

CLINICAL EFFICACY OF COMBOCOHERENCE PHOTOBIMODULATION THERAPY IN ORAL LICHEN PLANUS

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ABSTRACT

Oral lichen planus (OLP) is a chronic inflammatory mucocutaneous condition that is commonly treated with topical or systemic corticosteroids. However, long-term pharmaceutical use is limited due to side effects, contraindications in illnesses such as diabetes, and frequent relapses or resistance, particularly in stubborn erosive types that significantly damage patients quality of life. We assessed the clinical efficacy of photobiomodulation (PBM) Combocoherence therapy as a non-invasive, safe option for addressing aggravating oral lichen planus. This case series describes individuals with symptomatic OLP, including erosive and atrophic lesions that cause severe mouth burning and functional impairment, who were treated with dual diode laser photobiomodulation therapy.

PBM therapy resulted in immediate and considerable reductions in pain and burning sensations, as well as effective ulcer healing. The therapies were well-tolerated, with no adverse effects reported during follow-up assessments, suggesting long-term alleviation and stability in comparison to typical pharmacological techniques. Photobiomodulation-coherence therapy is a promising, safe, and effective non-invasive therapeutic option for symptomatic and erosive oral lichen planus. It has potent analgesic, anti-inflammatory, and healing properties without the side effects associated with corticosteroid therapy.

KEYWORDS: Oral Lichen Planus (OLP), Photobiomodulation (PBM), Erosive Lichen Planus, Diode Laser, Pain Management, Combo Coherence

INTRODUCTION

Oral lichen planus (OLP) is a relatively common chronic mucocutaneous disorder that affects 0.5–2% of the general population. It usually affects individuals between the ages of 30–65 years, with a slight female predisposition [1]. Buccal mucosa is the most common site of OLP followed by tongue and gingiva, but any site of the mucosa can be affected. Clinically, OLP is classified as reticular, papule, bullous plaque-type, atrophic, and erosive.

The reticular form is the most common form; it is mostly asymptomatic and requires no treatment. In contrast, atrophic-erosive forms usually present erythematous, ulcerative areas causing symptoms, ranging from mild burning sensation to severe pain, interfering with eating and speaking. [2].

It greatly affects patients quality of life that requires medical intervention. Additionally, OLP is considered a potentially malignant disorder with estimated transformation rate of 1.09%, with higher risk among those with atrophic-erosive lesions [3]. Although the exact etiopathogenesis of OLP is still unclear, current evidence supports an inflammatory cell-mediated immune response to an unknown trigger [1]. Factors reportedly associated with OLP include dental materials, systemic diseases, as well as medications, stress, viruses and genetic susceptibility [4].

Given the obscure etiology, there is no specific therapy for OLP as yet and the treatment is usually symptomatic and without a definite cure. Therapies that have been used for treatment of OLP include corticosteroids such as clobetasol; topical calcineurin inhibitors such as tacrolimus; topical and systemic retinoids such as tretinoin; and immunosuppressants such as azathioprine [5].

Non-pharmacological modalities include cryotherapy, photodynamic therapy and surgical excision. Topical and systemic corticosteroids are the most widely accepted treatment option for OLP [2]. However, due to the chronic nature of OLP, long-term use of corticosteroids has numerous disadvantages that include mucosal thinning, secondary candidiasis, adrenal insufficiency, patient compliance with the treatment, and discomfort during application. Moreover, some cases remain refractory to steroid therapy. [5].

The use of low-level laser therapy (LLLT) as an alternative modality for treatment of OLP has been of great interest in the recent years. LLLT, also known as photobiomodulation, is a non-pharmacological, non-invasive clinical application,

which has potential analgesic, anti-inflammatory, immunomodulatory, and biostimulating effects, with minimum adverse effects [6]. Numerous studies have evaluated the efficacy of laser in treatment of symptomatic OLP. [7,8]. Dillenburg et al. [9] reported significantly better improvement in signs and symptoms of OLP with less recurrence rate among laser-treated group compared to clobetasol group. Additionally, Jajram et al. [10] reported that laser therapy was as effective as dexamethasone in the treatment of OLP without any reported side effects. On the other hand, Kazancioglu and Erisen [11] found that corticosteroids and ozone to be more effective in pain alleviation and clinical improvement in patients with erosive OLP than laser therapy. There seems to be some controversy regarding the efficacy of laser therapy in management of OLP.

Our aim is to report a long term follow up of a case of severe oral lichen planus (erosive type) with holistic management. This holistic management could be considered whenever dealing with oral lichen planus cases or any oral disease at large.

Case 1

A 55-year-old male patient was referred for severe pain in the buccal mucosa and gum inflammation associated with white intraoral lesions. The patient was consulted by several dental practitioners but neither a definitive investigation nor a conclusive diagnosis was made. The patient was referred to the department after all forms of treatment were unsuccessful. The provisional diagnosis of chronic periodontitis from the previous hospital indicated a prescription of chlorhexidine mouthwash and full mouth scaling.

He presented with extreme pain and burning sensation in his mouth particularly at both buccal mucosa. The patient was barely able to open her mouth due to extreme pain. Due to this problem, he had avoided any spicy and sour food. His dietary routines are roti and rice with some curry which he could not enjoy for many years. He was only able to tolerate soft or blended food since then. His daily diet was so bland and not much of options.

Medically, he was diabetic for the past 10 years and was under medication and also previously suffered from unstable angina. His systemic conditions are currently well-stabilized with medical therapy, and he remains under regular follow-up with his physician.

During his initial visit to the department, his intraoral examination findings showed a mixed reticular & erosive type of Lichen planus on his buccal mucosa bilaterally. (Figures 1 and 2). These white patches were in the background of ulcerated/erythematous mucosa. We also observed the frothy saliva as a sign of dry mouth condition. The patient was not wearing any dental prosthesis and had undergone regular scaling procedures with his dentist from the previous hospital. The patient takes up to 20 minutes to brush her teeth (in a gentle manner) daily with a manual, soft bristle toothbrush.

He showed slight dryness of the skin without any other significant findings. Eyes were moist without any evidence of dryness. Skin and lips were dry, but there were no abnormalities in the temporomandibular joint (TMJ) and cervical lymph nodes were non-palpable. Clinically, the presentation of his mouth condition gave the impression of an oral lichenoid reaction based on some medications consumed by the patient.

Psychologically, we found patient showed some signs of depression correlated with his ongoing chronic oral problem.

Due to his history as well as intraoral and extraoral findings, we believed that he could have either oral lichen planus (mixed reticular & erosive type) or an oral lichenoid reaction (associated with medications). A biopsy was planned but was put on hold due to his complaint of extreme pain.

Case 2

The index patient's younger brother aged 52 years accompanied him and presented together on the same day, exhibiting a remarkably similar clinical picture of severe oral discomfort, burning sensations, and mucosal lesions. Notably, he reported experiencing more intense pain on the right side of his oral cavity. His medical history was significant for a 15-year history of tobacco chewing, as well as a history of diabetes mellitus and hypertension, both of which were currently managed with medication.

Clinical Findings

Intraoral Findings: Bilateral white atrophic and erosive patches distributed across the buccal mucosa mirroring the presentation seen in his older brother—accompanied by significant mucosal erythema and pain that severely impacted his daily nutritional intake and quality of life. (Figure 8)

Similar clinical evaluations were performed to rule out systemic contributing factors and medication-induced or tobacco-associated lesions, highlighting a striking simultaneous familial presentation and clustering of the disease phenotype.

Both patients have undergone Phase I scaling and root planing. A 980-nm/650 nm dual wavelength diode laser (Novolase) and a photobiomodulation handpiece were employed to perform PBM and to reduce pain & inflammation for 3 sessions in a week for a period of two weeks (Figure 4 & 5). Laser energy was delivered with contact mode, with a variable number of spots to cover all the size of the lesion and the area over the border for 5-10 mm. To ensure a fluence of 10 J/cm², the diode laser with 650nm was set as follows: output power of 0.2 W with continuous wave and time of application 30 s per point for 2 minutes. For pain relief the laser output of 0.2W of 980 nm wavelength for 30 seconds per point for 2 minutes. (Figure 3, Figure 9)

No adverse effects occurred following laser PBM treatment. Symptoms had completely subsided after the first sessions and both returned for a one-year follow-up visit upon returning to their hometown. (Figure 6, 7 & 10)



Figure 1 Case 1:Pre-op. Figure 2



Figure.3 PBM Using Novolase Duo



Figure 4 & 5 After 3 Sessions of PBM



Figure.6 & 7 Follow up After One Year



Figure 8 Case 2: Pre-op



Figure 9 PBM Using Novolase Duo



Figure 10 Follow up After One Year

DISCUSSION

The literature offers several trials and systematic reviews supporting the efficacy of laser PBM in reducing symptoms and clinical signs in OLP, but those protocols included many PBM sessions (8 to 12) and multiple sessions during the week [11,12,13]. For example, Dillenburg et al. found improvement in symptoms, clinical signs, and post-treatment relapse with PBM vs. topical clobetasol for OLP treatment in 42 patients, who underwent a photobiomodulation protocol including 12 sessions, 3 times a week [9].

Our Laser Protocol was similar to Dillenburg's study but in our study laser sessions were limited to three and we have not compared with any topical medications. Further, Jajarm et al. reported comparable improvements in symptoms and clinical signs with PBM vs. dexamethasone rinses, but the protocol included 10 PBM sessions, twice a week [10]. Of note, such protocols require considerable compliance by the patient who is expected to attend the clinics several times for the therapy sessions with the laser. PBM is therefore an indicated treatment for patients with adequate time and means to travel.

A single laser administration (or any smaller number of sessions) would allow an easier and more suitable treatment to a higher number of patients suffering from OLP.

PBM performed with a photobiomodulation handpiece would be more effective, predictable and reproducible [14]. The use of this handpiece and of the "spot technique" application technique allows to accurately calculate the amount of energy delivered to the tissues and to make the protocol easily reproducible. The laser protocol of our study delivered a fluence of 12 J/cm². This value of fluence would allow to obtain an analgesic and anti-inflammatory action on the mucous membranes, two fundamental effects in the management of symptoms of OLP.

The potential effects of LLLTs in reduction of signs (clinical appearance) and symptoms (pain) in OLP can be credited to various mechanisms. LLLT plays a pivotal role in the production of β -endorphins and enkephalins and reduction in levels of bradykinin and histamine, thereby contributing to an analgesic effect and pain relief. The analgesic effect of LLLT is also corroborated by its action on the C fibers, decreasing their activity and leading to a reduction in conductance of pain stimuli [15]. The reduction in clinical signs of OLP after LLLT could be explained by its biological activity in enhancing

increased proliferation, differentiation, and migration of fibroblasts and stimulation of epithelial cells, which are considered key contributors in the healing process of oral mucosa [16]. Additionally, LLLT plays a crucial role in immunomodulation. Modulation of mast cell function by LLLT enhances the release of leucocytes into oral tissues thereby playing a key role in control of oral mucosa inflammation [17].

A major advantage of LLLT over other conventional methods such as corticosteroids is its safety and the absence of any adverse effects. One of the included studies [9] that used corticosteroid has reported severe adverse effects such as burning sensation and gastrointestinal upset. The chronic nature of OLP necessitates the use of corticosteroids on a long-term basis resulting in numerous adverse effects such as mucosal atrophy, secondary candidiasis, and adrenal insufficiency and limits their use in hypertensive or diabetic patients [18]. Hence, LLLT can be considered as a viable alternative in these patients. Our laser sessions was limited to a three and our findings confirm the data in the literature about the absence of side effects after laser PBM, which is a very relevant data for the treatment of a chronic disease such as OLP [19]. Indeed, commonly used corticosteroid-based therapies can produce, especially if prolonged over time, undesirable effects such as secondary candidiasis, mucosal atrophy, adrenal insufficiency, gastrointestinal problems, hypertension, and diabetes [20].

Our findings suggest that 3 sessions in a week of laser PBM may provide some advantages in the reduction of pain for symptomatic OLP, with no undesirable effects. Randomized controlled trials including placebo or topical corticosteroids as comparator would be required to assess the efficacy of the multiple session laser PBM with a higher level of evidence. Suggested recommendations for future research include the incorporation of well-designed randomized controlled trials with sufficient sample size and long-term follow-up along with inclusion of standard laser parameters with appropriate dose. These measures would validate the evidence of LLLT use in OLP treatment and minimize the risk of measurement bias. Future studies and further research could substantiate the role of LLLT as a viable alternative option in the treatment of OLP.

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