ulcer or recurrent aphthous stomatitis (RAS), commonly referred to as canker sores, are inflammatory lesions of the mucous lining of the mouth which may involve the cheeks, gums, tounge, lips, and roof or floor of the mouth.(1) They are characterized by painful, recurrent, small, round or ovoid ulcers with circumscribed margins, erythematous haloes, and yellow or gray floors, typically first presenting in childhood or adolescence.(2) The epithelium lesion cause exposed nerve ending, resulting in pain or soreness especially when eating spicy food or citrus fruits.(3) Manifestation of the disease can range from mild to severe and, in extreme cases, even hinder a person's ability to ingest foods, thereby making the person susceptible to malnutrition.(1)There are three clinical

presentation of RAS: minor aphthous, major aphthous and herpetiform ulcer. Minor aphthous (Mikulicz ulcer) are the most common (80-95% of all RAS lesions). They are white ulcerative lesions that may be round or oval and single or multiple.(4) Two to eight lesions occur per year, heal without scars after seven to fourteen days. (5) Major aphthous (Sutton's ulcer), accounts 10-15% of RAS cases and is characterized by large lesions with 1-2 lesions occurring at a time. These lesions may last for six weeks or more with severe pain commonly in immune-deficient patients.(1) Herpetiform ulcers are the least common variety (5-10%). Unlike minor and major aphthous, herpetiform ulcers appear on both keratinized and non-keratinized mucosa. (4) Minor aphthous ulcer is amongst the most common form of oral ulcerative disease and affects 15-20% of the population worldwide. It has been documented as being as high as 50-66% in some populations.(6)The cause of these lesions is not thought to be viral or bacterial in origin, but likely an auto-immune mediated condition. (2) There is considerable evidence that aphthous ulcers are related to a focal immune dysfunction in which T lymphocytes have a significant role.(7) Some predisposing factors may be identifiable for RAS: trauma, stress, deficiency of iron, folic acid or vitamin B12, sodium lauryl sulfate, cessation of smoking, food allergy and gastrointestinal disorders.(8) Aphthae can also occur as widespread lesions in association with systemic diseases including Bacet's syndrome, and malabsorption disorders like Crohn's and Celiac diseases. (1, 4) Similar epithelial damage resulting from trauma, an immunological attack of as in lichen planus, pemphigoid or pemphigus; damage because of an immune defect as in HIV disease and leukemia; infections like tuberculosis, herpes

viruses and syphilis; cancers and nutritional defects.(3)There is no curative treatment for RAS. The best that can be achieved is to avoid local traumatic precipitation, lessen the pain and duration of ulceration by suppressing the local immune response, and prevent secondary infections.(8)Lasers have several potential applications in periodontology, these applications include laser gingivectomy, laser gingivoplasty, laser curettage, laser sterilization of root surfaces and periodontal pockets, laser scaling, frenectomy, crown lengthening, biopsies, tongue lesions, white lesions, aphthous ulcers, laser root planning, distal wedge and tuberosity reduction.(9)Diode lasers are semiconductors that use solid state elements to change electrical energy to optical energy. Diode laser wavelength ($\lambda = 810-980\text{nm}$) approximate the absorption coefficient of soft tissue pigmentation (melanin, hemoglobin and oxyhemoglobin). Therefore, the light energy from the diode is highly absorbed by the soft tissues and poorly absorbed by teeth and bone.(10, 11) A 940 nm laser can be used to coagulate, cut or ablate soft tissue, in a contact mode for enhanced surgical precision and tactile feedback, or in a non-contact mode. Pulsed mode have been developed which allow a range of soft tissue procedures to be completed without local anaesthesia. This is possible by using very short pulse durations (≤ 100 microseconds) which are shorter than both the thermal relaxation time of soft tissue and the receptor range of nociceptor pain responses.(12) High power diode laser can be used as low power laser when it is defocused. The advantages of this adaptation are to enable both high and low power functions with same laser device. Defocused diode laser is based on physical parameters that produce only biomodulatory effects on the tissue without thermal damage or ablation. It

has been applied to induce analgesia and acceleration of wound repair.

(13)The aim of this study is to evaluate the effect of the diode laser irradiation on the duration and pain sensation of the recurrent aphthous stomatitis. Materials and methodsSubjects: thirty two aphthous ulcers were included in this study as experimental samples, in addition to the same number of ulcers as control lesions. These ulcers where selected from patients who attended to the educational clinics of the college of the dentistry in Tikrit university from January to April 2013. Patient with systemic disorders and /or less than 16 years old were excluded. The patients were informed about the nature of the study and asked to commit to the follow up visits and consents were taken from them. Method: the lesions from the experimental group were irradiated with diod laser (Ezlase, Biolase, USA). The laser parameters used in this study were listed in table (1). Within the first visit, pain score were estimated according to the patient perception in a scale (1-10) for all patients (experimental and control groups). After the lesions irradiation the pain scores were recorded again for the experimental group. All patients were examined every 24 hours until complete subside of the ulcers occur. The duration of each ulcer (experimental and control) was recorded taking in consideration the periods after and before the first visit. Statistical analysis: collected data including duration of the ulcers and pain scores were tabulated in excel tables (Microsoft office 2010). Means, standard deviations, ANOVA test and p values were calculated using IBM SBSS 19. 0. 0 statistical package for windows. ResultsTable (2) has shown means, standard deviations and the significance of the differences in the pain scores of the patients just before and after irradiation of the lesion.

There are immediate changes in the pain scores of the experimental group just after diode laser application. The patient felt pain relief and decreased pain scores in a range (4-8) and the mean reduction in the pain scores is as high as 6 in a scale of (1-10). The means and standard deviations of the lesion duration (in days) are listed in table (3). The duration of the control group lesions ranged between 7-14 days, and the mean was 10. 28 days, while the lesion in the experimental group subsided with a range between 4-12 days with 6. 66 days in mean. There is highly significant reduction in the lesion duration in the irradiated ulcers. DiscussionThe result of this study showed that a single session of diode laser irradiation can be used to produce immediate, dramatic and sustained analgesic effect on RAS lesion. In addition, the lesion duration were significantly reduced to about 40% from that of control lesion. Early studies in this field depended on the thermal and ablation effects of the laser on RAS lesions. Colvard and Kuo got 88% pain free result by using carbon dioxide laser in ablative manner to treat aphthous ulcers. However, laser with these parameters could not be used without local anesthesia.(14) Zand et al found more promising results by using low intensity, non-thermal and subablative dose of carbon dioxide laser.(15) The pain of RAS lesions derives from inflammatory sensitization of small diameter nerve endings that form a plexus at the junction of the epithelial and subepithelial layers. Branches of the plexus extend upward, into the epithelial layer; thus, RAS produces a superficial, focal, inflammatory lesion that is directly associated with exposed sensory nerve endings.(16) So in an aphthous ulcer, carbon dioxide laser irradiation can reach the exposed nerve endings easily.(15)Low level laser therapy (LLLT) involves the use of

specific laser wavelengths ranged from visible red to near infrared with the tissue in order to stimulate and improve healing, as well as reduce pain.(17) Laboratory studies suggest that irradiation with LLLT stimulates collagen production, alter DNA synthesis, and improves the function of damaged neurological tissue. Different mechanisms have been suggested for the main therapeutic effects with LLLT, some of these theories are as follow; the mitochondria produces more ATP and cellular oxygen consumption is decreased, the serotonin and endorphin are increased, prostaglandin synthesis is decreased, expression of cytokines and growth factors is induced and inflammation will be decreased then wound healing occurs.(18) De Souza TO et al reported that LLLT can cause reduction in pain and a total regression of the lesion after 4 days.(19) Khademi H et al reported that low level laser can decrease the healing time, pain intensity and also decrease the time of pain relief in patients with aphthae.(20)In the current study, all the patients from the experimental group claimed reduction of the pain after single session of diode laser. That is much more than the previous studies. The lesion also showed quicker healing. These finding may be due to the use of the third generation diode laser technology. In this study diode laser source emitted radiation with 940nm wavelength which absorbed strongly in haemoglobin and water. This wavelength corresponds to the peak absorption for oxygenated (arterial) blood in this region of the spectrum and also higher absorption into deoxygenated (venous) blood than 810 or 980 nm diode lasers, giving this laser type more efficiency.(12) The wavelength of this laser render it very effective biostimulation device at the same time the output parameters render it very efficient thermal laser. In other words,

diode laser with 940nm wavelength combine the effect of thermal subablative lasers with the wanted effect of LLLT. Conclusion Single session of diode laser irradiation can be used to produce immediate, dramatic and sustained analgesic effect on RAS lesion. The lesion duration were significantly reduced to about 40% from that of control lesion. Table (1): Laser parameters used to irradiate the experimental lesions. Laser device Wavelength Pulse duration Exposure time Total energy Mode Diode (Ezlase) 940 nm 1.00 μ s 30-40 s 150-200 J Non-contact

Table (2): Statistical analysis between experimental and control groups according to pain score difference in the first visit.

groups	mean	SD	experimental	control	P-value	Significance
experimental	5.96	8751.14	1088661	control	00P-value	1.72E-37

Table (3): Statistical analysis between experimental and control groups according to lesion duration in days.

groups	mean	SD	experimental	control	P-value	Significance
experimental	6.65	6251.96	2291	control	10.28	1252.08
experimental	6.65	6251.96	2291	control	10.28	1252.08