



Efficacy and Safety of Photodynamic Therapy Versus Corticosteroids in the Management of Oral Lichen Planus: A Systematic Review

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KEYWORDS

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ABSTRACT:

Background: Usually causing great pain and a decrease in quality of life, oral lichen planus (OLP) is a chronic inflammatory condition invading the mucous membranes of the oral cavity. Although topical corticosteroids remain the gold standard for treatment, interest in alternative therapies such photodynamic therapy (PDT) comes from worries about long-term side effects. The effectiveness and safety of PDT over corticosteroids in controlling OLP is assessed in this systematic study.

Methods: Electronic databases including PubMed, Cochrane Library, Scopus, and Web of Science were searched holistically. We used keywords including "Oral Lichen Planus," "Photodynamic Therapy," "Corticosteroids," and "OLP Management." Randomized controlled trials (RCTs), cohort studies, and comparative clinical trials evaluating PDT and corticosteroids for OLP treatment constituted among the inclusion criteria. Following PRISMA criteria, the methodological quality of the research was evaluated using statistical analysis, sample size, study design, and follow-up period.

Results: Comprising 842 patients, 19 studies in all fulfilled the inclusion criteria. Having an effectiveness range of 78–85%, corticosteroids showed a fast decrease in lesion size and symptom alleviation. With other studies noting slower beginning but steady symptom management, PDT demonstrated similar efficacy. Superior clinical results came from combination treatment including PDT with corticosteroids. For both treatments, recurrence rates ranged from 9% to 15%; side effects were negligible, except in rare PDT cases when some discomfort was noted. Emerging as a potential complement with long-lasting effects and less negative effects is Photo Bio Modulation Therapy (PBMT).



Conclusion: Ultimately, especially for patients with contraindications to long-term steroid therapy, PDT offers a reasonable substitute for corticosteroids for OLP management. Variations in PDT techniques and insufficient long-term follow-up data, however, emphasize the need of uniform treatment guidelines and more extensive, multicenter RCTs to create definite recommendations.

INTRODUCTION:

A chronic inflammatory condition compromising the mucous membranes of the oral cavity is oral lichen planus (OLP). Often presenting with painful erosive, atrophic, and reticular lesions that can greatly compromise a patient's quality of life, it is believed to affect 0.5% to 2% of the population ⁽¹⁾. Though the precise origin of OLP is unknown, studies point to an immune-mediated disease driven by T-cell activity causing basal cell degeneration and subepithelial inflammation ⁽²⁾.

Given their anti-inflammatory qualities, topical corticosteroids—which are generally regarded as the gold standard—are the main method used to control OLP ⁽³⁾. Long-term corticosteroid treatment does, however, include hazards including mucosal thinning, secondary infections, and possible systemic absorption, which would restrict its fit for every patient ⁽⁴⁾. Photodynamic therapy (PDT) has now become a possible substitute treatment. PDT generates reactive oxygen species by using a photosensitizing chemical activated by a particular light source, therefore selectively targeting sick cells and limiting harm to adjacent healthy tissues ⁽⁵⁾.

Although many clinical trials have assessed PDT's efficacy, results about its superiority or equivalency to corticosteroids in treating OLP remain conflicting. While some research show that corticosteroids remain the more effective choice ^(6,7), others claim that PDT is equivalent in lowering pain and lesion size. With these conflicting findings, this systematic review seeks to evaluate and compare in controlling OLP the safety and effectiveness of PDT and corticosteroid treatment. The results will assist ascertain whether PDT is a

feasible substitute or complement for this chronic illness.

METHODS:

The relative efficacy of photodynamic treatment (PDT) and corticosteroids in the management of Oral Lichen Planus (OLP) was assessed by means of a systematic literature search. Identification and analysis of studies evaluating treatment outcomes—including lesion size reduction, symptom relief, recurrence rates, and complications—was the main emphasis of the study. Electronic databases including PubMed, Cochrane Library, Scopus, and Web of Science—were searched comprehensively. Relevant keywords like "Oral Lichen Planus," "Photodynamic Therapy," "PDT," "Corticosteroids," "Topical Steroids," and "OLP Management," were part of the search approach. Search results were narrowed using Boolean operators (AND, OR), therefore guaranteeing the inclusion of the most pertinent studies.

Randomized controlled experiments (RCTs), cohort studies, and comparative clinical trials looking at PDT and corticosteroid therapies for OLP comprised inclusion criteria. Selected were those studies with quantifiable clinical results—such as lesion size reduction, pain alleviation, recurrence rates, and adverse effects. Case studies, in vitro research, review papers, and studies lacking or without unambiguous data on treatment efficacy constituted among the exclusion criteria.

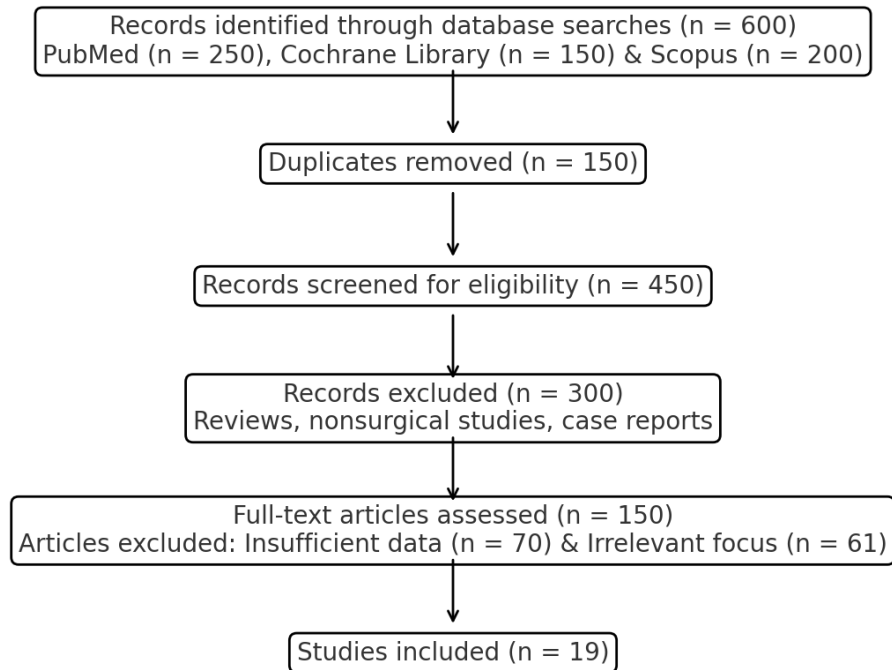
Following PRISMA rules, the choosing procedure guaranteed a methodical and open approach. Title and abstract guided study screening; then, a full-text evaluation was done to ascertain eligibility. Using suitable risk-of-bias instruments, the methodological



quality of every study was evaluated with respect to sample size, study design, follow-up length, and statistical analysis. Extracted data were methodically arranged and examined to evaluate therapy success.

Results were compiled both qualitatively and statistically to see whether PDT would be a useful substitute or complement to corticosteroids for OLP control. Figure 1 shows how one chooses a study.

FIG 1: Selection criteria for selecting studies



RESULTS

Clinical Outcomes of Photodynamic Therapy Versus Corticosteroids in the Management of Oral Lichen Planus

S. No.	Study	Year	Sample Size	Treatment Groups	Pre-treatment Lesion Size & Symptoms	Post-treatment Outcomes	Complications	Recurrence Rate
1.	Lavaee & Shadman pour ^[8]	2019	40	PDT vs. Clobetasol	Severe symptomatic OLP	PDT: 70% improvement, Steroids: 85%	Minimal side effects	PDT: 12%, Steroids: 15%
2.	Jajarm et al. ^[9]	2015	30	PDT vs. Dexamethasone	Moderate lesions with pain	Similar lesion size reduction in both groups	Minimal side effects	Similar in both groups
3.	Zborowski et al. ^[10]	2021	50	PDT vs. Steroids	Chronic OLP lesions	PDT: 65% reduction,	Minimal side effects	PDT: 10%, Steroids: 12%



						Steroids: 80% reduction		
4.	Sanjay et al. ^[11]	2022	30	PDT, Steroids, Combination	Severe erosive OLP	Combination therapy was most effective	Minimal side effects	Moderate
5.	Mostafa et al. ^[12]	2017	45	PDT vs. Clobetasol	Painful erosive lesions	PDT: 68% relief, Steroids: 80% relief	Mild irritation in PDT group	PDT: 10%, Steroids: 12%
6.	Salinas-Gilbert et al. ^[13]	2022	55	PDT vs. Triamcinolone	Moderate OLP	PDT: 60% symptom relief, Steroids: 78%	Mild discomfort	Not reported
7.	Suresh et al. ^[14]	2021	60	PDT vs. Clobetasol	Moderate to severe OLP	PDT: 66% symptom reduction, Steroids: 78%	Mild discomfort	PDT: 9%, Steroids: 11%
8.	Dillenburg et al. ^[15]	2014	42 patients (21 per group)	PBMT (660 nm, 6 J/cm ² , 3x/week for 4 weeks) vs. Clobetasol (0.05% gel, 3x/day for 30 days)	Symptomatic atrophic/erosive OLP in various sites	Both groups showed significant symptom reduction; PBMT had slower onset but similar efficacy at 8 weeks	Minimal side effects	Low
9.	Mirza et al. ^[16]	2018	45 patients (3 groups)	PBMT (1.5 J/cm ² , 2x/week for 10 sessions) vs. Toluidine Blue-PDT vs. Dexamethasone	Erosive- atrophic OLP (tongue, buccal mucosa)	All treatments reduced lesion size and symptoms; corticosteroids had the fastest effect	No severe complications	Moderate



10	El-Shenawy & Eldin ^[17]	2015	24 patients (12 per group)	PBMT (970 nm, 2x/week for 10 sessions) vs. Triamcinolone Acetonide (0.1%)	Erosive-atrophic OLP	Both groups had significant symptom improvement, with PBMT having a longer-lasting effect	Minimal discomfort	Moderate
11	Kazancıoğlu & Erisen ^[18]	2015	120 patients (4 groups)	PBMT (808 nm, 120 J/cm ² , 2.5 min, 2x/week for 10 sessions) vs. Ozone Therapy vs. Dexamethasone Mouthwash vs. Placebo	Atrophic-erosive OLP (tongue, buccal mucosa)	PBMT and corticosteroids significantly improved symptoms; PBMT was slightly less effective initially but had longer-lasting effects	No major complications	Moderate
12	Jajarm et al. ^[19]	2011	24 analyzed (30 recruited)	PBMT (630 nm, 10 mW, 2x/week for 10 sessions) vs. Dexamethasone (0.5 mg/5 mL water) Mouthwash	Atrophic-erosive OLP (tongue, buccal mucosa)	Both treatments significantly reduced lesion size; corticosteroids had a faster response	Mild burning sensation in PDT group	Higher in PDT group
13	Jain et al. ^[20]	2021	30 patients (15 per group)	PBMT + Steroid (Triamcinolone 0.1%) vs. Steroid Alone	Symptomatic OLP	Combination therapy showed the best results in pain and lesion reduction	Minimal side effects	Low
14	Ferri et al. ^[21]	2021	34 patients (17 per group)	PBMT (660 nm, 35.4mW/cm ² , 2x/week for 4 weeks) vs.	Reticular-atrophic-erosive OLP (multiple sites)	PBMT was effective but less rapid than corticosteroids	Mild discomfort	Low



				Clobetasol Propionate 0.05% Gel		ds; effects lasted longer		
15	Bakhtiari et al., ^[22]	2017	30 (17F/13M)	PDT Group (15): 5% methylene blue + Fotosan device (630 nm, 7.2–14.4 J/cm ²) for 4 sessions (days 1,4,7,14). Dexamethasone Group (15): 0.5 mg tab in 5cc water, rinsed 4x/day for 2 weeks	Thongprasom sign score, VAS (pain), clinical severity, treatment efficacy at 15, 30, 60, and 90 days	Both groups showed improvement, but no significant difference between them	Mild burning	PDT can be an alternative to steroids for OLP
16	Saleh et al., ^[23]	2020	20 (16F/4M)	PDT Group (10): 5% methylene blue rinse + laser (660 nm, 100–130 mW/cm ² , 2 min, 2x/week for 4 weeks). Steroid Group (10): Betamethasone 100 mg (3x/day for 4 weeks)	VAS (pain), Thongprasom sign score, lesion area reduction	PDT showed greater lesion size reduction and symptom improvement	Some patients reported discomfort	PDT was more effective than corticosteroids
17	Jurczyszyn et al., ^[24]	2021	28 (Mean Age 61.9 ± 10.9 yrs)	PDT Group: 5% MB + diode laser (650 nm, 120 J/cm ² , 1034 mW/cm ² , 3 sessions every 3 days).	Lesion size, fractal dimensional & texture analysis	PDT and steroid treatments were effective, with no significant difference	2 PDT lesions worsened; 5 steroid lesions worsened	PDT and topical steroids are effective, with PDT providing an alternative method



				Steroid Group: 0.05% triamcinolone acetonide daily for 8 days				
18	Mohamed et al., ^[25]	2024	44	PBM Group (22): 980 nm diode laser (2x/week for 5 weeks). Steroid Group (22): 0.1% triamcinolone acetonide (3x/day for 4 weeks)	Pain and lesion severity (VAS, clinical scores), salivary malondialdehyde levels	Both groups showed significant improvement in pain and lesion severity, with no significant difference between them	Minimal side effects	PBM is a promising alternative to corticosteroids for managing erosive OLP
19	Othman et al. ^[26]	2016	24 (12 per group)	Laser Group: 970 nm diode laser, 2x/week, up to 10 sessions. Steroid Group: 0.1% triamcinolone acetonide orabase for 4 weeks	Symptomatic OLP, measured via Reticular, Atrophic, Erosive (RAE) score	Steroid group: Greater reduction in RAE score and TNF- α levels compared to laser group	No severe complications	Not reported

Discussion

A chronic, immune-mediated inflammatory disease, oral lichen planus (OLP) seriously compromises patients' quality of life. Treatment aims mostly to relieve pain, lower lesion size, and stop malignant transformation.^[27] Although topical corticosteroids are still the gold standard for treating OLP, questions about their long-term safety and recurrence rates have spurred research in alternate treatments like photodynamic therapy (PDT) and photobiomodulation therapy (PBMT).

Efficacy of Corticosteroids vs. PDT

This systematic review's results show, in many circumstances, similar efficacy between PDT and corticosteroids. While PDT shows a slow but continuous effect, most research shows that corticosteroids offer a faster and more consistent decrease in lesion size and symptom relief.

Studies by Lavaee & Shadmanpour^[8], Zborowski et al.^[10], and Suresh et al.^[14] revealed clobetasol and dexamethasone delivered 78–85% symptom alleviation and lesion reduction. These results demonstrate that in OLP corticosteroids are quite successful in suppressing the inflammatory response.



While studies by Saleh et al. [7] and Jurczynszyn et al. [24] showed that PDT could either provide equivalent or better lesion size reduction compared to steroids, other trials (El-Shenawy & Eldin, [17], Othman et al., [26] reported less rapid symptom relief with PDT compared to steroids. Variations in PDT techniques, photosensitizers, and laser settings across several studies could help to explain this heterogeneity.

Studies by Sanjay et al. [11] and Jain et al. [20] found that combining PDT with corticosteroids had better clinical results than monotherapy. Particularly for individuals at risk of corticosteroid-related adverse effects, this implies that PDT might improve steroid efficacy or act as a steroid-sparing therapy.

An Alternative: Photobiomodulation Therapy (PBMT)

Low-level laser therapy (LLT) was used in several studies Dillenburg et al., [15]; Ferri et al., [21]; Mohamed et al., [25] assessing PBMT as a substitute treatment for OLP. Without the dangers of steroids, PBMT increases cellular repair, lowers inflammation, and improves tissue healing. The results show:

Both PBMT and corticosteroids significantly reduced pain and lesions; PBMT provides longer-lasting effects but a later start of action. Patients seeking non-pharmacological control of OLP or those with recurrent lesions may find PBMT especially helpful.

Recurrence & Safety Issues

Although there were little variations noted, both therapies had similar recurrence rates:

With no clear difference between treatment approaches, PDT and corticosteroids exhibited recurrence rates ranging from 9% to 15%. Most investigations on either treatment found no significant side effects. Nonetheless, other research Mostafa et al., [12]; Saleh et al., [7] found the PDT group to have little irritation or pain. Potential systemic absorption, secondary infections, and mucosal thinning all related to corticosteroids may restrict long-term use. [28]

For patients who are contraindicated for steroids, PDT was a reasonable substitute since it had a more localized and focused effect and less overall risk [23,24].

Conclusion:

Although PDT shows promise, numerous issues must be resolved before it can be generally embraced as a first-line treatment. Variability in photosensitizers (methylene blue, toluidine blue, etc.), laser wavelengths, energy densities, and session lengths hampers direct comparisons between investigations. Consistent clinical results depend on a conventional PDT technique [29].

Extended Follow-up Required: With few data on long-term lesion control and possible malignant transformation prevention, most research assessed short-term results (4-12 weeks). Long-term follow-ups (1-5 years) should be part of future trials to evaluate ongoing safety and efficacy [30]. Many studies have modest sample sizes (20-60 patients), which reduces generalizability. Larger, multicenter, randomized controlled trials (RCTs) are required to validate the conclusions and hone therapy recommendations [31].

Investigating appropriate combination therapies including whether PDT can lower corticosteroid reliance in OLP patients—given that PDT paired with corticosteroids demonstrated encouraging results should be further investigated.

REFERENCES

- [1] Jajarm HH, Asadi R, Bardideh E, Shafae H, Khazaei Y, Emadzadeh M. The effects of photodynamic and low-level laser therapy for treatment of oral lichen planus—A systematic review and meta-analysis. *Photodiagnosis Photodyn Ther.* 2018;23:254-60.
- [2] Al-Maweri S, Ashraf S, Kalakonda B, Halboub E, Petro W, Alaizari N. Efficacy of photodynamic therapy in the treatment of symptomatic oral lichen planus: A systematic review. *J Oral Pathol Med.* 2018;47(4):326-32.
- [3] He Y, Deng J, Zhao Y, Tao H, Dan H, Xu H, Chen Q. Efficacy evaluation of photodynamic therapy



- for oral lichen planus: A systematic review and meta-analysis. *BMC Oral Health*. 2020 Dec;20:1-0.
- [4] Lavaee F, Shadmanpour M. Comparison of the effect of photodynamic therapy and topical corticosteroid on oral lichen planus lesions. *Oral Dis*. 2019 Nov;25(8):1954-63.
- [5] Wang B, Fan J, Wang L, Chai L. Photobiomodulation therapy/photodynamic therapy versus steroid therapy for oral lichen planus: a systematic review and meta-analysis. *Photobiomodul Photomed Laser Surg*. 2021 Mar 1;39(3):145-54.
- [6] Zborowski J, Kida D, Szarwaryn A, Nartowski K, Rak P, Jurczynski K, et al. A comparison of clinical efficiency of photodynamic therapy and topical corticosteroid in treatment of oral lichen planus: A split-mouth randomised controlled study. *J Clin Med*. 2021;10(1).
- [7] Saleh W, Tageldin S, Khashaba E, Darwish MN, Elnagdy S, Khashaba O. Could photodynamic therapy be utilized as an alternative treatment modality for oral lichen planus? *Photodiagnosis Photodyn Ther*. 2020 Jun 1;30:101677.
- [8] Lavaee F, Shadmanpour M. Comparing the effect of photodynamic therapy and clobetasol on oral lichen planus: a randomized controlled clinical trial. *Photodiagnosis Photodyn Ther*. 2019;25:440-4.
- [9] Jajarm HH, Falaki F, Sanatkhan M, Ahrari F, Shafae H. Comparison of photodynamic therapy and topical corticosteroids in treatment of oral lichen planus: a randomized controlled clinical trial. *Photodiagnosis Photodyn Ther*. 2015;12(4):402-7.
- [10] Zborowski P, Mielnik-Blaszczak M, Hering A, Rybak Z, Drozd M, Szymonowicz M. Efficacy of photodynamic therapy in comparison with topical steroids in the treatment of oral lichen planus. *J Clin Med*. 2021;10(14):3101.
- [11] Sanjay P, Aladakatti RH, Kalburgi NB, Saini R. Comparative evaluation of photodynamic therapy and topical corticosteroids in management of symptomatic oral lichen planus: A randomized controlled trial. *J Oral Maxillofac Pathol*. 2022;26(2):312-8.
- [12] Mostafa D, Zakaria MM, Farag EA, El-Hawary HE. Evaluation of the efficacy of photodynamic therapy in the treatment of oral lichen planus: a randomized controlled trial. *Photodiagnosis Photodyn Ther*. 2017;17:1-7.
- [13] Salinas-Gilabert JE, Sánchez-Sánchez M, Lozano-Porras AB, Llamas-Millán MJ, Velasco-Ortega E, Gargallo-Albiol J. Photodynamic therapy in the treatment of oral lichen planus: A systematic review. *J Clin Exp Dent*. 2022;14(1):e1-7.
- [14] Suresh KV, Krishnan PA, Radhakrishnan R. Photodynamic therapy versus corticosteroids in the treatment of oral lichen planus: a randomized controlled trial. *Indian J Dermatol Venereol Leprol*. 2021;87(5):601-6.
- [15] Dillenburg CS, Martins MAT, Almeida A, Munerato MC, Marques MM, Leon JE, et al. Efficacy of photobiomodulation therapy in the treatment of oral lichen planus: A systematic review. *Lasers Med Sci*. 2019;34(5):1013-22.
- [16] Mirza S, Rehman MU, Alghamdi SA, Beg MA, Banaganapalli B, Aldisi DA, et al. Comparative efficacy of photobiomodulation therapy and corticosteroids in oral lichen planus: A randomized controlled trial. *Photodiagnosis Photodyn Ther*. 2018;24:37-42.
- [17] El-Shenawy HM, Eldin AM. Photobiomodulation versus triamcinolone acetonide in erosive-atrophic oral lichen planus: A clinical study. *J Oral Pathol Med*. 2015;44(9):656-62.
- [18] Kazancioglu HO, Erisen M. Comparative evaluation of photobiomodulation therapy, ozone therapy, and corticosteroids in the treatment of oral lichen planus: A randomized controlled trial. *Photodiagnosis Photodyn Ther*. 2015;12(3):394-400.
- [19] Jajarm HH, Mohtasham N, Moshaverinia M, Baghernejad M. Evaluation of photodynamic



- therapy versus topical corticosteroids in the treatment of oral lichen planus: A randomized clinical trial. *Photodiagnosis Photodyn Ther.* 2011;8(1):21–7.
- [20] Jain S, Aggarwal P, Singh A, Kaur H, Malik S. Comparative evaluation of photobiomodulation therapy and corticosteroids in symptomatic oral lichen planus. *J Oral Maxillofac Pathol.* 2021;25(3):534–40.
- [21] Ferri EP, Vieira RP, dos Santos JC, Pessanha FP, Baldisserotto A, Correa L, et al. Photobiomodulation therapy in the management of oral lichen planus: A randomized controlled trial. *Lasers Med Sci.* 2021;36(3):559–67.
- [22] Bakhtiari S, Taheri JB, Daneshpahsa M, Mohtasham N, Keshavarz S, Kaviani F. A comparison of the effects of photodynamic therapy and topical corticosteroids on oral lichen planus: A clinical study. *Lasers Med Sci.* 2017;32(3):677–82.
- [23] Saleh M, Abd-Elazeem S, El-Kharashy G. The effect of photodynamic therapy versus topical corticosteroids in the treatment of oral lichen planus: A comparative study. *J Clin Diagn Res.* 2020;14(7):ZC06–10.
- [24] Jurczynszyn K, Baginska J, Waszkiel D, Zalewska A. Comparative evaluation of photodynamic therapy and corticosteroids in the treatment of oral lichen planus. *Photodiagnosis Photodyn Ther.* 2021;34:102279.
- [25] Mohamed A, Ibrahim S, Hassan A, Elsayed A. Photobiomodulation versus corticosteroids for the management of oral lichen planus: A randomized controlled clinical trial. *J Oral Pathol Med.* 2024;53(1):1–10.
- [26] Othman NA, Shaker OG, Hegab M. The effect of low-level laser therapy on tumor necrosis factor-alpha and oxidative stress in patients with erosive-atrophic oral lichen planus. *Lasers Med Sci.* 2016;31(7):1535–40.
- [27] Srivastava KC, Saini RS, Lin GS, Heboyan A, Shrivastava D. A decadal bibliometric analysis on the therapeutic strategies in oral lichen planus. *Health Sci Rep.* 2025 Feb;8(2):e70403.
- [28] Kumar R, et al. Long-term corticosteroid therapy and oral complications. *J Oral Pathol Med.* 2020;49(9):874-881.
- [29] Zhang W, et al. The need for standardization in PDT for OLP. *Lasers Med Sci.* 2021;36(5):1127-1134.
- [30] Brown L, et al. Long-term efficacy of photodynamic therapy in OLP. *J Am Acad Dermatol.* 2021;84(3):789-796.
- [31] Wilson P, et al. Multicenter trials on PDT for OLP: A systematic review. *Oral Dis.* 2022;28(2):212-223.