



Photobiomodulation Therapy in the Management of Oral Lichen Planus and its Outcome in Refractory Cases of Erosive Form

Farha Khatoon¹, Sunil Surendraprasad Mishra¹, Anupama Anand Chavan¹, Prajakta Ravindra Patil¹, Akash Dattatray Bade¹, Arunima Sarma²

¹Department of Oral Medicine and Radiology, Dr. D. Y. Patil Dental College and Hospital, Dr. D. Y. Patil Vidyapeeth (Deemed to be University), Pimpri, Pune, India

²Department of Oral Medicine and Radiology, M.M. Institute of Dental Sciences and Research, MM (Deemed to be University) Mullana ambala, Haryana, India

*Correspondence to
Sunil Surendraprasad Mishra,
Email: aegisthesunil@gmail.com

Received: June 2, 2025
Accepted: August 20, 2025
ePublished: September 30, 2025



Abstract

Introduction: Oral lichen planus (OLP) presents with a burning sensation which may be severe enough to affect the daily activity of the patient. A standard therapy regimen includes the use of topical/systemic corticosteroids. However, many cases show the relapse/recurrence of the lesion and its symptoms frequently after the discontinuation of treatment. Some patients may also develop resistance to corticosteroids or may suffer from the side effects of corticosteroids. Its use is again limited in diabetic patients who are more prone to OLP.

Methods: We report six OLP cases (Three were diagnosed as recalcitrant erosive lichen planus) presenting with a complaint of oral burning condition which severely affected their quality of life.

Results: Following photobiomodulation (PBM), all cases had complete remission of burning sensation and healing of ulceration and have shown no recurrences in the past 6 months, making PBM an ideal choice for the management of oral burning conditions.

Conclusion: PBM is a promising non-invasive treatment modality, which has instantaneous effects on reducing burning sensation in all forms of OLP, even in recalcitrant cases, without any side effects. It does have proven analgesic, anti-inflammatory, and healing effects.

Keywords: Erosive lichen planus; Recalcitrant OLP; Photobiomodulation therapy; PBM, Good health and well-being.

Introduction

Oral lichen planus (OLP) is a chronic, inflammatory mucocutaneous disease that originated from a T-cell mediated autoimmune reaction, having various clinical forms in the oral cavity.¹ The reticular forms are mostly asymptomatic, whereas the atrophic and erosive forms are associated with ulcerations and are consequently more severe, causing symptoms such as a burning sensation. Also, the latter forms have a high risk of malignant transformation.^{2,3} The majority of OLP patients have episodes of relapse and remission. During periods of exacerbation, symptoms intensify and are associated with psychological disorders or stress.² OLP management is primarily aimed at providing symptomatic relief from burning sensations to improve quality of life, reduce stress, minimize the risk of malignant transformation, and prevent frequent relapses.^{1,3} There are various treatment methods for reducing the burning sensation in OLP, most commonly topical and systemic corticosteroids but the evidence of recurrence noted after the stoppage of

corticosteroids and the associated side effects of long-term corticosteroids have led to the search for an alternative for managing OLP.

Photobiomodulation (PBM) therapy is a promising approach for the management of burning sensations in inflammatory conditions and autoimmune lesions, like OLP, without any adverse effects. It is the therapeutic use of non-ionizing light at near-infrared frequencies to modulate biological activity.⁴ PBM therapy modulates biological processes at the molecular and cellular levels, enhancing tissue healing and repair.⁴⁻⁶

Case Presentation

Case 1

A 23-year-old female patient was referred to the dental outpatient department (OPD) with a one-year history of burning sensations in the mouth. Initially, the symptoms were mild but increased gradually overtime and worsened after 1 month. She also had ulceration, which led to difficulty in eating food and even routine tooth brushing.

One year back, she had consulted a private dental practitioner who prescribed her medicine (The patient could not recall the names of medicines), after which the burning sensation was reduced temporarily but recurred 3-4 times within a year. There were no relevant medical history and no adverse habits. On intraoral examination, right and left buccal mucosa showed a diffuse mixed red and white lesion in the form of reticular white striae at the periphery with the central erythematous area extending antero-posteriorly from the commissural area to the retromolar area. The palatal mucosa showed localized white-grey radiating striae along with the erythematous component with respect to the bilateral first molar regions. The dorsal surface of the tongue showed well-defined reticular striae in annular form with central erythema, whereas the lateral border of the tongue had white reticular striae along with ulceration on both left and right sides. The gingiva showed generalized desquamation along with the intermittent evidence of white striae. With a provisional diagnosis of erosive lichen planus and after histopathological confirmation of no dysplastic changes, the patient was advised to have topical and systemic corticosteroids, along with antioxidants for 2 months, which reduced the symptoms but showed immediate recurrence of ulceration after the stoppage of steroids. After obtaining consent from the patient, PBM therapy (980 nm soft diode with power setting of 1 W in non-contact mode for 2 minutes per area at an interval of 3 days) was given (Table 1). After 8 sessions, the patient reported complete remission of ulceration as well as burning sensation (Figure 1, Table 2). The patient is under ongoing follow-up, and so far, there has been no reported incidence of recurrence of the lesion.

Case 2

A 63-year-old female was referred to the dental OPD for routine cleaning of the teeth. During history taking, she also reported ulcerations and burning sensations in the mouth associated with difficulty in eating over the past one and half years. She previously reported to a private dental clinic with the same complain and was diagnosed with an allergic reaction and was prescribed antihistamines.

Table 1. LASER Parameters for PBM Therapy

Parameters	
Type of laser	980 nm soft diode
Emission mode	Continuous wave
Delivery mode	Non-contact mode
Duration of exposure	2 minutes
Average time at each spot	1 minute
Working power	1 W
Distance between the fibre tip and the tissue surface	1-2 mm
Interval days between sessions	3 days

The patient did not have the documentation and did not remember the name of the drug prescribed, but there was no relief. She then opted for homeopathic medicine, from which she had a temporary relief for 5 months, after which ulcerations reoccurred, and then she presented at a nearby government hospital, reporting a fear that it might be a cancerous lesion. A biopsy was done, and the results revealed that the sample had features of a lichenoid reaction. As per the patient's narration, she was prescribed systemic steroids by doctors; however, the ulcerations became more severe. After this episode, she opted for ayurvedic treatment, but there was no relief either, and then she resorted back to homeopathic treatment from where she was referred to our OPD for teeth cleaning and for dental caries. There were no relevant medical history and no adverse habits. On examination, widespread mixed white (striae) and red (erosions and ulcerations) lesions involving bilateral buccal mucosa, lower labial mucosa, and dorsal and ventral surfaces of the tongue were seen. The gingiva showed generalized desquamation along with multiple points of ulceration. A working diagnosis of erosive lichen planus was considered, and a second biopsy was advised and turned out to be OLP with no dysplastic changes on histopathological examination. Treatment was started with antioxidants and corticosteroids for 2 weeks, but there was no significant relief. The patient was then advised to undergo PBM therapy to which she consented (The protocol was the same as that described in case 1). She began to see the improvements from the first session and was very pleased since she could carry out her daily activities and have food without any discomfort after a long time. After 10 sessions, the patient reported complete remission of the ulceration as well as the burning sensation (Figure 2, Table 2). To date, the patient has been under follow-up with no recurrence.

Case 3

A 43-year-old female patient was referred to our OPD from a medical college with complaints of white patches and burning sensations for one month. Upon inquiry, the patient reported a history of a sudden burning sensation that began two years ago, which she had initially ignored, attributing it to "heat of the body", but then it started increasing in intensity gradually, and after 20 days, she noticed greyish white patches on her cheeks. She consulted a skin specialist who prescribed her antioxidant, vit A cap, multivitamins, LA gel, and topical steroids. These medicines reduced the burning sensation, but it took over 9 months for complete remission. However, after 5-6 months, she again experienced a burning sensation and took medicine from a medical college for 1 month (multivitamin and anaesthetic gel) but had no relief, and then she was referred to our OPD. The patient had a habit of *mishri* once a day for 4-5 years, and there was no relevant medical history. On examination,

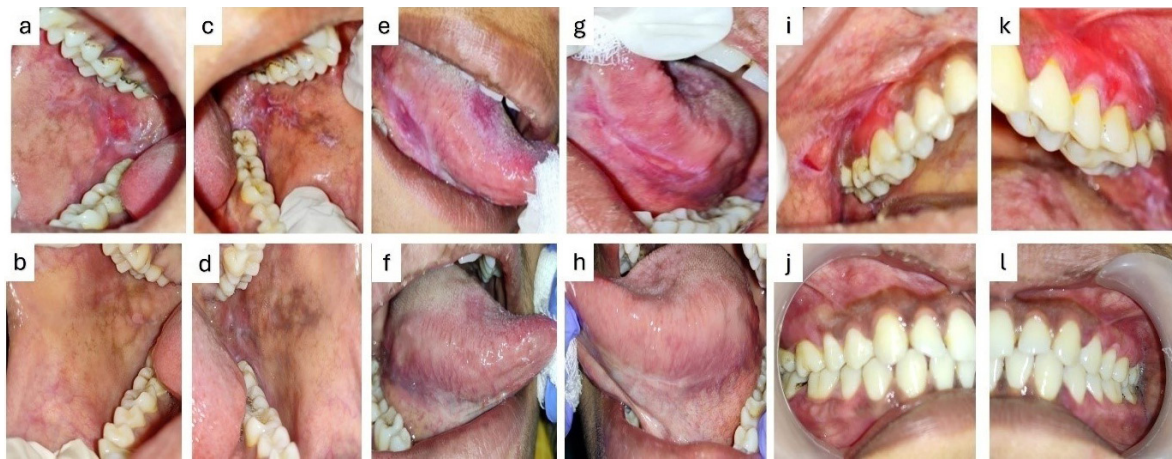


Figure 1. Pre- and Post-therapy Clinical Images of Case 1; a&b: right buccal mucosa, c&d: left buccal mucosa, e&f: right lateral border of the tongue, g&h: left lateral border of the tongue, i&j: gingiva of upper right posterior teeth region, k&l: gingival of the upper left posterior teeth region

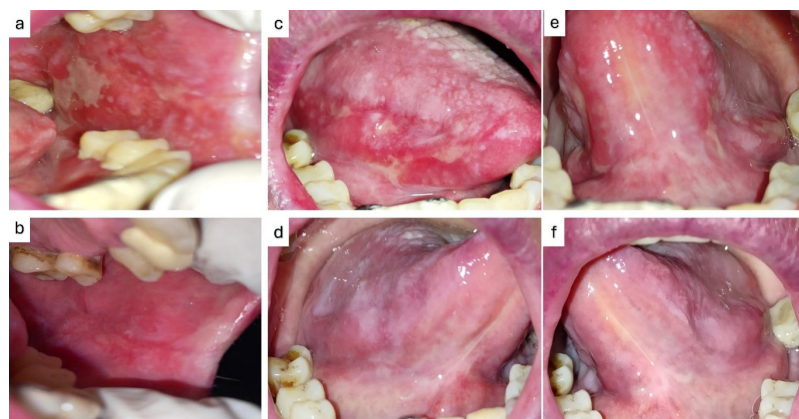


Figure 2. Pre- and Post-therapy Clinical Images of Case 2; a&b: left buccal mucosa, c&d: right lateral border of the tongue, e&f: ventral surface of the tongue

Table 2. Progression of the Burning Sensation in Terms of the VAS Score Following Photobiomodulation Therapy

Case No.	Age/sex	VAS scores									
		Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Session 7	Session 8	Session 9	Session 10
1	23/F	9/10	6/10	5/10	4/10	4/10	3/10	1/10	0/10	-	-
2	63/F	10/10	8/10	7/10	6/10	6/10	5/10	5/10	3/10	1/10	0/10
3	43/F	8/10	6/10	4/10	4/10	3/10	1/10	1/10	0/10	-	-
4	56/F	9/10	6/10	4/10	1/10	0/10	-	-	-	-	-
5	20/M	8/10	7/10	5/10	4/10	2/10	0/10	-	-	-	-
6	31/M	7/10	4/10	3/10	1/10	0/10	-	-	-	-	-

amalgam restoration with #36 (FDI) and metal crown prosthesis with #45- #47 were noted. Bilateral buccal mucosa showed diffuse greyish white reticular striae with an erythematous component extending to upper and lower buccal vestibules, and a working diagnosis of mixed reticular and erosive form of lichen planus was suggested. The patient was put on an antioxidant and a topical corticosteroid for 1 month, but there was no relief, and then we advised PBM therapy (the same protocol as that in case1) after histopathological confirmation of no dysplastic changes. From the first session, the burning sensation started to reduce and completely remitted

after 8 sessions (Figure 3a-d, Table 2). There has been no recurrence of lesions/symptoms for more than 6 months.

Case 4

A 56-year-old female patient presented to the dental OPD with a one-year history of gingival ulceration and burning sensations. Initially, the symptoms were mild and relieved on their own within 5-6 days, but they recurred once in every 2-3months; their intensity increased gradually overtime and worsened during the past 15 days, which led to difficulty in eating food and tooth brushing. She also reported skin lesions for which she had consulted a skin

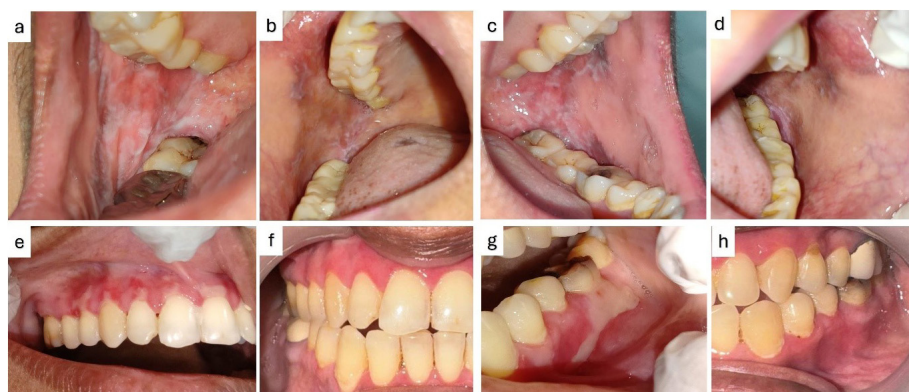


Figure 3. Pre- and Post-therapy Clinical Images of Case 3 (a-d); a&b: right buccal mucosa, c&d: left buccal mucosa; case 4 (e-h); e&f: gingiva of the upper right anterior and posterior teeth region, g&h: gingiva of the lower left posterior teeth region

specialist one year back, who had prescribed her topical cream/ointment for the skin (The patient could not recall the names of medicines). The patient was on antidiabetic medication for 4 years, underwent angioplasty three times (2016, 2018, 2019), and was on a daily dosage of aspirin. There was no adverse habit. Intraoral examination revealed desquamative gingivitis in the maxillary arch with the right second premolar to the left second premolar region, with overlying mucosa showing bullae formation in the labial/buccal marginal gingiva, with the largest bulla seen with the #23 region on attached gingival and alveolar mucosa. Similarly, desquamative gingivitis was seen with the mandibular arch, along with the formation of a large bulla seen with the #36 region. After ruling out lichenoid drug reaction with a provisional diagnosis of bullous lichen planus, we recommended PBM therapy as the first-line treatment due to the patient's diabetes. She agreed to the treatment, and after obtaining her informed consent, we initiated PBM therapy instead of steroid therapy. After the first session, a reduction in the size of ulcers and burning sensation was noted. After 5 sessions, complete resolution of the burning sensation and complete remission of the lesion were observed (Figure 3e-3h, Table 2).

Case 5

A 20-year-old male patient presented to the dental OPD with a complaint of a white patch and a burning sensation in his mouth for two months. The burning sensation had a sudden onset. It was initially mild but gradually increased in intensity, causing difficulty eating. He subsequently noticed white patches in his oral cavity. There were no relevant medical history and no adverse habit. Clinically bilateral buccal mucosa showed white reticular radiating striae at the periphery with a pigmented base and localised regions of erosions extending to the buccal vestibules. A clinical diagnosis of the annular form of OLP was considered. The patient was prescribed antioxidants, vitamin A supplements, and topical corticosteroids. He did have some relief in the burning sensation, with the

VAS score dropping down from 9 to 7, but he still had the discomfort and hence was advised to have PBM therapy which showed immediate relief following initial sessions. After 6 sessions, a complete remission of the burning sensation was noted (Figure 4a-4d, Table 2).

Case 6

A 31-year-old male patient was referred to the dental OPD with a complaint of white patches and burning sensations in his mouth for 2 months. Initially, intensity was mild but increased overtime. No relevant medical history was mentioned. He had a habit of Gutkha chewing and tobacco habit with chewing and placement habit in buccal vestibule 5-6 times a day for 3 years. Intraoral examination revealed a mixed red and white lesion with violaceous striae (pigmented) on the bilateral buccal mucosa. Also, a localized non-scrapable plaque was noted on the commissural area of the left buccal mucosa. With a working diagnosis of OLP with co-existing leukoplakia, the patient was advised to undergo PBM therapy immediately without waiting for biopsy, as there was no erosive component. After 5 sessions, the burning sensation was completely remitted, and the patient was further advised to have treatment and counselling for leukoplakia and habit cessation (Figure 4a-4d, Table 2).

Discussion

OLP primarily affects the skin and oral mucosa, though other mucosal surfaces, including the conjunctiva, esophagus, and genitalia, may also be involved. The prevalence rate is approximately 1%–2% in the general population, predominantly affecting individuals over 40 years of age, with a higher incidence in females. Within the oral cavity, the buccal mucosa is the most frequently involved site, typically presenting bilaterally.²⁻⁴ Among its various forms, the atrophic and erosive/ulcerative forms are characterized by epithelial thinning, erythema, and/or ulceration, often encircled by whitish striae at the periphery. These forms are commonly associated with a burning sensation, persist without spontaneous

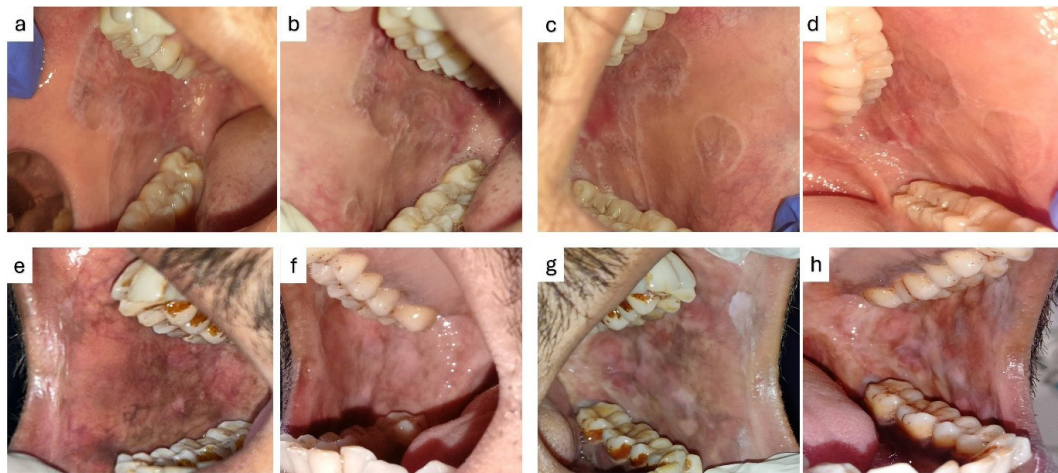


Figure 4. Pre- and Post-therapy Clinical Images of Case 5 (a-d); a&b: right buccal mucosa, c&d: left buccal mucosa; case 6(e-h); e&f: right buccal mucosa, g&h: left buccal mucosa

resolution, and may contribute to psychological stress or disorders.² Although the exact etiology of OLP remains uncertain, several predisposing factors have been implicated in its development.⁷ According to WHO, OLP has a malignant transformation rate of 0.4% to 5%.¹

In the pathogenesis of OLP, oxidative stress mediated by reactive oxygen species (ROS) plays a complex role. Under normal physiological conditions, a balance between intracellular ROS levels and biochemical antioxidants prevents cellular damage. Oxidative stress (OS) arises when this balance is disrupted. When ROS levels become excessive, the cell's ability to neutralize them is impaired, leading to damage to proteins, lipids, and DNA, ultimately resulting in cellular dysfunction. While normal ROS levels regulate essential cellular processes such as growth, apoptosis, and signal transduction, moderate to high ROS concentrations can induce apoptosis or even necrosis through OS. Additionally, ROS alter the antigenic properties of proteins, increasing their antigenicity and contributing to autoimmune diseases through oxidative protein modification.⁸

Corticosteroids serve as the standard therapy. However, their use is associated with potential adverse effects, development of resistance in some patients, and a high recurrence rate following treatment discontinuation. Additionally, corticosteroids show limited efficacy in refractory OLP and are contraindicated/restricted in diabetic patients. Immunomodulators and immunosuppressants, considered second-line treatments for OLP, may also cause side effects. Surgical intervention, though an option, is invasive, and its applicability depends on the type and extent of the lesion. Photochemotherapy methods, such as PUVA and PUVASOL, carry risks of multiple adverse effects, and the chemicals used in these therapies have potential carcinogenic properties.⁹ Another approach, photodynamic therapy, involves the activation of the photosensitizer 5-aminolevulinic acid (5-ALA) using light. However, its effectiveness depends on

tissue oxygen levels, and 5-ALA is easily diluted by saliva, necessitating proper salivary isolation. Additionally, 5-ALA is not commercially available in gel form, requiring preparation from its powdered formulation. This therapy is time-intensive, as the gel must remain on the lesion for 30–60 minutes before laser irradiation. Some patients also report experiencing a burning sensation during treatment.^{1,10}

PBM therapy is a promising alternative for managing the burning sensation in recalcitrant cases of OLP, offering effective relief without adverse effects and requiring minimal treatment time. The optimal therapeutic dose typically ranges from 2 to 3 J/cm² to achieve the desired biological effects. It enhances the production of adenosine triphosphate (ATP), decreases ROS levels, and regulates transcription factors involved in protein synthesis. Additionally, PBM modulates cytokine levels and growth factors, further contributing to its therapeutic benefits.³

The most widely accepted mechanism underlying PBM's efficacy is the "Cytochrome c Oxidase (CCO) Theory" proposed by Tiina Karu in the 1990s. According to this theory, mitochondrial CCO serves as the primary site of action, absorbing light energy, which leads to the dissociation of nitric oxide (NO) from its oxygen-binding site. This process restores oxygen availability within the cell, enhancing ATP production through the electron transport chain, increasing cellular oxygen levels, and subsequently reducing ROS, thereby alleviating oxidative stress. Furthermore, PBM stimulates RNA transcription and DNA synthesis, facilitating cellular repair and regeneration. NO also contributes indirectly by promoting local vasodilation, improving oxygen supply, increasing cell permeability, and enhancing cell division while modifying cellular self-degradation processes.^{3-5,7,8,11-13}

PBM therapy exerts anti-inflammatory effects by downregulating prostaglandin E2, prostaglandin-endoperoxide synthase 2, interleukin-1 beta, and tumor necrosis factor-alpha, as well as reducing neutrophil

infiltration, edema, and bleeding in a dose-dependent manner.³ PBM plays a crucial role in pain modulation by promoting the production of β -endorphins and enkephalins while simultaneously reducing the levels of bradykinin and histamine. Additionally, it inhibits pain receptors and also acts on C-fibers, decreasing their activity and thereby reducing the conduction of pain stimuli, leading to its analgesic and pain-relieving effects. PBM also stimulates fibroblast production, which is essential for tissue healing. The reduction of clinical signs in OLP following PBM therapy can be attributed to its biological activity in enhancing fibroblast proliferation, differentiation, and migration. This, in turn, promotes the stimulation of epithelial cells, which play a critical role in the healing process of the oral mucosa.⁷

Conclusion

PBM therapy is a safe, non-invasive, and effective treatment for managing the burning sensation and ulceration in OLP, especially in refractory cases. It provides rapid symptomatic relief, promotes healing, and shows no adverse effects or recurrence over the follow-up. PBM can be considered a valuable alternative to corticosteroids, particularly in patients with systemic contraindications.

Authors' Contribution

Conceptualization: Farha Khatoon, Sunil Surendraprasad Mishra.

Data curation: Farha Khatoon, Sunil Surendraprasad Mishra, Anupama Anand Chavan, Prajakta Ravindra Patil, Aakash Dattatray Bade, Arunima Sarma.

Formal analysis: Farha Khatoon, Sunil Surendraprasad Mishra.

Investigation: Farha Khatoon, Sunil Surendraprasad Mishra, Anupama Anand Chavan, Prajakta Ravindra Patil, Aakash Dattatray Bade.

Methodology: Farha Khatoon, Sunil Surendraprasad Mishra, Anupama Anand Chavan, Prajakta Ravindra Patil, Aakash Dattatray Bade, Arunima Sarma.

Project administration: Farha Khatoon, Sunil Surendraprasad Mishra.

Resources: Farha Khatoon, Sunil Surendraprasad Mishra, Anupama Anand Chavan, Prajakta Ravindra Patil, Aakash Dattatray Bade, Arunima Sarma.

Software: Farha Khatoon, Sunil Surendraprasad Mishra.

Supervision: Sunil Surendraprasad Mishra.

Validation: Farha Khatoon, Sunil Surendraprasad Mishra.

Visualization: Farha Khatoon, Sunil Surendraprasad Mishra, Anupama Anand Chavan, Prajakta Ravindra Patil, Aakash Dattatray Bade, Arunima Sarma.

Writing—original draft: Farha Khatoon, Sunil Surendraprasad Mishra.

Writing—review & editing: Farha Khatoon, Sunil Surendraprasad Mishra.

Ethical Approval

Written informed consent was taken from all patients.

Funding

Article Processing Charges by Dr. D. Y. Patil Dental College and

Hospital, Dr. D. Y. Patil Vidyapeeth, Pimpri, Pune-18.

References

1. Trakarnboonkij J, Tanya S, Sarideechaigul W, Subarnbhesaj A, Tabbon P, Sattayut S. Case report: recalcitrant oral lichen planus involving bilaterally buccal mucosae treated with a combination of photodynamic and photobiomodulation therapies. *F1000Res*. 2024;13:152. doi: [10.12688/f1000research.146733.1](https://doi.org/10.12688/f1000research.146733.1).
2. Ferri EP, de Barros Gallo C, Abboud CS, Yanaguizawa WH, Horliana A, de Fatima Teixeira da Silva D, et al. Efficacy of photobiomodulation on oral lichen planus: a protocol study for a double-blind, randomised controlled clinical trial. *BMJ Open*. 2018;8(10):e024083. doi: [10.1136/bmjopen-2018-024083](https://doi.org/10.1136/bmjopen-2018-024083).
3. Mohamed RK, Elsayed NM, Mahmoud SA, Gaweesh YY. Photobiomodulation versus corticosteroid in the management of erosive oral lichen planus: a randomized controlled clinical trial. *BMC Oral Health*. 2024;24(1):246. doi: [10.1186/s12903-024-03976-6](https://doi.org/10.1186/s12903-024-03976-6).
4. Nammour S, El Mobadder M, Brugnera A Jr, Namour M, Houeis S, Heysselaer D, et al. Photobiomodulation therapy vs. corticosteroid for the management of erosive/ulcerative and painful oral lichen planus: assessment of success rate during one-year follow-up: a retrospective study. *Healthcare (Basel)*. 2021;9(9):1137. doi: [10.3390/healthcare9091137](https://doi.org/10.3390/healthcare9091137).
5. Hanna R, Dalvi S, Benedicenti S, Amaroli A, Sălăgean T, Pop ID, et al. Photobiomodulation therapy in oral mucositis and potentially malignant oral lesions: a therapy towards the future. *Cancers (Basel)*. 2020;12(7):1949. doi: [10.3390/cancers12071949](https://doi.org/10.3390/cancers12071949).
6. Widhowaty Santoso A, Sufiawati I. Effectiveness of photobiomodulation in reducing pain of oral mucosal diseases: a case series. *Int Med Case Rep J*. 2023;16:407-17. doi: [10.2147/imcrj.S414313](https://doi.org/10.2147/imcrj.S414313).
7. Del Vecchio A, Palaia G, Grassotti B, Tenore G, Ciolfi C, Podda G, et al. Effects of laser photobiomodulation in the management of oral lichen planus: a literature review. *Clin Ter*. 2021;172(5):467-83. doi: [10.7417/ct.2021.2360](https://doi.org/10.7417/ct.2021.2360).
8. Li X, Wang Z. Mechanisms of reactive oxygen species in oral lichen planus: a literature review. *Eur J Inflamm*. 2022;20:1721727X221104389. doi: [10.1177/1721727x221104389](https://doi.org/10.1177/1721727x221104389).
9. Sulewska ME, Tomaszuk J, Sajewicz E, Pietruski J, Starzyńska A, Pietruska M. Treatment of reticular oral lichen planus with photodynamic therapy: a case series. *J Clin Med*. 2023;12(3):875. doi: [10.3390/jcm12030875](https://doi.org/10.3390/jcm12030875).
10. Rakesh N, Clint JB, Reddy SS, Nagi R, Chauhan P, Sharma S, et al. Clinical evaluation of photodynamic therapy for the treatment of refractory oral lichen planus - a case series. *Photodiagnosis Photodyn Ther*. 2018;24:280-5. doi: [10.1016/j.pdpdt.2018.09.011](https://doi.org/10.1016/j.pdpdt.2018.09.011).
11. Ramesh H, Somashekhar S, Kanathur S. Lichens in dermatology. *Indian J Dermatol Venereol Leprol*. 2023;89(6):908-15. doi: [10.25259/ijdv.794_2021](https://doi.org/10.25259/ijdv.794_2021).
12. Ślebioda Z, Dorocka-Bobkowska B. Low-level laser therapy in the treatment of recurrent aphthous stomatitis and oral lichen planus: a literature review. *Postepy Dermatol Alergol*. 2020;37(4):475-81. doi: [10.5114/ada.2020.98258](https://doi.org/10.5114/ada.2020.98258).
13. Rinku S, Deepak D, Uthkal MP, Mustafa SM. Treatment of erosive lichen planus with diode laser: a case report. *J Indian Acad Oral Med Radiol*. 2023;35(3):433-5. doi: [10.4103/jiaomr.jiaomr_303_22](https://doi.org/10.4103/jiaomr.jiaomr_303_22).