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INFLUENCE OF DIODE LASER TREATMENT OF RECURRENT HERPES LABIALIS ON HEALING TIME AND LESION RECURRENCE RATE

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AUTHORS' CONTRIBUTIONS

This work was carried out in collaboration between both authors. Author HAE performed the diagnosis of the patient and treatment sessions, study design and drafting of the article and approval for the final version of the manuscript. Author IPA data collection and interpretation, critical revision of the manuscript and approval for the final version of the manuscript. Both authors read and approved the final manuscript.

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Case Report

ABSTRACT

Aims: Describe the use of the diode laser in the treatment of recurrent herpes labialis (RHL) to alleviate the symptoms, accelerate healing and delays recurrences.

Presentation of Case: A female patient with a history of 3-4 episodes of RHL per year for the last 5 years was treated with a 940 nm diode laser. Two applications were done during 60 seconds covering the whole area**.** The Pain was significantly reduced with a complete healing after 7 days and no recurrences have been seen up to now.

Discussion: Photobiomodulation has been proposed as a good alternative for this lesion despite the heterogeneity in the application protocols and parameters among the literature and its effects over the recurrent herpes labialis have been proved.

Conclusion: The use of photobiomodulation can prevent recurrent relapses in this pathology and improve the quality of life of the patients.

Keywords: Diode laser treatment; herpes labialis; photobiomodulation.

1. INTRODUCTION

Recurrent herpes labialis (RHL) is a very common clinical situation among young adults 20-40% [1]. Following the primary infection with herpes simplex virus type 1 (HSV-1) the virus replicates at the site of infection and remains latent in the trigeminal ganglion. Its future reactivation can take place by triggering factors such as psychological or physiological stress, ultraviolet radiation, trauma, menstruation, immunosuppression**,** or fever among others [2]. The course of the disease starts with a tingling or burning sensation, followed by macule formation turning into papule forming a single or multiple vesicles. The vesicle bursts resulting in painful erosion, and subsequent crust formation which indicates the healing initiation and the lesion usually resolves without scarring within seven to ten days [3,4].

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Although it is a self-limiting condition, several treatment options aiming to decrease the severity of symptoms and infectivity as well as improve the disease course. Topical application of acyclovir 5% or penciclovir 1% can be applied to reduce healing time but there is no evidence for decreasing its outbreak; in addition because of its short half-life several daily applications are necessary.

Systemic antivirals can be indicated in patients with frequent and severe episodes of RHL as a prophylactic modality. However, the nephrotoxic effect has been reported [5]. Photobiomodulation therapy has been proposed recently as a treatment option due to its anti-inflammatory analgesic effect, tissue regeneration capacity, promotion of fibroblasts proliferation, and neo-vascularization [6]. Eduardo Cde P et al. [7] in a 3-year follow-up of the pilot study observed the efficacy of laser therapy on the prevention of herpes labialis outbreaks.

The aim of this case report is to show the benefits of the diode laser treatment of recurrent herpes labialis to alleviate the symptoms, accelerate healing and retards the recurrent rate.

2. CASE REPORT

A 32-years old female patient, with a history of 3-4 episodes of RHL annually for the last 5 years coinciding with the menstruation, which is usually resolved and completely heals by applying acyclovir 5% topical treatment within 7-10 days. The patient came to our practice referring to an initiation of a new RHL episode with a tingling painful sensation in the right side of the upper lip. Clinical examination revealed a reddish swollen region of the described area with a pale central region indicating the formation of the papule.

2.1 Pain Level Evaluation

The patient referred pain levels of 6/10 on the visual analog scale (VAS) before treatment.

2.2 Treatment Session

The informed consent for the laser treatment was signed by the patient and we performed two laser applications in a single session. A 940 nm diode laser (iLase handpiece, Biolase Irvine, CA 92618, USA) was used to irradiate the affected area in a vertical and horizontal scanning movements covering the whole area of the papule at a distance of 2-3 mm with a non-initiated 300 µm tip for 60 seconds.

The fiber optic tip was removed and we used the handpiece directly to perform a second irradiation at 3 mm distance in a scanning movement covering an area of approximately $1cm^2$ to promote anti-inflammatory analgesic effect in the affected area.

The laser specifications and irradiation parameters used are documented in Tables 1and 2.

Table 1. Laser specifications

Laser specifications	Value
Wavelength	940 nm ± 10 nm
Laser class	IV
Emission mode	Continuos wave
Aiming beam	Laser diode max. 1 mW, 625-670 nm, class I
N.O.H.D	2.61 meters

Follow-up was carried out on the second, third and seventh day and documented with photographs (Fig. 1).

2nd day follow-up: The patient referred zero pain on the VAS, and we noticed the area more brownish indicating healing initiation.

3rd day follow-up: we observed a crust formation and significant improvement of the inflammation of the whole area.

7th day follow-up: shows complete healing.

Table 2. Laser application parameters

Irradiation parameters	First application	Second application (in the same session).
Tip	300 µm of 7 mm length	Handpiece without tip
Tip initiation	No	-
Emission mode	Continous wave	Continous wave
Power	0.7 W	0.2 W
Irradiation time	60 seconds	40 seconds
Total energy delivered	42 J	8 J
Scanning movement speed	2 mm/s	1 mm/s
Contact mode	2-3 mm distance	2-3 mm distance
Power density		1.53 W/cm^2

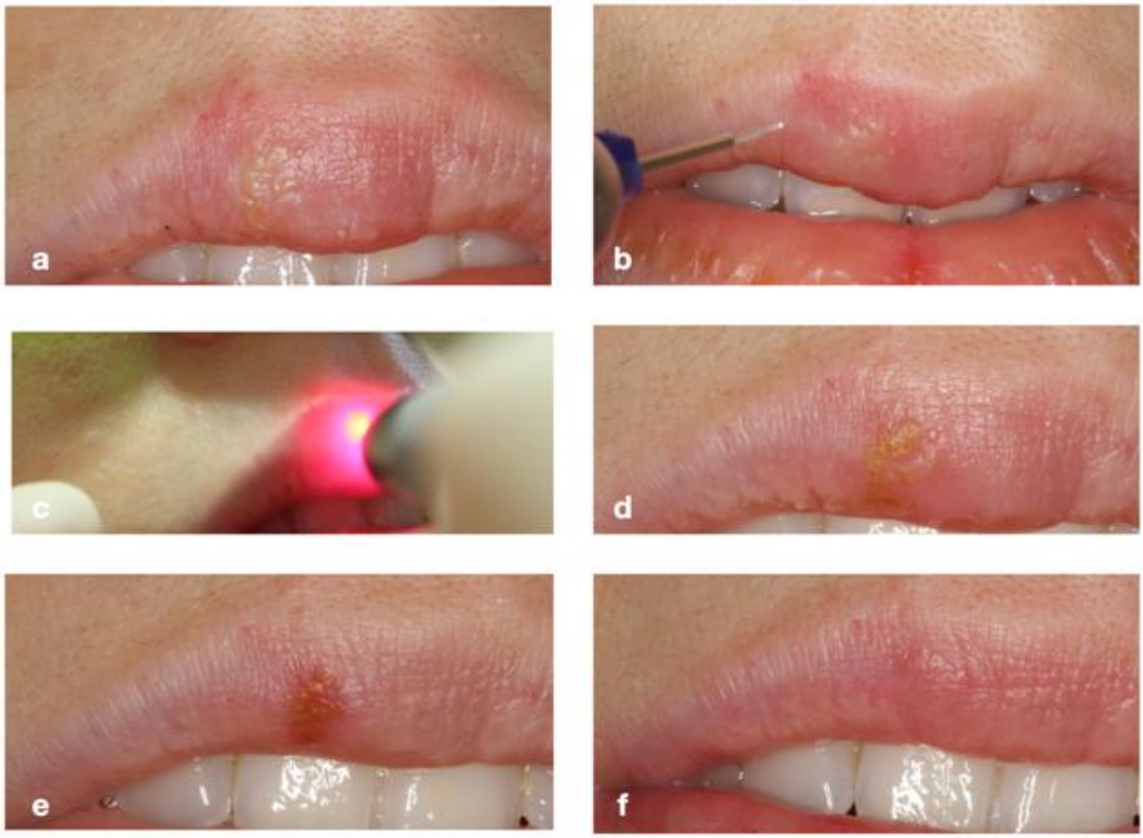

Fig. 1. a) Initial situation, b) Laser aplication using the fiber tip 300 µm, c) Photobiomodulation application with the handpiece, d) second day after treatment, e) Third day (notice the early crust formation), f) One week after treatment showing complete healing

One year follow-up: The patient reported no outbreak episodes during this year without changing her lifestyle and daily routine.

3. DISCUSSION

The recurrent herpes labialis usually starts by a prodromic phase before the lesion outbreaks. This phase can take less than 24 hours with a tingling or burning sensation at the area where the lesion will be formed. After this stage, the erythematous area appears which transforms to maculopapular ulcers and small infective vesicles that persist several hours until a crust develops which indicates the healing initiation [8].

Although RHL is a self-limiting condition, topical antivirals are used to shorten the duration and alleviate the symptoms. These agents should be used several times per day due to their short half-life and it is only effective if they are initiated during the early lesion onset [9]. The healing time and painful symptoms reduction are very limited with the pharmacological approach and the patients can still experience several relapses during the year [10,11].

Photobiomodulation has been proposed for the treatment of RHL due to its anti-inflammatory analgesic effect together with tissue regeneration, fibroblast proliferation, and neovascularization capacity [12]. In this case report, the patient described no pain during the course of the lesion after the photobiomodulation treatment and also we were able to document the healing course with 24 hours control noticing crust formation at the third day which is significantly faster than the usual course.

Concerning diode laser parameters wavelength range from 780-808 nm seems to be effective to prevent RHL in the latent stage, while 600-700 nm wavelengths are more effective in the prodromic and crust stages [13,14]. Studies reported power settings to range between 20-80 mW, and energy densities of 2-8 J/cm^2 with exposure times between 40 seconds to 10 minutes per session [15]. The heterogeneity in the application protocols and parameters among studies makes it difficult to reach an ideal clinical protocol.

In our case report, we used the wavelength of 940 nm in the earliest stages of the lesion with 2 applications, the first one using 300 µm fiber optic tip at 2-3 mm distance in continuous scanning movement covering the whole lesion area for photobiomodulation of the infected epithelial cells. A second application was done with lower power settings of 30 mW scanning a larger area to reduce pain and inflammation of the surrounding tissues. Donnarumma et al. [16] in an *In vitro* study observed that diode laser (808 nm) was able to inhibit HSV-1 replication and reduced the HSV-1 VP16 gene expression (the gene responsible for viral replication) by 50%, which can be a possible explanation for the mechanism of action of the laser therapy but it is still uncertain.

In our protocol we irradiated the lesion in a non-contact mode, Eduardo Cde et al. [13] used an activated laser tip to rupture the vesicles and eliminate the infective stage accelerating the healing time which can be another useful alternative in that stage. Muñoz et al. [17] in a clinical randomized study irradiate between C2 and C3 vertebrae with 1.2 J in each session in an attempt to inhibit viral reactivation, noticing lower relapse rates in the irradiated group. Nevertheless, the efficacy of this irradiation point is uncertain due to the low energy dose given and the absence of previous human studies to support its effectiveness, but it can be considered for future investigations.

4. CONCLUSION

The laser therapy in our case accelerated the healing time, obtained lower pain levels compared to other episodes treated by the conventional therapy and with no recurrence during the course of one-year follow-up. Photobiomodulation can be a promising treatment alternative to conventional antiviral medication, but there are insufficient homogenous randomized controlled clinical trials to establish a specific clinical protocol.

DISCLAIMER

The products used for this research are commonly and predominantly use products in our area of research and country. There is absolutely no conflict of interest between the authors and producers of the products because we do not intend to use these products as an avenue for any litigation but for the advancement of knowledge. Also, the research was not funded by the producing company rather it was funded by personal efforts of the authors.

CONSENT

Patient consent was done for the presentation of the case.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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