Disease severity scoring systems in mucosal lichen planus: a systematic review

Running title: severity scoring in mucosal lichen planus

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Keywords: mucosal lichen planus, oral lichen planus, clinical scoring systems, validity, reliability

Date of submission: 21 July 2022

ABSTRACT

Objectives

Several scoring systems have been developed to evaluate disease severity in mucosal lichen planus, but only a few have been validated to ensure reproducible and accurate assessment of disease severity. The current systematic review was undertaken to identify clinical severity scoring systems in mucosal lichen planus that have undergone validity or reliability testing and to describe their operating characteristics.

Materials and Methods

We performed a bibliographic search in five databases from their inception to October 2022 for severity scoring systems in mucosal lichen planus that have undergone validity or reliability tests. Quality assessment was conducted using the Joanna Briggs Institute Critical Appraisal tools.

Results

We have included 118 studies and identified 11 clinical severity scoring systems for oral lichen planus that have undergone validity or reliability testing. Of these, the most reported were the Thongprasom score, the Oral Disease Severity Score (ODSS) and the REU (Reticular/hyperkeratotic, Erosive/erythematous, Ulcerative) system. We did not identify clinical scoring systems for extraoral mucosal lichen planus that have undergone validity or reliability testing.

Conclusion

The ODSS and REU scoring systems have undergone the highest number of validation attempts and reliability assessments for oral lichen planus, respectively. However, numerous factors that have hampered the development of a standardised scoring system were identified. There is a need for the development and validation of scoring systems for extraoral mucosal lichen planus.

1. INTRODUCTION

Mucosal lichen planus can present with debilitating symptoms resulting from painful mucosal erosions, and healing with scarring and adhesions (Nylander, Ebrahimi, Wahlin, Boldrup, & Nylander, 2012). The frequency of mucosal involvement in lichen planus patients is reported at 30–70% (Lehman, Tollefson, Gibson, & Lawrence Gibson, 2009). Any mucous membrane can be affected, and multiple mucosal sites may be affected synchronously.

The oral cavity is the most common site affected by mucosal lichen planus(Wagner et al., 2013). The estimated worldwide prevalence of oral lichen planus is 1% (González-Moles et al., 2021). Patients with oral lichen planus may develop extraoral lesions involving the skin, nails, scalp and other mucosal sites. The most common extraoral site in females with oral lichen planus is the genital mucosa (Eisen, 2003), with approximately 25% of women with oral lichen planus having vulvo-vaginal involvement (Eisen, 1999). In the majority of cases vulval lesions are seen in females of peri and post-menopausal age (Cooper & Wojnarowska, 2006). The erosive type is the most common form affecting the vulva and vagina and may manifest as part of a syndrome encompassing the triad of vulva, vagina, and gingiva, a condition known as a vulvovaginal-gingival syndrome (Pelisse, 1989), which is more resistant to treatment (Setterfield et al., 2006). Similarly, a male equivalent was described in 1993, and is known as peno-gingival syndrome (Cribier, Ndiaye, & Grosshans, 1993). Other mucosal sites that may be affected by lichen planus, albeit rarely, include auricular, ocular, nasal, laryngeal, oesophageal and gastric (Scully & Carrozzo, 2008).

The pathogenesis of lichen planus has not been fully elucidated. A large body of evidence suggests a role for immune dysregulation mediated by cytotoxic T cells against basal keratinocytes (Sugerman et al., 2002). According to Cooper et al. (2008), different mucosal forms are thought to have a similar immunopathological basis. On the other hand, the chronicity and refractory nature of mucosal lichen planus compared to cutaneous lichen planus may support the hypothesis of distinct mechanisms in the two phenotypes (Cooper, Haefner, Abrahams-Gessel, & Margesson, 2008).

Many treatment options for mucosal lichen planus, such as topical and systemic corticosteroids, topical calcineurin inhibitors, retinoids, photochemotherapy and traditional medicines have been investigated in clinical trials with the primary goal of reducing pain and inflammation. Nevertheless, the lack of a validated disease scoring system is a significant obstacle in performing good quality interventional trials and comparing the treatment effectiveness of various interventions in mucosal lichen planus (Lodi, Carrozzo, Furness, & Thongprasom, 2012). In research studies, a standardised disease activity grading system would allow accurate definition of baseline disease status, stratification into disease severity subgroups and valid outcome measures when measuring the effectiveness of interventions. Valid and reliable severity scores will ultimately aid comparison of disease severity within and between patients, in order that inferences can be drawn regarding patients' responses to different interventions, thereby guiding clinicians in personalised treatment plans and monitoring of response to treatment.

Several scoring systems based on clinical criteria have been developed to quantify the severity of the disease quantitatively, semi-quantitively or qualitatively. Twenty-two disease severity scoring systems for oral lichen planus have been identified by a narrative review in 2015 (Wang & van der Waal, 2015). However, to date, only a minority of reported scoring systems have been validated to ensure reproducible and accurate assessment of disease severity. Therefore, the current systematic review aimed to identify clinical severity scoring systems applied to mucosal lichen planus that have undergone validity or reliability tests and to describe their operating characteristics. The purpose of this systematic review is to disclose the most valid and reliable scoring systems suitable for clinical monitoring of disease progression and predicting response to therapy in lichen planus patients.

Severity scoring systems based on patient-reported outcome were outside the scope of this review.

2. MATERIALS AND METHODS

The full protocol of this systematic review has been published in the PROSPERO register (registration no. CRD42021281193). A specific question was raised based on the PE(C)OS framework: "Do clinical severity scoring systems represent a valid and reliable method to assess the disease severity in patients with mucosal lichen planus?" where Population: patients with mucosal lichen planus, Exposure: disease severity assessed by clinical severity scoring systems that have undergone validity or reliability tests, Outcome: validity and reliability of scoring systems.

2.1 Search Strategy

We performed a systematic search of MEDLINE (Ovid), EMBASE (Ovid), Scopus, Web of Science, and the Cochrane Library (CENTRAL) from their inception to 6th October2022 for studies that have applied scoring indices/criteria for the evaluation of disease severity of mucosal lichen planus.

The details of the search strategies for different databases are listed in the Supporting Information (Search strategy). We scanned the reference lists of the included articles to identify additional studies that may have been missed by the electronic database search. Eligibility criteria were: original articles (randomised controlled trials, quasi-experimental studies, cohort studies, case-control studies, case series with a minimum sample size of n=9); human studies; English language articles; patients diagnosed with mucosal lichen planus or desquamative gingivitis secondary to lichen planus based on clinical or histopathological diagnosis; clinical severity scoring systems for mucosal lichen planus that have undergone validity or reliability tests.

Exclusion criteria were: disease severity scoring systems for cutaneous lichen planus; clinical severity scoring systems in mucosal lichen planus that have not undergone any validity or reliability tests; severity scoring systems based on patient reported outcome measures; systematic reviews, narrative reviews, conference abstracts, brief

communications, study protocols and letters to the editor.**2.2 Study selection and data extraction**

Three authors (SPU, ER, AMc) independently reviewed the titles and abstracts of the articles retrieved from the literature search after duplicate removal using RefWorks (Proquest LLC). Thereafter, the full text of potentially eligible manuscripts was screened for inclusion by the same authors and any disagreements were resolved by discussion. There was good agreement with regards to full-text selection amongst the three reviewers (k = 0.84). In the event of disagreements two senior authors (KH and RAE) served as arbitrators and were available for mediation at each stage of the review.

A tabulated template was used to extract data from selected studies. Three authors (SPU, ER, AMc) independently extracted and recorded data. The following information was recorded from each included study: study author, year of publication, study design, study population, sample size, age, gender, exclusion of oral lichenoid lesions, consideration of confounding factors, co-occurring periodontal disease, characteristics of disease severity scoring system and their operating properties.

The following criteria and descriptors within scoring systems were extracted: name of the scoring system, description of the scoring criteria, mucosal changes evaluated within the scoring criteria, consideration of oral sites, number and anatomical description of sites, consideration of lesion size/area involved, pain score within the scoring criteria, operating properties as detailed below.

The quality and risk of bias of the included studies were assessed using the Joanna Briggs Institute (JBI) Critical Appraisal tools (Aromataris & Munn, 2020). The overall risk of bias for each study was determined using the JBI quality assessment tools according to study design as follows: i) 'low risk of bias' when all questions were answered ‘YES’, ii) 'high risk of bias' (if at least one of the questions was answered ‘NO’ or if multiple questions were answered ‘UNCLEAR’ without any ‘NO’ responses), iii) 'moderate risk of bias' (if at least one of the

questions was answered ‘UNCLEAR’ without any ‘NO’ responses). (Moola et al., 2020). Random checks of 10% of data extracted and quality assessment outcomes were carried out by two senior authors (KH and RAE).

2.2.1 Operating properties

The operating properties of the scoring systems were recorded as follows: validation, examiner calibration, number of examiners, inter-examiner reliability, intra-examiner reliability, internal consistency reliability, diagnostic accuracy data (where appropriate), responsiveness/discriminatory power, feasibility/ease of application.

Given the lack of a gold standard for assessing disease severity in mucosal lichen planus, it was not possible to rate validation approaches according to the strict definition of criterion validity. Hence, we have reported validation methods under three descriptive categories for ease of understanding and interpretation: a) Correlation analysis between scoring tools measuring the same variable relating to clinical evidence of disease activity; b) Correlation analysis between clinical evidence of disease activity and pain scores, as it is assumed that pain scores (generally measured as Visual Analogue Scale (VAS), Numerical Rating Scale (NRS) and Change in Symptom Scale (CSS)) are positively correlated with erythema and ulceration (Chainani-Wu et al., 2008).; c) Agreement between clinical scores and histological findings.

Reliability was evaluated based on examiner calibration, intra-rater reliability, inter-rater reliability, and internal consistency analysis. Responsiveness was evaluated as the ability of the scoring system to detect a change following a period of known clinical or histological change. Feasibility was based on ease of administration and time required for scoring as judged by the authors.

3 RESULTS

3.1 Search results and study characteristics

The bibliographic search retrieved a total of 2199 studies. After exclusion of 446 duplicates, 1753 records were screened for eligibility. Of these records, 148 articles were selected following title and abstract screening. After full-text screening, 115 studies were included in the systematic review. Three additional eligible articles were identified by hand search of the reference lists of the included articles. Figure 1 shows the PRISMA diagram of the studies retrieved for the current systematic review. The 118 studies included in this review comprised: 50 randomised controlled trials, 12 non-randomised clinical trials, 3 cohort studies, 29 case control studies, 22 cross sectional studies, and 2 case series (one arm studies with n≥9). Characteristics of the included studies (study author, year, study design, study population, number of participants, demographic characteristics, exclusion of lichenoid reactions, consideration of confounding factors and disease scoring system applied within the study) are reported in the Supporting Information (Table S1).

3.1.1 Quality assessment

According to the stringent criteria of the JBI quality assessment tools, we observed a high risk of bias in all the included studies in the current systematic review except for one study (Wee, Shirlaw, Challacombe, & Setterfield, 2012) (Supporting information, Table S2). Several randomised control and quasi-experimental studies fell short on reliable assessment of outcomes. Case-control and cross-sectional studies showed inadequate management of confounding factors, while cohort studies suffered from attrition bias (Supporting information, Table S2).

3.2 Scoring systems for oral lichen planus

We identified eleven clinical scoring systems that have undergone validity or reliability testing for evaluation of clinical severity of oral lichen planus. Characteristics of severity scoring systems and their operating properties are summarised in Tables 1 and 2, respectively**.** The most reported scoring system was the Thongprasom sign score, later renamed as White Erosive Atrophic scoring system (WEA) (described in 54 studies). Other commonly reported

scoring systems were: the Oral Disease Severity Score (ODSS) or Escudier score (27 studies), the REU scoring system (Reticular/hyperkeratotic, Erosive/erythematous, Ulcerative) (16 studies) and the RAE scoring system (Reticular, Atrophic, Erosive) (14 studies). Table S1 includes the full list of studies that have employed these scoring systems. The most reported scoring systems are described in more detail in the following sections.

We did not identify scoring systems that had undergone validity or reliability testing for extraoral mucosal lichen planus.

3.2.1 Thongprasom scoring system

The Thongprasom score was first reported in a randomised controlled study that evaluated the efficacy of fluocinolone acetonide versus triamcinolone acetonide in the treatment of oral lichen planus (Thongprasom, Luangjarmekorn, Sererat, & Taweesap, 1992). Later, Gobbo et al. (2017) renamed this scoring system as White Erosive Atrophic (WEA). A score from 0 to 5 is assigned on the basis of the size of the lesion and clinical features (white striations, atrophic, and erosions) but without consideration of disease site. Despite the use of this score for over two decades, validation and reliability tests were only carried out in one recent study (Elsabagh, Gaweesh, Ghonima, & Gebril, 2021).

A modification of the Thongprasom scoring system known as the White Erosive Atrophic Modified scoring system (WEA-MOD) proposed by Gobbo et al. (2017) has undergone some level of validity and reliability assessment (Section 3.4.1, Table 2). This modified version is site-specific and is based on the same scoring criteria as the Thongprasom scoring system (Gobbo et al., 2017).

3.2.2 Oral Disease Severity Score

This scoring system was proposed in 2007 (Escudier et al., 2007) and later renamed as Oral Disease Severity Score (Wee et al., 2012). Here, the oral cavity is divided into seventeen oral sites, each of which is assigned a ‘site score’ (indicating absence/presence of disease for the score of 0 and 1 respectively and >50% of the site affected for a score of 2) and a ‘severity

score' (0-3) (Escudier et al., 2007). The product of site and severity scores is the 'activity score', the total of which is combined with a pain score (Escudier et al., 2007). Validation of this scoring system is described in Section 3.4.1 and Table 2. A modification of this scoring system, known as Modified Escudier Index (Salgado et al., 2013) has undergone reliability testing for evaluation of disease severity of desquamative gingivitis secondary to oral lichen planus (Mergoni, Magnani, Goldoni, Vescovi, & Manfredi, 2019). In this modified version each gingival sextant is assigned a 'site score' (indicating absence/presence of disease) and a 'severity score' (0-3)(Salgado et al., 2013).

3.2.3 REU scoring system

The REU scoring system was developed in 2005 (Piboonniyom, Treister, Pitiphat, & Woo, 2005). This scoring system divides the oral cavity into ten oral sites, each of which is assigned a score based on the lesion size/area involved (0-3) and weighted on three clinical phenotypes (Reticular/hyperkeratotic, Erosive/erythematous, Ulcerative). The total weighted score is the summation of reticulation score (weighted 1), erythematous score (weighted 1.5) and ulcerative score (weighted 2.0) from ten sites. This scoring system was applied in the monitoring of treatment response at patient level and for comparisons of response between patients (Gobbo et al., 2017; Park, Hurwitz, & Woo, 2012; Piboonniyom et al., 2005).

3.2.4 RAE scoring system

The RAE scoring system was introduced in some studies as an improvement to the REU scoring system (Javadzadeh et al., 2008; Zhou et al., 2012). As in the REU scoring system, ten oral sites are assigned a score based on the lesion size and weighted on clinical phenotypes (Javadzadeh et al., 2008; Zhou et al., 2012). The total weighed score is calculated as for REU, but in RAE different clinical descriptors are used for the three clinical types: Reticular, Atrophic and Erosive (Javadzadeh et al., 2008; Zhou et al., 2012).

3.3 Common Characteristics of Clinical Scoring Systems

The number and the location of affected mucosal sites can be reasonably expected to reflect the extent of the disease, and thereby represent an important parameter for assessment of overall severity. All scoring systems reported here, except for the Thongprasom score, divided the oral cavity into a predefined number of sites assigning a score for each site. As shown in Table 1, there was considerable variation in the number of oral sites assessed by each scoring system, with the most granular approach seen in ODSS.

Consideration of gingival involvement in site-specific scoring systems is important to reflect a common and clinically challenging presentation of oral lichen planus known as desquamative gingivitis. All the site-specific scoring methods included scoring of desquamative gingivitis. However, some authors classified gingiva into maxillary and mandibular gingiva (Chainani-Wu et al., 2007; Gobbo et al., 2017; Piboonniyom et al., 2005; Wu et al., 2022) while others divided the gingiva into sextants (Escudier et al., 2007; Salgado et al., 2013). In the scoring system proposed by Elsabagh et al. gingival involvement was graded based on the number of the teeth involved (Elsabagh et al., 2021).

With regards to the description of clinical phenotypes of disease, we identified inconsistencies amongst disease severity scoring systems. The clinical features described by each scoring system are listed in Table 1. In the REU scoring system, three clinical descriptors are used: Reticular/hyperkeratotic, Erosive/erythematous, and Ulcerative (Piboonniyom et al., 2005). The Thongprasom and RAE scoring systems consider atrophy and erosion as separate entities (Thongprasom et al., 1992; Zhou et al., 2012), while Elsabagh et al. classifies both into a single entity (Elsabagh et al., 2021). On the other hand, the Thongprasom score does not consider ulceration (Thongprasom et al., 1992). Reticulations are not included in the Modified Oral Mucositis Index (MOMI) (Chainani-Wu et al., 2007) and the Malhotra tool which evaluate erosions only (Malhotra et al 2008). A newly introduced scoring system by Wu et al. used three clinical descriptors, namely Reticulation, Hyperemia/Erythema and Erosion/Ulceration (RHU) (Wu et al., 2022).

3.4 Operating characteristics

Nine scoring systems identified by this review have undergone some level of validation testing (Chainani-Wu et al., 2008; Elsabagh et al., 2021; Escudier et al., 2007; Gobbo et al., 2017; López-Jornet & Camacho-Alonso, 2010; Malhotra et al., 2008; Park et al., 2012; Radwan-Oczko, Zwyrtek, Owczarek, & Szcześniak, 2018; Siponen, Huuskonen, Kallio-Pulkkinen, Nieminen, & Salo, 2017, Wu et al., 2022)), while ten underwent reliability assessments (Elsabagh et al., 2021; Escudier et al., 2007; Gobbo et al., 2017; Mergoni et al., 2019; Piboonniyom et al., 2005; Siponen et al., 2017; Stone, McCracken, Heasman, Staines, & Pennington, 2013; Yang, Wang, & Zhou, 2022, Wu et al., 2022)). None of the included scoring systems were assessed for responsiveness and feasibility (Table 2).

3.4.1 Validity

Five scoring systems were included in correlation analysis between different tools assessing the same criteria/domains (Gobbo et al., 2017; López-Jornet & Camacho-Alonso, 2010, Wu et al., 2022)). The correlation estimates between two different disease activity scoring systems ranged from 'moderate' to 'very high (Table 2). For example, the WEA-MOD scoring system was compared to the REU scoring system and correlation coefficients ranged from 0.84 to 0.57 for three raters with varying experience levels (Gobbo et al., 2017).

Eight scoring systems were included in correlation analysis between disease activity and pain scores (Chainani-Wu et al., 2008; Elsabagh et al., 2021; Gobbo et al., 2017; López-Jornet & Camacho-Alonso, 2010; Malhotra et al., 2008; Park et al., 2012; Radwan-Oczko et al., 2018; Siponen et al., 2017; Wiriyakijja et al., 2021) (Table 2). The correlation estimates between the disease scoring systems and symptom scales ranged from negligible to very high. The REU scoring system was compared to the NRS (Park et al., 2012) and VAS (Gobbo et al., 2017) (for three different raters) and disclosed low to moderate positive correlation. The ODSS was compared to the VAS in three different studies (López-Jornet & Camacho-Alonso, 2010; Radwan-Oczko et al., 2018; Wiriyakijja et al., 2021), one of which showed a good correlation estimate (rs=0.65) (Wiriyakijja et al., 2021). The MOMI was compared to the NRS, VAS and

CSS and found that the NRS scores correlated positively with the Modified Oral Mucositis scores (rs=0.5), but not the CSS scores (rs=-0.232) (Chainani-Wu et al., 2008).

Two scoring systems were assessed for agreement between histological findings and clinical scores (Elsabagh et al., 2021) (Table 2). Elsabagh et al. found statistically significant agreement between biopsy results and disease activity scores measured by a new scoring system proposed in their study with a total percentage agreement of 86.2% (25/29) (kappa=0.74, $P<0.05$). In contrast, the Thongprasom score showed no agreement with biopsy results with a total percentage agreement of 24.1% (7/29) (kappa=0.03163, $P>0.05$) (Elsabagh et al., 2021).

3.4.2 Reliability

Intra-rater reliability was calculated for four disease severity scoring systems (Elsabagh et al., 2021; Mergoni et al., 2019; Piboonniyom et al., 2005) (Table 2). High intra-rater reliability was reported for the REU (Piboonniyom et al., 2005), the Thongprasom and the Elsabagh scoring systems (Elsabagh et al., 2021).

Inter-rater reliability was assessed for seven disease severity scoring systems (Elsabagh et al., 2021; Gobbo et al., 2017; Piboonniyom et al., 2005; Stone et al., 2013; Yang et al., 2022) (Table 2). The inter-rater agreement of the REU scoring system was assessed in two different studies which reported high reproducibility between examiners (Gobbo et al., 2017; Piboonniyom et al., 2005). Similarly, the ODSS was evaluated in two studies which observed good agreement amongst the examiners (Escudier et al., 2007; Stone et al., 2013).

Four scoring systems were tested for internal consistency (Chainani-Wu et al., 2008; Elsabagh et al., 2021; Park et al., 2012, Wu et al., 2022)) (Table 2). However, Cronbach-α coefficients were only reported for the REU, MOMI and RHU scoring systems (0.70, 0.66, and 0.49 respectively) (Park et al., 2012; (Chainani-Wu et al., 2008).

4 DISCUSSION

Disease severity scoring systems can be important tools to enhance the robustness of both interventional and observational studies and monitor response to treatment in clinical practice. For the past three decades, researchers have used different disease severity scoring systems to measure the severity of lichen planus. However, most of these scoring systems are not validated, thus hampering a meaningful interpretation and comparison of findings from different studies. Furthermore, there have been no attempts to develop and validate severity grading tools for extra-oral mucosal lichen planus.

4.1 Scoring systems in oral lichen planus

Scoring systems identified in this systematic review were based on clinical evidence of disease, whilst severity scoring systems based on patient-reported outcome were outside the scope of this review. Here, the most common parameters for evaluation of disease severity were the number of affected oral sites, lesion size or area involved and clinical forms of the disease. The widely reported Thongprasom score is based on the size of the lesion and the clinical phenotype, but not number or location of oral sites. Whilst the presumed ease of application of this method is likely at the basis of its wide adoption, we could not retrieve evidence of formal feasibility studies. On the other hand, the site-specific approach of the ODSS allows a more accurate registration of disease severity at oral site level while obtaining an overall severity score which includes assessment of pain. Site-specific approaches have been adopted for all others scoring systems and are regarded as more representative of the overall picture of the disease. These have been anecdotally criticised for being resource-consuming but again not on the basis of the outcome of feasibility studies. Further, gingival involvement merits standalone consideration given the highly symptomatic and often refractory nature of this presentation. A new scoring system (Elsabagh et al., 2021) and previously published tools have reflected this important variable (Escudier et al., 2007).

Another concern identified by this review is the inconsistency or lack of clarity of nomenclature used for describing lichen planus-associated mucosal changes or even omission of certain clinical phenotypes. The widely accepted clinico-pathological descriptors for different types of

oral lichen planus are: reticular (white appearance resulting from thickening of the epithelium), atrophic (red appearance resulting from thinning of the viable layers of the epithelium), erosive (red appearance resulting from partial loss of epithelial cell layers) and ulcerative (resulting from full loss of the epithelium) (Andreasen & Copenhagen, 1968; Elsabagh et al., 2021). In this systematic review we noted that some scoring systems used 'erosive' and 'ulcerative' interchangeably, whilst others included 'erosive' in the red/erythematous type. In addition, we observed the use of the unconventional terms 'wound injury' in defining score 5 of the Thongprasom scoring criteria in one study (Sadeghian, Rohani, Golestannejad, Sadeghian, & Mirzaee, 2019) and 'hyperemia' in the newly developed RHU scoring system (Wu et al., 2022)

4.2 Study population and confounding factors

Oral lichenoid lesions resemble oral lichen planus clinically and histologically but have a different aetiology and higher risk of malignant transformation and should be viewed as a separate pathological entity(Rotim et al., 2015). In this systematic review, some studies have excluded cases of oral lichenoid contact reactions and drug-induced lichenoid reactions as well as conditions mimicking lichen planus such as chronic graft-versus-host disease. However, the majority of the studies did not consider this distinction in the study design or analysis (Supporting information, Table S1), thereby introducing a source of bias

Periodontal diseases are modulated by immune responses, which are also involved in the immunopathogenesis of oral lichen planus. A recent systematic review has shown that oral lichen planus is a risk factor for of periodontal disease (Nunes et al., 2022). On the other hand, the role of periodontal disease in the pathogenesis of lichen planus is still not defined clearly, notwithstanding the well-known beneficial role of plaque control in the management of gingival lichen planus (Mergoni et al., 2019; Stone, Heasman, Staines, & McCracken, 2015). In this systematic review, only a few studies excluded or managed periodontal disease as a confounding factor (Supporting information, Table S1). We recommend that future studies should at a minimum consider the influence periodontal disease on gingival lichen planus activity scores.

4.3 The operating characteristics

The methodology involved in the development of severity scoring system for any disease is complex but more challenging yet for diseases with diverse clinical presentations. In oral lichen planus this is further complicated by the remitting-relapsing nature of the disease and the inconsistent correlation between disease activity and symptoms/patient-reported outcomes (Gobbo et al., 2017). Ideally, a disease severity scoring system should be evaluated based on operating characteristics such as feasibility, reliability (reproducibility) and different types of validity (content, construct and criterion).

Construct and criterion validity were mainly addressed in this review. While construct validity is the extent to which a particular measure performs according to theoretical expectations (Chainani-Wu et al., 2008), criterion validity is the extent to which a test is related to an independent criterion or standard that reflects the same construct. . However, the lack of a gold standard in oral lichen planus has compelled researchers to perform validity tests based on the correlation between existing tools measuring disease activity defined clinically or between objective evidence of disease versus patient-reported outcomes. In this respect, we noted disagreements, and possibly confusion, in the interpretation of the concepts of criterion and construct validity. For example, correlation estimates of signs and symptoms were defined as construct validity by two studies, (Chainani-Wu et al., 2008; Wiriyakijja et al., 2021) and criterion validity by another (Elsabagh et al., 2021). Criterion validity assessment impinges of the availability of a gold standard. On the other hand, construct validity may be measured by comparing the study tool to a measure by a similar construct or parts of the same construct. Therefore, definition of construct validity as correlation estimates between signs and symptoms may be reasonably based on the assumption that pain scores correlate positively with erythema or ulceration (Chainani-Wu et al., 2008).

Validation attempts were made based on the correlation estimates between clinical disease activity tools. The first attempt compared ODSS to the Malhotra scoring system and showed a good correlation between these scoring systems. However, this was without using any of

the systems as a comparator to validate the other (López-Jornet & Camacho-Alonso, 2010). This study also assessed correlation of both scoring systems to the VAS pain rating scale (López-Jornet & Camacho-Alonso, 2010). Another study compared the WEA-MOD with the REU scoring system and observed a moderate-high correlation with the highest correlation observed for an expert examiner (Gobbo et al., 2017). The REU scoring system had undergone a previous validation attempt based on correlation with pain rating scales (Park et al., 2012).

Chainani Wu et al. (2008) first attempted to validate the pain rating scales themselves (VAS, NRS, CSS) for oral lichen planus and defined the criterion validity of these pain rating scales based on their correlation estimate. They proposed construct validity of these scales based on their correlation with the MOMI scoring tool which they also assessed for internal consistency (Chainani-Wu et al., 2008). Recently, a study evaluated the validity of pain rating scales (VAS and NRS) for oral lichen planus using the approach adopted by Chainani Wu et al. (2008) to assess criterion and construct validity but with the pain rating scales correlated to ODSS (Wiriyakijja et al., 2021). Other studies tried to document associations between pain rating scales and clinical severity of oral lichen planus without a clear intent of validation (Radwan-Oczko et al., 2018; Yiemstan, Krisdapong, & Piboonratanakit, 2020).

Recently, Wu et al. evaluated the discriminant validity of the RHU scoring system using t-test analysis to compare the change in RHU scores after two weeks of treatment (Wu et al., 2022). However, this method is not acceptable for defining discriminant validity which should instead be based on correlation with a measure by a different test.

Interestingly, one study used the receiver operating characteristic curve (ROC) to assess the diagnostic accuracy of the Elsabagh and Thongprasom scoring systems in relation to histological findings. Here biopsy results were taken as standards to calculate sensitivity and specificity rates with the under the curve (AUC) used as accuracy index (Elsabagh et al., 2021). However, it could be argued that histological findings derived from an incisional biopsy

(usually a mucosal sample measuring a few millimetres in size) cannot be assumed to be a true representation of overall disease severity.

Reliability is an essential operating characteristic that measures the precision of an instrument. It refers to the consistency of a measure, while validity refers to the accuracy of a measure. The reliability of the recently described RHU scoring system was described based on the correlation estimates with the REU scoring system and the Physician Global Assessment tool (Wu et al., 2022). This approach is not an appropriate measure of reliability, and points to the incorrect interchangeable use of reliability and validity. In most studies intraclass correlation coefficient analysis (ICC) was used as a statistical method to assess the intra-rater and/or inter-rater reliability of scoring systems in oral lichen planus. However, only three studies have reported the confidence intervals (Elsabagh et al., 2021; Gobbo et al., 2017; Mergoni et al., 2019). A recently published research letter (Ormond et al., 2022) evaluated the intra-rater and inter-rater reliability of ODSS in oral lichen planusl, where ICCs with confidence intervals were documented for each ODSS component using ten calibrated examiners. Other methods used to measure reliability were correlation coefficients, Cohen's weighted kappa, comparison of mean differences, Kendall's coefficient of concordance and Bland-Altman limits of agreement (Elsabagh et al., 2021; Gobbo et al., 2017; Piboonniyom et al., 2005; Stone et al., 2013). Correlation coefficients were used only in one study to measure the intra- and inter-rater reliability of the REU system (Piboonniyom et al., 2005). However, this parameter is not a measure of reliability and should not be used in isolation (Zaki, Bulgiba, Nordin, & Ismail, 2013). Elsabagh et al. (2021) have used three statistical parameters to assess the reliability (ICC, mean difference, Bland-Altman) while correlation coefficients were reported as a measure of internal consistency, which is not acceptable. Otherwise, Cronbach-α was the most used test to measure internal consistency reliability (Chainani-Wu et al., 2008; Park et al., 2012; Wu et al., 2022). Examiner calibration is a significant aspect that influences the reliability of clinical findings and is crucial for the accuracy of the results. Only nine studies employed examiner calibration (Agha-Hosseini et al., 2010; Elsabagh et al., 2021; Gobbo et

al., 2017; Keller & Kragelund, 2018; Mergoni et al., 2019; Piboonniyom et al., 2005; Stone et al., 2013; Veneri, Bardellini, Amadori, Conti, & Majorana, 2020; Yang et al., 2022).

In summary, the ODSS has undergone the highest number of validation attempts. The REU scoring system has undergone the larger number of reliability assessments, notwithstanding a recent letter to the editor by Ormond et al. on reliability assessment of ODSS (Ormond et al., 2022). Future validation of any scoring system requires robust studies at low risk of bias. Additionally, the lack of studies assessing the responsiveness and feasibility of scoring systems hinders their universal applicability.

4.4 Scoring systems in extraoral mucosal lichen planus

We identified several severity grading tools for oesophageal lichen planus. A grading system by Schauer et al. classified oesophageal lichen planus into severe and mild forms based on endoscopic, immunofluorescence and histological findings (Schauer et al., 2019), while dysphagia scores and endoscopic findings were used by Podboy et al. to evaluate treatment efficacy (Podboy et al., 2017). However, none of these tools have undergone validity or reliability testing and therefore, were ineligible for inclusion in this review. Patient Reported Outcome Measures (PROMs) were commonly employed for severity grading in vulvovaginal lichen planus, for example the Vulvar Quality of Life Index (VQLI) and the Female Sexual Function Index (FSFI) (Kherlopian & Fischer, 2022; Yıldız et al., 2022) but as above, none met the inclusion criteria of this review.

5. RECOMMENDATIONS FOR FUTURE RESEARCH

We identified several factors that have hampered the development of a standardised scoring system in oral lichen planus. Based on these factors, future studies should consider adherence to standard nomenclature for the description of clinical phenotypes, appropriate inclusion and exclusion criteria to define the study population, management of confounding factors, use of site-specific clinical scoring systems, appropriate use of concepts of validity and reliability, use of correct statistical methods, execution of clinical trials with calibrated examiners and

reported measures of reliability. Future studies should assess the responsiveness and feasibility of scoring systems. The development and validation of severity grading tools for extra-oral mucosal lichen planus, in particular vulvo-vaginal lichen planus, should be considered.

A valid and reliable severity scoring system for mucosal lichen planus has the potential to inform good quality interventional trials allowing comparison of disease severity at intra- and inter-patient level. In addition, the use of such tools would strengthen studies of host factors associated with the disease progression and response to treatment, in turn enhancing treatment guidelines and informing new personalised therapies.

6. ACKNOWLEDGEMENT

SPU is supported by the University of Aberdeen Elphinstone Scholarship Scheme.

7. CONFLICT OF INTERESTS

The authors declare no conflict of interests.

8. AUTHOR CONTRIBUTIONS

Data collection and analysis (SPU, ER, AMc, KH, RAE); Conception, design, supervision, funding acquisition (KH, MEC, RAE); Manuscript writing (SPU, ER, AMc, KH, MEC, RAE).

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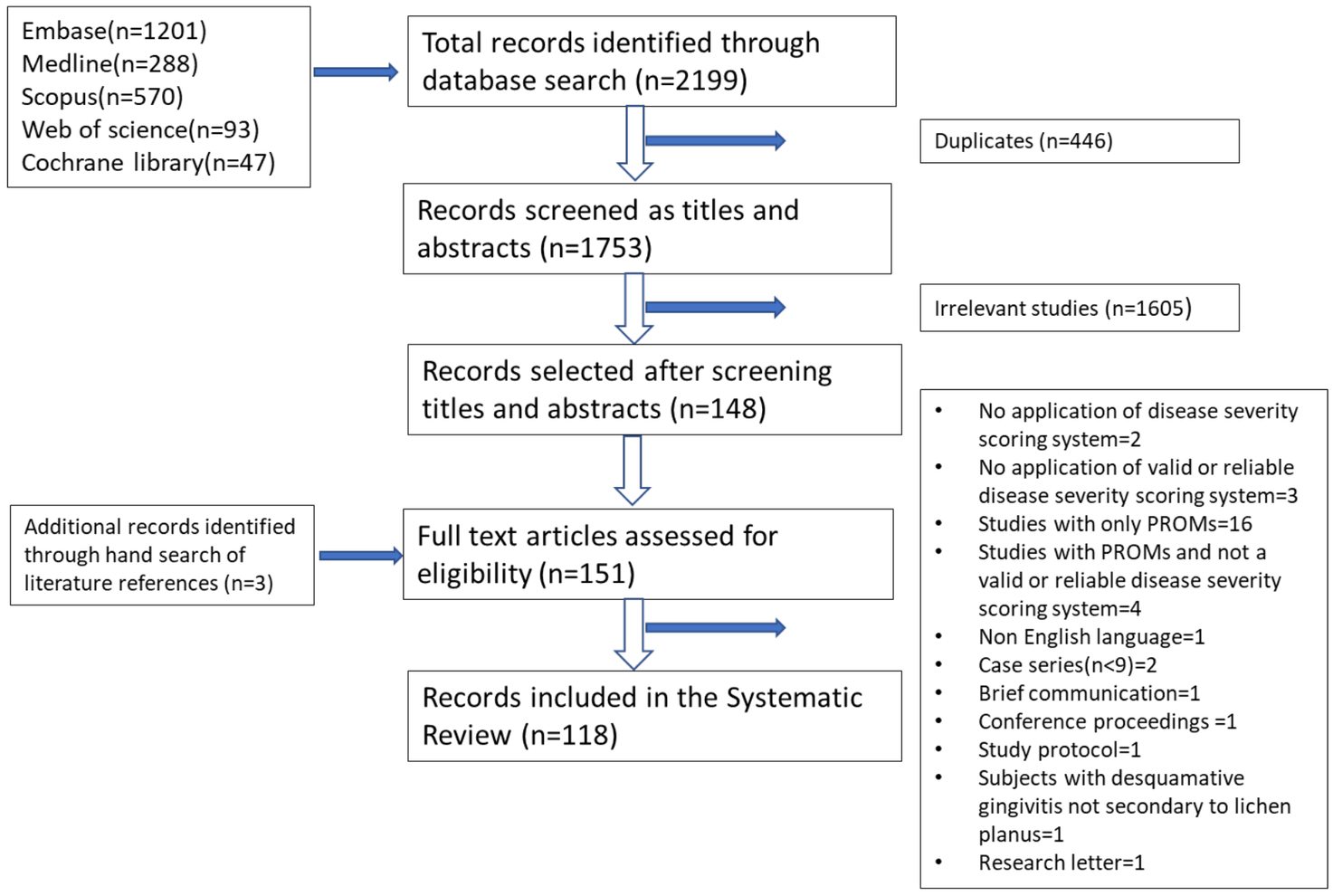

Figure 1: Study selection flowchart according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines.

PROMs: Patient Reported Outcome Measures

Table 1: Characteristics of clinical scoring systems that have undergone validity or reliability (listed in descending order from most to least reported).

Name	Reference-first described	Description	Mucosal changes evaluated	Number and anatomical description of sites assessed	Consideration of gingival involvement	Consideration of area involved/size of the lesion	Consideration of symptom scores	Number of studies in which the scoring system has been reported
Thongprasom scoring system (White-Erosive-Atrophic scoring system)	Thongprasom et al. (1992)	Score 0: no lesion, normal mucosa Score 1: mild white striae, no erythematous area Score 2: white striae with atrophic area less than 1 cm^2 Score 3: white striae with atrophic area more than 1 cm^2 Score 4: white striae with erosive area less than 1 cm^2 Score 5: white striae with erosive area more than 1 cm^2	White striae, atrophic and erosive mucosa	Not assessed	No	Yes	No	49
Oral Disease Severity Score (Escudier scoring system)	Escudier et al. (2007)	a) Site score 0: no detectable lesion present; 1: evidence of lichen planus seen; 2: >50% of buccal mucosa, dorsum of tongue, floor of mouth, hard palate, soft palate or oropharynx affected. b) Severity score 0: keratosis only; 1: keratosis with mild erythema (<3 mm from gingival margins); 2: marked erythema (e.g., full thickness of gingivae, extensive with atrophy or oedema on nonkeratinized mucosa); 3: ulceration present. c) Activity score Site score x Severity score d) Pain score on a scale of 0–10, how painful has the lichen planus been over the past two weeks? Total score: sum of site, activity and pain scores	Keratosis, erythema and ulcerative mucosa	17 sites: Outer lips Inner lips Left buccal mucosa Right buccal mucosa Gingiva: Lower right (distal) Lower central Lower left (distal) Upper left (distal) Upper central Upper right (distal) Dorsum of tongue Right lateral tongue Left lateral tongue Floor of mouth Hard palate Soft palate Oropharynx	Yes	Yes	Yes	25
REU scoring system (Reticular/hyperkeratotic, Erosive/erythematous, Ulcerative)	Piboonniyom et al. (2005)	a) Reticular/hyperkeratotic lesions (R): Score 0: no white striations; 1: presence of white striations or keratotic papules. b) Erosive/erythematous areas (E): Score 0: no lesion; 1: lesions less than 1 cm^2; 2: lesions from 1 to 3 cm^2; 3: lesions greater than 3 cm^2. c) Ulcerative areas (U): Score 0: no lesion; 1: lesions less than 1 cm^2; 2: lesions from 1 to 3 cm^2; 3: lesions greater than 3 cm^2. The total score of all 10 areas= $\Sigma R + \Sigma (E \times 1.5) + \Sigma (U \times 2.0)$	Reticular/hyperkeratotic, erosive/erythematous and ulcerative mucosa	10 sites: Upper/lower labial mucosa Right buccal mucosa Left buccal mucosa Dorsal tongue Ventral tongue Floor of mouth Hard palate mucosa Soft palate/tonsillar pillars Maxillary gingiva Mandibular gingiva	Yes	Yes	No	14

RAE scoring system (Reticular, Atrophic, Erosive)	Zhou et al. (2012)	a) Reticular lesions (R): Score 0: no white striations; 1: presence of white striations or keratotic papules. b) Atrophic areas (A): Score 0: no lesion; 1: lesions less than 1 cm^2; 2: lesions from 1 to 3 cm^2; 3: lesions greater than 3 cm^2. c) Erosive areas (E): Score 0: no lesion; 1: lesions less than 1 cm^2; 2; lesions from 1 to 3 cm^2; 3: lesions greater than 3 cm^2. The total score of all 10 areas= Σ R + Σ (A×1.5) + Σ (E×2.0)	Reticular, atrophic and erosive mucosa	10 sites: Upper/lower labial mucosa Right buccal mucosa Left buccal mucosa Dorsal tongue Ventral tongue Floor of mouth Hard palate mucosa Soft palate/tonsillar pillars Maxillary gingiva Mandibular gingiva	Yes	Yes	No	13
Malhotra scoring system	Malhotra et al. (2008)	a) Site score 1: areas involved < 50% of tongue and buccal mucosa scored; 2: areas involved ≥ 50% of tongue and buccal mucosa; 0: uninvolved (lips, gingiva and palate); 1: involved (lips, gingiva and palate). Total score: sum of scores of all subsites. b) Based on the total score a grade was assigned: Grade 0 = 0 points Grade I = 1-3 points Grade II = 4-6 points Grade III = 7-12 points c) The severity was expressed based on grade: Mild (asymptomatic grade I) Moderate (symptomatic grade I or grade II) Severe (grade III or erosive lesion of any grade)	Erosive mucosa	5 sites: Buccal mucosa Tongue Lips Gingiva Palate	Yes	Yes	No	3
Modified Oral Mucositis Index (MOMI)	Chainani-Wu et al. (2007)	a) Intensity score for erythema: 0: normal; 1: mild erythema, 2: moderate erythema; 3: severe erythema. b) The score for ulcerations: 0: no ulcerations; 1: area of ulceration between 0 and 0.25 cm^2; 2: area of ulceration between 0.25 and 1 cm^2; 3: area ≥1 cm^2. Total score: sum of erythema and ulcerative scores of all subsites.	Erythema and ulcerative mucosa	16 sites: Right buccal mucosa Left buccal mucosa Upper labial mucosa Lower labial mucosa Right lateral tongue Left lateral tongue Right dorsum of tongue Left dorsum of tongue Right ventral tongue and floor of mouth Left ventral tongue and floor of mouth Right maxillary gingiva Left maxillary gingiva Right mandibular gingiva Left mandibular gingiva Soft palate Hard palate	Yes	Yes	No	3
Modified Escudier Index	Salgado et al. (2013)	a) Site score 0: absence of lesion; 1: presence of lesion b) Severity score	Whitish plaque, erythema and ulcerative mucosa	Gingiva: Posterior right maxillary gingiva	Yes	Yes	Yes	2

		0: only whitish plaque; 1: whitish plaque with medium erythema (>3 mm of the gingival margin); 2: marked erythema (the entire extension of the gingiva, with atrophy or oedema in the non-keratinized mucosa); 3: ulceration. c) Activity score = Site score x Severity score d) Pain score: VAS (0-10) Total score= sum of site, activity and pain scores		Posterior left maxillary gingiva Anterior maxillary gingiva Posterior right mandibular gingiva Posterior left mandibular gingiva Anterior mandibular gingiva				
Siponen and Salo scoring system	Siponen et al. (2017)	1) Site of the lesion A) Size of lesions as a percentage of total surface area Score 0: no lesion; 1: < 25%; 2: 25-49%; 3: 50-74%; 4: 75-100% B) Clinical type of lesion Score 1: white; 2: predominantly white; 4: predominantly red; 6: ulcerative or bullous 2) VAS (0-10) discomfort produced by symptoms of OLP during the last 24 hours. Total score = 1A + 1B + 2	White, red, bullous or ulcerative mucosa	12 sites: Right buccal and labial mucosa Left buccal and labial mucosa Right gingiva Left gingiva Right tongue Left tongue Right palatal mucosa Left palatal mucosa Right lip Left lip Right floor of mouth Left floor of mouth	Yes	Yes	Yes	1
White Erosive Atrophic Modified scoring system (WEA-MOD)	Gobbo et al. (2017)	Score 0: normal mucosa Score 1: a lesion having only white striae Score 2: a lesion of white striae and atrophic areas <1 cm^2 Score 3: a lesion of white striae and atrophic areas >1 cm^2 Score 4: a lesion of white striae and erosive areas <1 cm^2 Score 5: a lesion of white striae with erosive areas >1 cm^2	White striations, atrophic and erosive mucosa	10 sites: Upper/lower labial mucosa Right buccal mucosa Left buccal mucosa Dorsal tongue Ventral tongue Floor of mouth Hard palate mucosa Soft palate/tonsillar pillars Maxillary gingiva Mandibular gingiva	Yes	Yes	No	1
Elsabagh scoring system	Elsabagh et al. (2021)	1) Objective mucosal lesion nature Score 0: no lesion; 1: white keratotic lesion; 2: atrophy/erosion intermixed or not with white lesion; 3: ulceration intermixed or not with white lesion. 2) Subjective pain score Score 0: no pain; 1: mild pain; 2: moderate pain; 3: severe pain. 3) Number of surfaces affected in the oral cavity other than the gingiva Score 0: only 1 surface affected or buccal mucosae bilaterally; 1: more than 1 surface affected or more than both buccal mucosae. 4. Gingival involvement as desquamative gingivitis	White keratotic, atrophy/erosion and ulcerative mucosa	Scoring based on number of surfaces affected	Yes	Yes	Yes	1

		Score 0: no gingival involvement; 1: narrow band [1 mm] of gingival involvement or wide band in less than 6 teeth involved; 2: wide band [>1 mm] of gingival involvement in more than 6 teeth involved. Total score: sum of all sub scores of each category						
Reticulation, Hyperemia/Erythema, Erosion/Ulceration (RHU scoring system)	Wu et al. 2022	White reticulation/patches are classified according to the proportion of their involved area to the total area of each part. If there is no white striations, the value is "0"; If the involved area is lesser than 50% of the total area of the part, the value is "1"; If the involved area is greater than or equal to 50% of the total area of the part, the value is "2". Area of hyperemia/erythema and erosion/ulceration are record directly. The total score for 11 areas: sum of the reticulation, 1.5*hyperemia/erythema and 2*erosion/ulcer.	Reticulations, hyperemia/erythema and erosion/ulcer	11 sites: Upper lip (red lip and inner lip) Lower lip (red lip and inner lip) Left buccal mucosa Right buccal mucosa Maxillary gingiva (including vestibular sulcus) Mandibular gingiva (including vestibular sulcus) Left dorsal tongue and ventral tongue Right dorsal tongue and ventral tongue Floor of mouth Hard palate Soft palate	Yes	Yes	No	1

Table 2: Validity and reliability tests undergone by severity scoring systems in oral lichen planus

Name of the scoring system	Results from studies aimed at validating pain rating scales	Results from studies aimed to reveal the association between the clinical severity and pain rating scales	Results from studies aimed at validating the clinical scoring systems/clinical assessment of scoring systems			Inter-rater reliability (Reference)	Intra-rater reliability (Reference)	Internal consistency reliability (Reference)
	Correlation between disease activity and pain scores (Reference)	Correlation between pain scores and disease activity (Reference)	Correlation between scoring systems (Reference)	Correlation between disease activity and pain scores (Reference)	Histological and clinical assessments (Reference)			
Thongprasom scoring system	Not reported	Thongprasom vs NRS: rs=0.298(p=0.013) (Yiemstan et al. 2020)	Not reported	Thongprasom vs NRS: rs=0.665 (Elsabagh et al. 2021)	Inter-examiner agreement between biopsy results and Thongprasom: (kappa = 0.03163, p > .05) (AUC=0.667; p =.192) sensitivity: 80.95% and specificity 50%. (Elsabagh et al. 2021)	ICC: 0.93;95%, 0.88-0.96 (Elsabagh et al. 2021)	ICC: 0.96;95%, 0.93-0.98 (Elsabagh et al. 2021)	Not reported
Oral Disease Severity Score (Escudier scoring system)	ODSS-activity vs VAS: rs= 0.494 ODSS-activity vs NRS: rs=0.479 ODSS-total vs VAS: rs= 0.648 ODSS-total vs NRS: rs=0.635 (Wiriyakijja et al. 2021)	ODSS-total vs VAS: r=0.32 (p=0.04) ODSS-activity vs VAS: r=0.26 (p=0.09) (Radwan –Oczko et al. 2018)	ODSS vs Malhotra: rs =0.540 (López-Jornet & Camacho-Alonso 2010)	ODSS vs VAS: rs=0.44 (López-Jornet & Camacho-Alonso 2010)	Not reported	ICC: ODSS-total: >0.93; ODSS-site: >0.93; ODSS-activity: >0.93. Pain: Cohen's weighted k>0.99 (Escudier et al. 2007) Weighted Cohen's Kappa ODSS-site: 0.96 (95% CI 0.83, 1.00) ODSS-activity: 0.78 (95% CI 0.63, 0.91). (Stone et al. 2013)	Not reported	Not reported
REU scoring system (Reticular/hyperkeratotic, Erosive/erythematous, Ulcerative)	Not reported	Not reported	WEA-MOD vs REU Observer 1: rs=0.84 Observer 2: rs=0.85 Observer 3: rs=0.57 (Gobbo et al. 2017)	REU vs NRS: rs=0.40; NRS vs E: rs=0.35; NRS vs U: rs=0.31; NRS vs R: rs=0.29. (Park et al. 2012) REU vs VAS: Observer 1: rs=0.35	Not reported	rs=1.0 (Piboonniyom et al. 2005) ICCs between Observer 1 vs 2: 0.87 (0.78-0.92) Observer 1 vs 3: 0.84 (0.73-0.90) Observer 2 vs 3: 0.91 (0.85-0.95)	rs=0.98 (Piboonniyom et al. 2005)	Cronbach coefficient alpha: 0.70; REU vs E: rs=0.92; REU vs U: rs=0.82; REU vs R: rs=0.57 (Park et al. 2012)

				Observer 2: rs=0.40 Observer 3: rs=0.37 (Gobbo et al. 2017)		Kendall's W at T1: 0.889 Kendall's W at T2: 0.837 (Gobbo et al. 2017)		
RAE scoring system (Reticular, Atrophic, Erosive)	Not reported	Not reported	Not reported	Not reported	Not reported	ICC:>0.91 (p=<0.001) (Yang et al. 2022)	Not reported	Not reported
Malhotra scoring system	Not reported	Not reported	Malhotra vs ODSS: rs =0.540. (López-Jornet & Camacho-Alonso 2010)	Malhotra vs symptom score Group A: rs=-0.986. Group B: rs=-0.958; P<.001). (Malhotra et al. 2008) Malhotra vs VAS: rs=0.078 (López-Jornet & Camacho-Alonso 2010)	Not reported	Not reported	Not reported	Not reported
Modified Oral Mucositis Index	MOMI vs NRS Baseline: rs=0.5 First follow up: rs=0.327 Second follow up: rs=0.575 Third follow up: rs=0.648 MOMI vs VAS Baseline: rs=0.33 First follow up: rs=0.04 Second follow up: rs=0.521 Third follow up: rs=0.567 Change in MOMI at first follow up and baseline visit vs CSS: rs=-0.232 (Chainani Wu et al. 2008)	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	Cronbach alpha: 0.66. Baseline: r=0.652 First follow up: r=0.318 Second follow up: r= 0.412 Third follow up: r=0.526 (Chainani Wu et al. 2008)
Modified Escudier Index	Not reported	Not reported	Not reported	Not reported	Not reported	Not reported	ICC for: site score:0.766 (0.504-0.898). severity score:0.951 (0.883-.980). (Mergoni et al. 2019)	Not reported

Siponen and Salo clinical scores	Not reported	Not reported	Not reported	Siponen and Salo vs VAS: r=0.180 (Siponen et al. 2017)	Not reported	ICC: 0.96 (Siponen et al. 2017)	Not reported	Not reported
White Erosive Atrophic Modified scoring system (WEA-MOD)	Not reported	Not reported	WEA-MOD vs REU Observer 1: rs=0.84 Observer 2: rs=0.85 Observer 3: rs=0.57 (Gobbo et al. 2017)	WEA-MOD score vs VAS (weak evidence; results not significant) (Gobbo et al. 2017)	Not reported	ICC between: Observer 1 vs 2: 0.78 (0.65 to 0.87), Observer 1 vs 3: 0.70 (0.52 to 0.814), Observer 2 vs 3: 0.58 (0.36 to 0.74) Kendall's W at T1: 0.745 Kendall's W at T2: 0.578 (Gobbo et al. 2017)	Not reported	Not reported
Elsabagh scoring system	Not reported	Not reported	Not reported	Elsabagh vs NRS: rs= 0.846 (Elsabagh et al. 2021)	Inter-examiner agreement between biopsy results and Elsabagh scoring system: (kappa = 0.74, p < .05) (AUC = 0.839; p<.0001), sensitivity:57.14% and specificity: 100%. (Elsabagh et al. 2021)	ICC: 0.97;95%, 0.95-0.98 (Elsabagh et al. 2021)	ICC: 0.98;95%, 0.97-0.99 (Elsabagh et al. 2021)	Lesion nature vs pain (rs= 0.66; p <.001) Lesion nature vs total (rs= 0.83; p <.001) (Elsabagh et al. 2021)
Reticulation, Hyperemia/Erythema, Erosion/Ulceration (RHU scoring system)	Not reported	Not reported	RHU vs REU: r= 0.675 RHU vs PGA: r=0.891 (Wu et al. 2022)	Not reported	Not reported	Not reported	Not reported	Cronbach alpha: 0.49

VAS: Visual Analogue Scale; NRS: Numerical Rating Scale; CSS: Change in Symptom Scale; ICC: Intraclass correlation coefficient; rs=Spearman's correlation coefficient; r=Pearson's correlation coefficient; Kendall's W: Kendall's coefficient of concordance; PGA: Physician Global Assessment

Materials and Methods

Search Strategy

Mesh terms and keywords used in the search were as follows: (“oral lichen planus” or “vulvovaginal lichen planus” or “vulval lichen planus” or “vulvar lichen planus” or “mucosal lichen planus”) and (“diagnosis” or “diagnostic criteria”) and (“disease severity” or “clinical severity” or “severity”) and (“scoring” or “scoring system” or “grading” or “classification”).

a) Embase **(1974 to Oct 6, 2022)**

1. exp lichen planus/

2. oral lichen planus$.tw.

3. vulvovaginal lichen planus$.tw.

4. vulval lichen planus$.tw.

5. vulvar lichen planus$.tw.

6. mucosal lichen planus$.tw.

7. lichen planus diagnosis$.tw.

8. lichen planus diagnostic criteria$.tw.

9. exp disease severity/

10. disease severity$.tw.

11. clinical severity$.tw.

12. severity$.tw.

13. exp scoring system/

14. scoring$.tw.

15. scoring system$.tw.

16. exp human/

17. grading$.tw.

18. classification$.tw.

19. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8

20. 9 or 10 or 11 or 12

21. 13 or 14 or 15 or 16 or 17 or 18

22. 19 and 20 and 21

23. 19 and 20 and 21 (limits to English language and Humans)

Results Identified: 1201

b) Medline® **(1946 to September week 5)**

1. exp lichen planus/

2. oral lichen planus$.tw.

3. vulvovaginal lichen planus$.tw.

4. vulval lichen planus$.tw.

5. vulvar lichen planus$.tw.

6. mucosal lichen planus$.tw.

7. lichen planus diagnosis$.tw.

8. lichen planus diagnostic criteria$.tw.

9. exp disease severity/

10. disease severity$.tw.

11. clinical severity$.tw.

12. severity$.tw.

13. exp scoring system/

14. scoring$.tw.

15. scoring system$.tw.

16. exp human/

17. grading$.tw.

18. classification$.tw.

19. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8

20. 9 or 10 or 11 or 12

21. 13 or 14 or 15 or 16 or 17 or 18

22. 19 and 20 and 21

23. 19 and 20 and 21 (limits to English language and Humans)

Results Identified: 288

c) Scopus: using search option '**No date restrictions'**

"oral lichen planus" OR "vulvovaginal lichen planus" OR "vulvar lichen planus" OR "vulval lichen planus" OR "mucosal lichen planus" OR "lichen planus diagnostic criteria" OR "lichen planus diagnosis" AND "disease severity" OR severity OR "clinical severity" AND "scoring system" OR scoring OR grading OR scores OR classification AND (EXCLUDE (DOCTYPE , "re") OR EXCLUDE (DOCTYPE , "ch") OR EXCLUDE (DOCTYPE , "bk") OR EXCLUDE (DOCTYPE , "le") OR EXCLUDE (DOCTYPE , "sh") OR EXCLUDE (DOCTYPE , "cp") OR EXCLUDE (DOCTYPE , "ed") OR EXCLUDE (DOCTYPE , "tb")) AND (EXCLUDE (LANGUAGE , "french") OR EXCLUDE (LANGUAGE , "spanish") OR EX

CLUDE (LANGUAGE , "german") OR EXCLUDE (LANGUAGE , "polish") OR EXCLUDE (LANGUAGE , "chinese") OR EXCLUDE (LANGUAGE , "persian") OR EXCLUDE (LANGUAGE , "portuguese") OR EXCLUDE (LANGUAGE , "russian") OR EXCLUDE (LANGUAGE , "turkish")) AND (EXCLUDE (LANGUAGE , "czech") OR EXCLUDE (LANGUAGE , "dutch") OR EXCLUDE (LANGUAGE , "norwegian") OR EXCLUDE (LANGUAGE , "slovak"))

Results Identified: 570

d) Cochrane Library '**No date restrictions'**

1. MeSH descriptor: [Lichen Planus, Oral]

2. MeSH descriptor: [Lichen Planus]

3. "oral lichen planus" OR "vulvovaginal lichen planus" OR "vulvar lichen planus" OR "vulval lichen planus" OR "mucosal lichen planus"

4. "lichen planus diagnostic criteria" OR "lichen planus diagnosis"

5. #1 OR #2 OR #3 OR #4

6. MeSH descriptor: [Severity of Illness Index]

7. "disease severity" OR severity OR "clinical severity"

8. "scoring system" OR scoring OR grading OR scores OR classification

9. #6 OR #7

10. #5 AND #8 AND #9

Results Identified: 47

e) Web of Science: using search option '**No date restrictions'**

((TS=("oral lichen planus" OR "vulvovaginal lichen planus" OR "vulvar lichen planus" OR "vulval lichen planus" OR "mucosal lichen planus" OR "lichen planus diagnostic criteria" OR "lichen planus diagnosis")) AND TS=("disease severity" OR severity* OR "clinical severity")) AND TS=("scoring system" OR scoring* OR grading* OR scores OR classification OR "grading system") **and** Review Articles **or** Meeting **(Exclude – Document Types) and** German **(Exclude – Languages) and** Russian **or** Turkish **(Exclude – Languages)**

Results Identified: 93

Table S1: Characteristics of the studies and demographics of the study population.

Authors	Year	Study Design	Study Population (Exclusion criteria)	Sample Size (n)	Age (mean± SD)	Sex(M/F)	Exclusion of Lichenoid Reactions	Consideration of confounding factors	Co-occurring periodontal disease	Scoring system	Pain score (Yes/No)/ (scoring system)
Thongprasom et al.	1992	Non randomised clinical trial	Patients with erosive and atrophic oral lichen planus confirmed by biopsy Exclusion criteria: treatment with medications for at least 2 weeks before the study; serious systemic diseases.	Triamcinolone acetonide: 20 Fluocinolone acetonide: 20	Triamcinolone acetonide: 44.55yrs Fluocinolone acetonide: 49.05yrs	Triamcinolone acetonide: 4/16 Fluocinolone acetonide: 5/15	Not excluded	Not reported	Not reported	Thongprasom	No
Buajeeb et al.	1997	Randomised clinical trial	Patients with diagnosis of OLP confirmed by histopathology with or without immunofluorescence. Exclusion criteria: Patients taking drugs causing lichenoid reaction; lesions in contact with corroding dental amalgam; females of childbearing age; patient with candida colony-forming units greater than 50; history of topical therapy for OLP in the past 2 weeks or systemic therapy in the past 4 weeks.	0.1% fluocinolone acetonide: 18 0.05% retinoic acid: 15	46yrs Age for different arms not specified	0.1% fluocinolone acetonide: 1/17 0.05% retinoic acid: 2/13	Excluded patients taking drugs causing lichenoid reaction and lesions in contact with corroding dental amalgam	Not reported	Not reported	Thongprasom	Yes/(VAS)
Buajeeb et al.	2000	Randomised clinical trial	Patients with erosive-atrophic oral lichen planus diagnosis confirmed by histology Exclusion criteria: Patients taking drugs that cause lichenoid reactions; lesions in contact with dental materials; history of topical therapy for OLP in the past 2 weeks or systemic therapy in the past 4 weeks.	0.1% fluocinolone acetonide in orabase: 18 0.1% fluocinolone acetonide gel with carbopol 934, 1%: 15 0.1% fluocinolone acetonide gel with carbopol 940, 0.5%: 15	48yrs (range:30-69yrs) Age for different arms not specified	Total participants: 4/44 M/F not specified for different arms	Excluded patients taking drugs that cause lichenoid reaction and lesions in contact with dental materials	Not reported	Not reported	Thongprasom	Yes/(VAS)
Piboonniyom et al.	2005	Cross sectional	Biopsy proven patients with oral lichen planus and patients with oral graft versus host disease based on clinical criteria.	Oral lichen planus: 6 Oral graft versus host disease: 3	42.3yrs	Not reported	Not excluded	Not reported	Not reported	REU (Reticular/hyperkeratotic, Erosive/erythematous, Ulcerative)	No
Aghahosseini et al.	2006	Non randomised clinical trial	Biopsy proven cases of oral lichen planus and the lesions previously failed to respond to corticosteroid therapy (triamcinolone and methylprednisolone and other treatment topical cyclosporine). Exclusion criteria: Patients with systemic diseases; drug consumption; pregnancy; photosensitivity; age less than 20 years, and lesion/lesions with dysplasia and who received treatment for OLP at least 1 month previous to beginning the study; lesions adjacent to amalgam filling site.	26 lesions in 13 patients	42.5yrs	1/12	Excluded lesions adjacent to amalgam fillings	Not reported	Not reported	Thongprasom	Yes/(VAS)
Xia et al.	2006	Non randomised clinical trial	Biopsy proven ulcerative OLP; ulcerative lesion on bilateral buccal mucosa. Exclusion criteria: Patients with other local or systemic diseases; pregnancy; lactation; not willing to attend follow up sessions; taken immunodepressants or immunopotentiating drugs during the previous 1 month.	0.5 ml intralesional triamcinolone acetonide injection: 45 lesions in 45 patients No intervention: 45 lesions in 45 patients	50.5 ± 13.0yrs	15/30	Not excluded	Not reported	Not reported	REU	Yes/(VAS)

Yoke et al.	2006	Randomised clinical trial	Biopsy proven symptomatic OLP patients. Exclusion criteria: Patients treated previously by either of the trial medications and worsened during that treatment; uncontrolled or severe hypertension; serious active or recurrent infections; severe respiratory, renal, or heart disease; recent history of malignancy; insulin dependent diabetes; active peptic ulcer disease; active inflammatory gastrointestinal disease or pregnancy.	Sandimmun Neoral solution containing 100 mg cyclosporine/mL: 68 Triamcinolone acetonide 0.1% in orabase: 71	Sandimmun Neoral solution containing 100 mg cyclosporine/mL: 43.5yrs (range 10.3-70.9yrs) Triamcinolone acetonide 0.1% in orabase: 43.9yrs (range 9.1-69.2yrs)	Sandimmun Neoral solution containing 100 mg cyclosporine/mL: 25/43 Triamcinolone acetonide 0.1% in orabase: 20/51	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Azizi and Lawaf	2007	Randomised clinical trial	Biopsy proven patients with oral lichen planus and clinically distributed atrophic-erosive lesions. Exclusion criteria: Lesions in contact with dental materials; patients with systemic disease and drugs known to cause lichenoid reaction.	Adcortyl ointment: 30 0.1% topical tacrolimus ointment: 30	48yrs Age for different arms not specified	Total participants:10/50 M/F not specified for different arms	Excluded lesions in contact with dental materials and patients taking any drugs that causes lichenoid reactions	Not reported	Not reported	Thongprasom	Yes/(VAS)
Buajeeb et al.	2007	Case control	Patients with clinical and histological diagnosis of atrophic and erosive OLP. Exclusion criteria: Patients suspected of having lichenoid lesions due to drugs or restorations; a history of topical therapy for OLP in the past 2 weeks or systemic therapy in the past 4 weeks. Controls: Age-sex-matched healthy individuals	Patients: 22 Healthy controls: 22	46.7yrs (range 24–61yrs) Age for different arms not specified	Total participants: 2/20 M/F not specified for different arms	Excluded cases of lichenoid reactions	Not reported	Not reported	Thongprasom	No
Chainani Wu et al.	2007	Randomised clinical trial	Patients over age 21 years; current presentation of atrophic or erosive OLP; a symptom score for OLP between 3 and 8 at enrolment; biopsy confirmed cases. Exclusion criteria: Pregnancy; lactation, a medical contraindication to prednisone or fluconazole; long-term corticosteroid therapy; current use of anticoagulants or antiplatelet agent; current orthodontic treatment; and history of gastric ulcers; duodenal ulcers; gallstones or liver disease.	Curcuminoids at doses of 2000 mg per day in two divided doses: 16 Placebo: 17	Curcuminoids at doses of 2000 mg per day in two divided doses: 60.6 ±7.5yrs Placebo: 60.6 ± 9.8yrs	Curcuminoids at doses of 2000 mg per day in two divided doses: 4/12 Placebo: 6/11	Not excluded	Not reported	Not reported	Modified oral mucositis index (MOMI)	Yes/(VAS and NRS)
Escudier et al.	2007	Cross sectional	Biopsy proven cases of oral lichen planus.	156	Not reported	46/110	Not excluded	Not reported	Not reported	Oral Disease Severity Score (ODSS)	No
Gorouhi et al.	2007	Randomised clinical trial	Biopsy proven OLP; older than 8 years. Exclusion criteria: Any malignant or viral involvement in the mouth; received topical therapy for OLP in the last 2 weeks or systemic therapy in the last 4 weeks; used azathioprine, cyclosporine, psoralen plus ultraviolet (UV) A, UVA, or UVB in the last month; history of allergy to either immunomodulators or corticosteroids.	Triamcinolone acetonide 0.1% paste: 20 Pimecrolimus 1% cream: 20	Triamcinolone acetonide 0.1% paste: 44.7±11.8yrs Pimecrolimus 1% cream: 44.2±14.5yrs	Triamcinolone acetonide 0.1% paste: 7/13 Pimecrolimus 1% cream: 8/12	Not Excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Chainani Wu et al.	2008	Randomised clinical trial	Biopsy proven cases of oral lichen planus; aged greater than 21 years; atrophic or erosive oral lichen planus; a symptom score (NRS) between 3 and 8 at enrolment. Exclusion criteria: Pregnancy; lactation; a medical contraindication to prednisone or fluconazole; patients on long-term	Curcuminoids: 16 Placebo: 17	Not reported	Not reported	Not excluded	Not reported	Not reported	MOMI	Yes/(VAS, NRS, CSS (Change in Symptoms Scale))

			corticosteroid therapy; current use of anticoagulants or antiplatelet agents; current orthodontic treatment; and history of gastric ulcers; duodenal ulcers; gallstones; or liver disease.								
Javadzadeh et al.	2008	Randomised clinical trial	Patients with clinical and histological diagnosis of atrophic/erosive OLP on the basis of WHO criteria; willingness. Exclusion criteria: Histological presence of dysplasia; use of drugs associated with lichenoid reaction; patients who received treatment for OLP in the last two weeks; contemporary skin and/or genital lesions; hypersensitivity to corticosteroids and other drugs; lupus erythematosus; erythema multiform; secondary syphilis; and Graft versus Host Disease (GVHD); any systemic disorders.	New mouthwash containing clobetasol, Ketoconazole and amitriptyline: 17 Diluted dexamethasone with 30 drops of nystatin 100000 unit: 16	New mouthwash containing clobetasol, Ketoconazole and amitriptyline: 49.29 ± 11.37yrs Diluted dexamethasone with 30 drops of nystatin 100000 unit: 47.25 ± 15.32yrs	New mouthwash containing clobetasol, Ketoconazole and amitriptyline: 8/9 Diluted dexamethasone with 30 drops of nystatin 100000 unit: 6/10	Excluded patients using drugs associated with lichenoid reaction	Not reported	Not reported	RAE (Reticular, Atrophic, Erosive)	Yes/(VAS)
Malhotra et al.	2008	Randomised clinical trial	Biopsy proven patients with oral lichen planus. Exclusion criteria: Patients who received any treatment in the previous 4 weeks; Children (age <15 years); elderly patients (age >65 years); pregnant and lactating women; and patients with asymptomatic OLP; multiple or extensive skin lesions of lichen planus; uncontrolled diabetes mellitus; or hypertension.	Betamethasone oral mini pulse therapy:25 Topical triamcinolone acetonide 0.1%: 24	Betamethasone oral mini pulse therapy: 42.72 ± 12.57yrs Topical triamcinolone acetonide 0.1%: 34.71 ± 8.76yrs	Betamethasone oral mini pulse therapy: 15/10 Topical triamcinolone acetonide 0.1%: 14/10	Not excluded	Not reported	Not reported	Malhotra	Yes/(No definite scale for pain was used. The changes in the symptoms were evaluated on a scale of 0% to 100% with 10% as a unit)
Ergun et al.	2009	Case control	Biopsy proven case of OLP; newly diagnosed patients prior to any treatment; clinical severity score 2 or below (according to Thongprasom score). Exclusion criteria: Patients with lichenoid lesions associated with drugs or restorations ; smokers or alcohol misusers; history of malignancy; history of malignancy among the first-degree relatives; reporting any infections within 3 months of the study; received periodontal therapy in the 3 months prior to the study; exposure to cytotoxic chemicals, drugs or radiation therapy known to affect sister chromatid exchange (SCE) and micronuclei (MN) frequencies; with systemic diseases (e.g. diabetes and liver disease. Controls: Healthy individuals	Patients: 22 Healthy controls: 20	Patients: 44.18 ± 6.25yrs Healthy controls: 45.50 ± 4.48yrs	Patients: 10/12 Healthy controls:11/9	Excluded cases of lichenoid reactions	Not reported	Excluded patients who received periodontal therapy in the 3 months prior to the study and performed periodontal assessment of included subjects.	Thongprasom	No
Aghahosseini et al.	2010	Randomised clinical trial	Patients with OLP diagnosed based on clinical and histopathologic criteria according to WHO (2003); age range of 25–70 year; availability for monthly appointments up to 6 months; the presence of symptoms as pain or burning sensation. Exclusion criteria: Participants demonstrating histological signs of dysplasia; lichenoid drug reactions; drug consumption in the past month; pregnancy. any kind of localized or systemic disease; renal problems; receiving immunosuppressive or immunomodulatory treatments or any kind of systemic or local drugs.	Purslane: 20 patients with 60 lesions Placebo: 17 patients with 46 lesions	47.4 ± 10.8yrs Age for different arms not specified	Purslane: 9/10 Placebo: 7/10	Excluded cases of lichenoid drug reactions	Not reported	Not reported	Thongprasom	Yes/(VAS)

Lopez-Jornet and Camacho-Alonso	2010	Cross sectional	Patients with oral lichen planus diagnosed on the basis of clinical and histopathology findings according to WHO criteria. Exclusion criteria: Patients taking drugs that might cause a lichenoid reaction; lesions in contact with dental amalgam; and those with lesions of the skin or in locations other than the oral mucosa.	100	53.69 ± 13.02yrs	19/81	Excluded cases of lichenoid reactions	Not reported	Not reported	ODSS and Malhotra	Yes/(VAS)
Tao et al.	2010	Cross sectional	Patient with clinical and histopathological diagnosis of oral lichen planus Exclusion criteria: Subjects with detectable gingival and⁄or periodontal inflammation; visible oral lesions under careful examination; taking drugs inducing hyposalivation, or any other prescription or non-prescription drugs, such as anticholinergics, antihistamines, antihypertensives and beta-adrenergic blockers; who received treatment for the OLP within 60 days before specimen collection and history, symptoms, and⁄or signs of systematic infections, allergies, and smoking. Controls: Healthy subjects who received orthognathic surgery	Patients: 23 Healthy Controls: 12	Patients: 46.3 ± 3.39yrs Healthy controls: 31 ± 1.68yrs	Total participants: 12/11 M/F for different arms not specified	Not excluded	Not reported	Subjects included were free from periodontal disease.	REU	No
Jajarm et al.	2011	Randomised clinical trial	Adult patients with atrophic-erosive; biopsy-proven OLP in the tongue or buccal mucosa; sized ≤3 cm. Exclusion criteria: Patients presenting with systemic diseases; drug consumption; pregnancy, photosensitivity; younger than 20 years; and patients who had lesions with dysplasia or had received treatment for OLP at least 1 month prior to the beginning of the study and lesions adjacent to the amalgam filling site.	Low intensity laser therapy: 11 Dexamethasone mouthwash: 13	Not reported	Not reported	Excluded lesions adjacent to the amalgam filling site	Not reported	Not reported	Thongprasom and author proposed criteria (Modified RAE)	Yes/(VAS)
Mansourian et al.	2011	Randomised clinical trial	Patients with erosive or atrophic OLP confirmed by clinical and histopathologic criteria according to WHO diagnostic criteria (2003). Exclusion criteria: Patients with systemic diseases: heart disease, renal disease, hypertension, neurologic disorders, etc; using any medication for treatment of OLP or any immunosuppressive medication during the 4 weeks preceding the study; lichenoid lesions, lesions in direct contact with amalgam restorations; allergy to other dental materials and dysplastic lesions.	Aloe vera: 23 Triamcinolone acetonide: 23	Aloe vera: 47.2 ± 2.0yrs Triamcinolone acetonide: 50.7 ± 2.1yrs	Aloe vera: 8/15 Triamcinolone acetonide: 9/14	Excluded patients with lichenoid lesions in direct contact with amalgam restorations and those with allergy to other dental materials.	Not reported	Not reported	Thongprasom	Yes/(VAS)
Chainani Wu et al	2012	Randomised clinical trial	Patients older than 21 years; a current clinical presentation of atrophic or erosive OLP; symptom score for OLP between 3 and 8 at enrolment [NRS]) Exclusion criteria: Patients who received topical or systemic steroids for at least 2 weeks; pregnancy; lactation; patients on long-term glucocorticosteroid therapy; current orthodontic treatment; and history of gastroesophageal	Curcuminoids at doses of 6000mg per day in 3 divided doses:10 Placebo: 10	Curcuminoids at doses of 6000mg per day in 3 divided doses :60.8± 8.6yrs Placebo :56.2 ± 11.7yrs	Curcuminoids at doses of 6000mg per day in 3 divided doses: 2/8 Placebo: 5/5	Not excluded	Not reported	Not reported	MOMI	Yes/(NRS)

			reflux disease; gastric ulcers; duodenal ulcers; gallstones; or elevated liver enzymes above 2.5 times the upper limit of normal.								
Malik et al.	2012	Non randomised clinical trial	Patients with OLP diagnosed on the basis of clinical and histopathological findings; recalcitrant to treatment with other medications or having recurrent lesions. Exclusion criteria: Patients on medication for other systemic diseases.	20	38.25 ± 11.19yrs	7/13	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Park et al.	2012	Cross sectional	Biopsy proven cases of oral lichen planus. Exclusion criteria: Patients with unilateral leukoplakia; erythroleukoplakia; or proliferative leukoplakia and on opioid analgesics.	115	57 ± 13yrs	41/74	Not excluded	Not reported	Not reported	REU	Yes/(NRS)
Wee et al.	2012	Case series	Patients with severe ulcerative OLP confirmed by histopathological examination and received treatment with mycophenolate mofetil.	10	Not reported	1/9	Not excluded	Not reported	Not reported	ODSS	No
Zhou et al.	2012	Case control	Patients with clinical and histopathological diagnosis of oral lichen planus; newly diagnosed patients. Exclusion criteria: History of smoking and alcohol abuse; detectable gingival or periodontal inflammation; any visible oral lesions; taking systemic or topical anti-inflammatory or immunosuppression/ immunomodulatory drugs; received any treatments for the OLP within 3 months prior to the specimen collection; and history, symptoms, and /or signs of systematic infections, allergies, cardiovascular disease, immunodeficient disease and autoimmune disease. Controls: Age-sex matched; healthy subjects	Patients22 Healthy controls:8	Patients:42±12yrs Healthy controls: 49±6yrs	Patients:10/12 Healthy controls:3/5	Not excluded	Not reported	Excluded cases with detectable gingival and／or periodontal inflammation	RAE	No
Hu et al.	2013	Case control	Biopsy proven cases of oral lichen planus. Exclusion criteria: Patients with any systemic disorders; soft tissue lesions in the oral mucosa; smokers and severe alcoholics; patients on immunotherapy or receiving any medical treatment of OLP within 3 months. Controls: Age and gender matched healthy volunteers	Patients: 22 Healthy controls: 8	Patients: 42.0yrs Healthy controls: 49.0yrs	Patients: 10/12 Healthy controls:3/5	Not excluded	Not reported	Not reported	RAE	No
Lee et al.	2013	Randomised clinical trial	Patients diagnosed with OLP by clinical and histopathologic examination. Exclusion criteria: Younger than 18 years; a history of topical therapy for OLP in the past 2 weeks or systemic therapy in the past 4 weeks; the presence of skin and/or genital lesions; histopathologic signs of dysplasia; treatment with drugs that may induce lichenoid reactions; a history of corticosteroid allergy; chronic liver disease, immune system dysfunction, or haematological diseases, pregnancy and lactation.	Triamcinolone acetonide mouth rinse: 18 Triamcinolone acetonide intralesional injection: 20	Triamcinolone acetonide mouth rinse: 56.6 ± 11.7yrs Triamcinolone acetonide intralesional injection: 57.1 ± 6.6yrs	Triamcinolone acetonide mouth rinse :11/7 Triamcinolone acetonide intralesional injection: 9/11	Excluded patients using drugs associated with lichenoid reaction.	Not reported	Not reported	ODSS	Yes/(VAS)
Salgado et al.	2013	Non randomised clinical trial	Patients with clinical and histopathological diagnosis of OLP; lesions in the gingiva; painful	20	55.9 ± 9.9yrs	2/18	Excluded cases of medication induced lichenoid reactions	Not reported	Periodontal evaluation was performed and recorded Visible	Modfied Escudier Index	No

			Exclusion criteria: Presence of treatment with topical corticoids in the preceding 60 days; systemic or local treatment with corticosteroids; use of non-steroid anti-inflammatory medications and/or antibiotics in the three months prior to the study; use of medications that induce lichenoid reactions; periodontal treatment in the three months prior to the study; medical history of any systemic condition that would determine the need for prophylactic antibiotic therapy; continuous use of any mouthwash for plaque control; and pregnancy.						Plaque Index (VPI) and Gingival Bleeding Index (GBI).		
Stone et al.	2013	Randomised clinical trial	Adult patients aged 18 years and above; willing and able to complete questionnaires; able to provide consent, newly referred or under review at Newcastle Dental Hospital with a provisional diagnosis of OLP with clinical signs of gingival involvement. Exclusion criteria: Unable to attend for the additional appointments prior to biopsy; unable to complete questionnaires; involved in a research study within the previous 28 days.	Patients received personalized oral hygiene instruction using a powered toothbrush and inter-dental cleaning aids: 39 Patients received normal plaque control regimen without any advice: 43	Patients received personalized oral hygiene instruction using a powered toothbrush: 61.2± 9.9yrs Patients received normal plaque control regimen without any advice: 61.6 ±11.8yrs	Patients received personalized oral hygiene instruction using a powered toothbrush :6/33 Patients received normal plaque control regimen without any advice:9/34	Not excluded	Not reported	Not reported	ODSS	Yes/(VAS)
Amanat et al.	2014	Randomised clinical trial	Patients with bilateral clinically and biopsy proven OLP lesions; lesions sized ≤ 4 cm; similar in form bilaterally with < 1 cm difference in size. Exclusion criteria: Patients who received any treatment for OLP at least 1-month prior to the beginning of the study; systemic diseases; pregnancy; drug consumption; smoking; patients with lesions contacting dental amalgams; dermal and other mucosal involvement at the time of therapy.	Cryotherapy with a cryo-probe: 30 lesions in 30 patients Triamcinolone acetonide 0.1% ointment in orabase: 30 lesions in 30 patients	Not reported	8/22	Excluded lesions contacting dental amalgam	Not reported	Not reported	Thongprasom and RPAE score (Reticular (R), white plaque (P), atrophy (A), erosion (E)	Yes/(VAS)
Rogulj et al.	2014	Non randomised clinical trial(Oral lichen planus) and Randomised clinical trial(Recurrent aphthous stomatitis)	Biopsy proven OLP cases; patients with RAS (2 or more episodes per year). Exclusion criteria: Patients younger than 18 years; haematological deficiencies; diseases of the hepatobiliary system; lichenoid reactions to amalgam and drugs; pregnancy; inflammatory bowel disease; immune dysfunction; current concomitant systemic or local anti-inflammatory therapy (corticosteroids, non-steroidal anti-inflammatory drugs, etc.)	Oral lichen planus: 11 Recurrent aphthous stomatitis: 7	Not reported	Not reported	Excluded cases of lichenoid reactions	Not reported	Not reported	REU	Yes/(VAS)
Sanatkhani et al.	2014	Randomised clinical trial	Biopsy confirmed OLP without dysplasia; severity of pain≥2 (VAS)> 3.5; severity of lesions≥2 (Thongprasom score). Exclusion criteria: Any treatment in the last month; kidney or liver diseases; evidence of lichenoid reaction in clinical or histopathologic assessment; loss of follow up; pregnant patients; diabetic patients; other mucosal disease; severe systemic disease; patients who refuse doctor's advice.	Cedar honey: 15 Dexamethasone mouthwash: 15	Cedar honey: 46.8± 8.9yrs Dexamethasone mouthwash: 46.53± 10.75yrs	Cedar honey: 0/15 Dexamethasone mouthwash: 2/13	Excluded cases with any evidence of lichenoid reaction in clinical or histopathologic assessment.	Not reported	Not reported	Thongprasom and Severity Index	Yes/(VAS)

Saruhanoglu et al.	2014	Case control	Oral lichen planus: Cases diagnosed according to WHO diagnostic criteria; no restorations in oral cavity and negative skin patch test result; newly diagnosed patients prior to any treatment; clinical severity score 2 or below (according to Thongprasom score). Oral lichenoid contact reactions: lichenoid lesions associated with dental materials and restorations; confirmed by positive patch test; newly diagnosed patients prior to any treatment. Exclusion criteria: Presence of lichenoid dysplasia; smokers and consumers of alcohol; subjects with a history of malignancy; history of malignancy among the first-degree relatives; reporting any infections within 3 months of the study; received periodontal therapy in the 3 months prior to the study; periodontal pocket probing depth higher than 5 mm; exposure to cytotoxic chemicals, drugs, or radiation therapy; confirmed systemic diseases who are under regular medications (e.g., diabetes, arthritis, and liver disease). Controls: Healthy individuals.	Oral lichen planus: 22 Oral lichenoid contact reaction: 21 Healthy controls: 17	Oral lichen planus: 47.6± 14.4yrs Oral lichenoid contact reaction: 51.3± 12.5yrs Healthy controls: 49.2± 14.6yrs	Oral lichen planus: 4/18 Oral lichenoid contact reaction: 6/15 Healthy controls: 5/12	Not excluded	Not reported	Excluded subjects with periodontal pocket probing depth higher than 5 mm.	Thongprasom and ODSS	No
Arunkumar et al.	2015	Randomised clinical trial	Patients with symptomatic OLP; agreeing for the biopsy and ready to apply the medication supplied. Exclusion criteria: Patients with a history of malignancy; immunocompromised diseases; current systemic or generalized infections; history of pregnancy or breast feeding; received topical or systemic immunosuppressants, retinoids or any other systemic therapies known to cause an effect on OLP within the last 4 weeks and patients allergic to the drugs supplied.	Pimecrolimus cream 1%: 15 Triamcinolone acetonide 0.1%: 15	36.7 ± 13.4yrs Age for different arms not specified	Total participants:10/20 M/F for different arms not specified	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Dvorak et al.	2015	Cross sectional	Biopsy proven OLP cases; above the age of 18years; living in Austria; no language barriers. Exclusion criteria: Patients treated for OLP, with language barriers or other mucosal diseases.	62	Age for all participants: 59.2±12.5yrs Female: 59 ± 11yrs Male: 59 ± 15yrs	19/43	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Hu et al.	2015	Case control	Biopsy proven OLP cases according to WHO criteria. Exclusion criteria: Subjects presenting with any systemic disease; any soft tissue lesions in the oral mucosa; smokers and severe alcoholics; patients on immunotherapy; receiving any medical treatment of OLP (local or systematic) within 3 months or having medicines affecting RNA synthesis and transcription in 6 months. Controls: Age and gender matched healthy volunteers.	First stage: Erosive oral lichen planus: 10 Non erosive oral lichen planus: 10 Healthy controls: 10 Second stage: Erosive oral lichen planus:17 Healthy controls:13	First stage: Erosive oral lichen planus: 44yrs Non-Erosive oral lichen planus: 41yrs Healthy controls: 49yrs Second stage: Erosive oral lichen planus (added): 46yrs Healthy controls (added): 48yrs	First stage: Erosive oral lichen planus:5/5 Non-Erosive oral lichen planus: 5/5 Healthy controls:3/5 Second stage: Erosive oral lichen planus (added): ¾ Healthy controls (added):1/2	Not excluded	Not reported	Not reported	RAE	No
Jajarm et al.	2015	Randomised clinical trial	Adult patients with atrophic-erosive biopsy-proven OLP in the tongue or buccal mucosa (size ≤3 cm).	Toluidine blue mediated photodynamic therapy: 11 Dexamethasone mouthwash: 14	Toluidine blue mediated photodynamic therapy: 48.71± 13.53yrs	Toluidine blue mediated photodynamic therapy :3/8	Not excluded	Not reported	Not reported	Thongprasom and Author proposed criteria	Yes/(VAS)

			Exclusion criteria: Patients presenting with systemic diseases; drug consumption; pregnancy; photosensitivity; patients younger than 20 years, and patients who had lesions with dysplasia or had received treatment for OLP at least 1 month prior to the beginning of the study.		Dexamethasone mouthwash: 43.73 ±10.01yrs	Dexamethasone mouthwash:5/9				(Modified RAE)	
Kazancioglu and Erisen	2015	Randomised clinical trial	Adult patients with atrophic-erosive OLP confirmed by biopsy; lesional size of ≤3 cm in the tongue or buccal mucosa. Exclusion criteria: Presence of systemic diseases that cause OLP; age ＜20 years; pregnant or breastfeeding; use of lichenoid reaction-inducing drugs such as antihypertensives, diuretics, nonsteroidal anti-inflammatory drugs, anticonvulsants, and drugs for treating tuberculosis; presence of histologic signs of dysplasia in the biopsy specimen; previous OLP treatment within 1 month before the beginning of the study; lesions adjacent to the amalgam filling site; and systemic corticosteroid use.	Low level laser therapy: 30 Ozone therapyd: 30 Topical corticosteroid (positive control): 30 Placebo (negative control): 30	42.6±8.3yrs (range 28-55yrs) Age for different arms not specified	Total participants:56/64 M/F for different arms not specified	Excluded use of lichenoid reaction-inducing drugs and lesions adjacent to the amalgam filling site.	Not reported	Not reported	Thongprasom and Modified RAE scoring system	Yes/(VAS)
Kia et al.	2015	Randomised clinical trial	Patients with atrophic and ulcerative forms of OLP confirmed by clinical and histopathological examination. Exclusion criteria: Pregnancy and lactation; current use of anticoagulants or antiplatelet agents; current orthodontic treatment; history of gastric ulcers; duodenal ulcers; gallstones, hepatic diseases; any existing malignancy or viral infections in the mouth; history of topical treatment for OLP in the past two weeks or any systemic treatment for OLP in the past four weeks; taking azathioprine, cyclosporine or receiving Psoralen plus ultraviolet A (PUVA), ultraviolet A (UVA) or ultraviolet B (UVB) radiation in the past month and history of allergy to corticosteroids or curcumin.	5% Curcumin oral paste: 25 0.1%Triamcinolone oral paste: 25	5% Curcumin oral paste:49.24 ±8.17yrs 0.1% Triamcinolone oral paste:52.08 ±9.20yrs	5% Curcumin oral paste:10/15 0.1% Triamcinolone oral paste:4/21	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Pakfetratet al.	2015	Randomised clinical trial	Biopsy proven patients with oral lichen planus; clinical distribution of atrophic-erosive lesions with size less than 2 cm^2; limited to two sites of the oral cavity. Exclusion criteria: Inability to undergo oral biopsy for diagnosis; age younger than 18 years; systemic diseases or malignancy; pregnancy, lesion/lesions with dysplasia; history of allergic reaction to corticosteroids or immunomodulatory drugs; lesions adjacent to an amalgam filling; current treatment of immunomodulatory agents.	Pimecrolimus 1% cream: 14 Adcortyl: 14	Not reported	Total participants:6/22 M/F for different arms not specified	Excluded only lesions adjacent to amalgam filling	Not reported	Not reported	Thongprasom	Yes/(VAS)
Stone et al.	2015	Randomised clinical trial	Adult patients aged 18 years and above; willing and able to complete questionnaires; able to provide consent, newly referred or under review at Newcastle Dental Hospital with a provisional diagnosis of OLP with clinical signs of gingival involvement.	Patients received structured oral hygiene instruction using a powered toothbrush and inter-dental cleaning aids: 39 Patients received normal plaque control regimen without any additional intervention or advice: 43	Patients received structured oral hygiene instruction using a powered toothbrush and inter-dental cleaning aids: 61.2± 9.9yrs Patients received normal plaque control regimen without any additional intervention or advice: 61.6 ±11.8yrs	Patients received structured oral hygiene instruction using a powered toothbrush and inter-dental cleaning aids: 6/33 Patients received normal plaque control regimen	Not excluded	Not reported	Not reported	ODSS	Yes/(VAS)

			Exclusion criteria: Unable to attend for the additional appointments prior to biopsy; unable to complete questionnaires; involved in a research study within the previous 28 days.			without any additional intervention or advice: 9/34					
Amirchaghmaghi et al.	2016	Randomised clinical trial	Patients with clinical signs of erosive-atrophic OLP confirmed by biopsy. Exclusion criteria: Pregnancy; lactation; current use of anticoagulants or antiplatelet agents; current orthodontic treatment; history of gastric ulcers; duodenal ulcers; gallstones; hepatic diseases; any existing malignancy or viral infection in mouth; receiving any topical treatment for OLP in the past two weeks or any systemic treatment for OLP in the past four weeks; use of azathioprine, cyclosporine or receiving Psoralen plus ultraviolet A (PUVA) ultraviolet A (UVA) or ultraviolet B (UVB) in the last month; a history of allergy to corticosteroids or curcumin.	Curcumin: 12 Placebo: 8	Curcumin: 49.42± 11.22yrs Placebo: 52.75± 9.43yrs	Curcumin: 2/10 Placebo: 5/3	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Batu et al.	2016	Case control	Oral lichen planus: Patients with OLP diagnosed according to WHO criteria; some patients without restorations in the oral cavity; others with restoration; negative result with skin patching test to dental materials; Thongprasom score of 2 or below. Oral lichenoid contact reactions: Atypical OLP lesions in direct topographical relationship to a dental restoration or a prosthesis; contact allergy to one or more tested dental materials according to International Contact Dermatitis Research Group. Exclusion criteria: Patients with major systemic disease; hepatitis C virus positivity; intake of any oral medication that may potentially influence the study parameters; history of trauma or surgery; non-steroidal anti-inflammatory drugs, and intake of any supplementary vitamins in the previous 3 months. Controls: Healthy individuals; volunteers.	Oral lichen planus:18 Oral lichenoid contact reactions: 32 Healthy controls: 18	Oral lichen planus: 50.67 ± 12.39yrs Oral lichenoid contact reactions: 50.41 ± 9.66yrs Healthy controls:49.22 ± 11.11yrs	Oral lichen planus: 5/13 Oral lichenoid contact reactions: 11/21 Healthy controls:9/9	Oral lichenoid contact reactions were a comparative group in the study	Not reported	Considered. Periodontal conditions were matched between groups.	Thongprasom	No
Chankong et al.	2016	Cross sectional	Biopsy proven case of oral lichen planus without evidence of dysplastic changes Exclusion criteria: Patients received systemic or topical steroid treatment for oral lesions in the past 3 months; pregnant or breast feeding; history of taking drugs that cause lichenoid drug reactions; lesion adjacent to dental restoration; history of other oral mucosal lesions and lichenoid-related systemic conditions.	25	48.76yrs	5/20	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Hashemy et al.	2016	Case control	Patients with oral lichen planus diagnosed on the basis of clinical and histopathological examination (Eisenberg criteria). Exclusion criteria: any previous treatment for OLP in the past 2 months; lichenoid reactions to drugs;	Patients: 25 Healthy controls: 23	Patients: 46.48± 11.080yrs Healthy controls: 43.70 ±12.32yrs	Patients: 8/17 Healthy controls:7/16	Excluded cases of lichenoid reactions to drugs	Not reported	Not reported	REU	No

			contraindication for biopsy; presence of any factors which could alter the equilibrium of production and elimination of free radicals; use of antioxidant drugs; pregnancy and patients with systemic diseases; malignancies, or dermal diseases. Controls: Healthy individuals								
Herrero-Gonzalez et al.	2016	Case series	Patients with mucosal lichen planus diagnosed on the basis of clinical, histopathological, and direct IF studies. Exclusion criteria: Patients taking drugs known to induce a lichenoid reaction; a positive patch test.	Oral lichen planus: 21 Genital lichen planus: 1	Oral lichen planus: 56yrs	Oral lichen planus: 5/16	Excluded cases of drug induced lichenoid reactions and patients with positive patch test.	Not reported	Not reported	ODSS and ABSIS	No
Kunz et al.	2016	Non randomised clinical trial	Patients older than 18 years of age; severe OLP of at least 3 months duration; confirmed by histopathologic examination (with or without LP lesions on other areas of the skin) and refractory to standard topical therapy; clinical disease activity at screening ≥ 10 points according to the Escudier severity scoring system; female patients to be postmenopausal, hysterectomized, or (if premenopausal) willing to use two methods of contraception at least 1 month before, during, and 1 month after study treatment. Exclusion criteria: Patients treated with any systemic or topical retinoid within 1 year or 1 month, respectively, before the start of study treatment; received systemic retinoids for treatment for OLP at any time; Pregnant or breast-feeding female patients.	10	55.6 ±16.6yrs	6/4	Not excluded	Not reported	Not reported	ODSS	Yes/(NRS)
Zhang et al.	2016	Case control	Biopsy proven cases of oral lichen planus. Exclusion criteria: History of smoking and alcohol abuse; detectable gingival or periodontal inflammation; any visible oral lesions; taking systemic or topical anti-inflammatory or immunomodulatory drugs; received any treatments for the OLP within 3 months prior to the specimen collection; and history, symptoms, and／or signs of systematic infections, allergies, cardiovascular disease, immunodeficient disease and autoimmune disease. Controls: Age-sex matched healthy subjects.	Patients:30 Healthy controls: 19	Patients:45±9yrs Healthy controls:49±7yrs	Patients:10/20 Healthy controls:5/14	Not excluded	Not reported	Excluded patients with detectable gingival or periodontal inflammation	RAE	No
Zhou et al.	2016	Randomised clinical trial	Biopsy-confirmed OLP in combination with a compatible clinical appearance; over 18 years of age. Exclusion criteria: Patients presenting with cancer; diabetes mellitus or other systemic diseases; pregnant or lactating; patients who received treatment with immunomodulators in the previous 3 months; presence of heart, brain, liver, and renal disease.	Reticular OLP, corticosteroid alone: 17 Reticular OLP, total glucosides of paeony capsule combined with corticosteroids: 22 Erosive OLP, corticosteroid: 17 Erosive OLP, total glucosides of paeony capsule combined with corticosteroids: 17	Reticular OLP, corticosteroid alone: 41.06 ±3.40yrs Reticular OLP, total glucosides of paeony capsule combined with corticosteroids: 42.05 ±2.27yrs Erosive OLP, corticosteroid alone: 46.31 ±3.47yrs Erosive OLP, total glucosides of paeony capsule combined with corticosteroids: 49.65 ±2.60yrs	Reticular OLP, corticosteroid alone: 8/9 Reticular OLP, total glucosides of paeony capsule combined with corticosteroids:8/14. Erosive OLP, corticosteroid alone: 8/9 Erosive OLP, total glucosides of paeony capsule combined with corticosteroids: 7/10.	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)

Bakhtiari et al.	2017	Randomised clinical trial	Biopsy proven cases of reticular and erosive lichen planus. Exclusion criteria: Presence of histological signs of dysplasia; use of drugs which caused lichenoid reactions, therapy for OLP in 2 months prior to the study; pregnant or lactating females; uncontrolled systemic disease; lesions adjacent to amalgam fillings and patients with photosensitivity.	Dexamethasone:15 Photodynamic therapy:15	Dexamethasone: 53.4yrs Photodynamic therapy: 47.2yrs	Total participants:14/17 M/F for different arms not specified	Excluded lesions adjacent to amalgam fillings and patients with use of drugs that causes lichenoid reactions	Not reported	Not reported	Thongprasom and Clinical severity index (SI)	Yes/(VAS)
Bombeccari et al	2017	Cohort	Biopsy proven case of oral lichen planus; liver diseases (biomarkers of hepatitis C virus infection (HCV Ab- and HCV-RNA) Exclusion criteria: Use of ribavirin and/or interferon therapy to slow the rate of progression to cirrhosis or liver failure, before or during the study period; liver disease related to type 1 (chronic) autoimmune hepatitis and chronic hepatitis B virus (HBV) infection.	HCV seropositive with chronic liver diseases: 48 HCV seronegative with chronic liver diseases: 23	Age for total participants: 62.3 ± 7.4yrs Age for different arms not specified	Total participants:22/49 M/F for different arms not specified	Not excluded	Not reported	Not reported	Thongprasom	No
Gobbo et al.	2017	Cross sectional	Patients with oral lichen planus diagnosed on the basis of clinical and histopathological findings.	50	64±14yrs	17 /33	Not excluded	Not reported	Not reported	Modified white-Erosive-Atrophic (WEA-MOD) and REU	Yes/(NRS)
Ke et al.	2017	Case control	Patients with OLP diagnosed on the basis of WHO diagnostic criteria 2003; Patients diagnosed with RAU and OSF were also included. Exclusion criteria: History of autoimmune or systemic disease; used systemic or topical drugs for at least 3 months prior to sample collection. Controls: Age and sex matched healthy controls.	Oral lichen planus: 38 Recurrent aphthous ulcers: 15 Oral submucous fibrosis: 10 Healthy controls: 38	Not reported	Not reported	Not excluded	Not reported	Not reported	RAE	No
Mostafa et al.	2017	Randomised clinical trial	Biopsy proven cases of erosive oral lichen planus (WHO criteria);; willingness and ability to complete the clinical trial; ages above 35 years old without skin involvement. Exclusion criteria: Histological signs of dysplasia; use of drugs associated with lichenoid reaction; pregnant; lactating and smoker patients; presence of systemic diseases; photosensitivity history; patients who received treatment for oral lichen planus in the previous 3 months.	Kenakort A-orabase: 10 Methylene blue mediated Photodynamic therapy: 10	Kenakort A-orabase: 47.0 ± 6.25yrs Methylene blue mediated Photodynamic therapy: 48.6 ± 5.25yrs	Total participants :3/17 M/F for different arms not specified	Excluded patients using drugs associated with lichenoid reaction.	Not reported	Not reported	Thongprasom	Yes/(VAS)
Riaz et al.	2017	Randomised clinical trial	Patients with clinical diagnosis of oral lichen planus; older than 8 years Exclusion criteria: Patients with malignancy or viral infection in mouth; patients who received topical treatment for oral lichen planus in last two weeks or systemic treatment in last four weeks cyclosporine, psoralen, azathioprine plus ultraviolet A or B in last month, or history of use to the drugs under study.	Pimecrolimus: 18 Triamcinolone: 18	Pimecrolimus: 44.50±6.20yrs Triamcinolone: 45.72±5.35yrs	Pimecrolimus: 2/16 Triamcinolone: 6/12	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Siponen et al.	2017	Randomised clinical trial	Patients with OLP diagnosed on the basis of clinical and histopathological features (Pindborg et al, 1997); symmetrical distribution of the lesions; the presence of white striae or reticulations;	0.1% Tacrolimus ointment: 11 0.1% Triamcinolone acetonide paste: 7 Placebo paste: 9	0.1% Tacrolimus ointment: 60± 9yrs 0.1% Triamcinolone acetonide paste: 51 ± 12yrs Placebo paste: 58± 10yrs	0.1% Tacrolimus ointment: 1/10 0.1% Triamcinolone acetonide paste: 0/7 Placebo paste: 3/6	Excluded patients with lesions suspected to be lichenoid.	Not reported	Not reported	Siponen and Salo	No

			symptomatic OLP (CS ≥20; VAS > 0), age over 18 and a washout period of 2 weeks. Exclusion criteria: Pregnancy; current nursing, allergy to TAC or other macrolides or other substances used in the study medications; hepatic insufficiency; use of medications that have significant interactions with TAC, including cyclosporine, erythromycin, rifamycin, posaconazole, itraconazole, ketoconazole, fluconazole, voriconazole, rifampicin, phenytoin, and dabigatran.								
Vahide et al.	2017	Case control	Biopsy confirmed case of OLP; new or untreated cases. Controls: Healthy; volunteers from hospital patients diagnosed with any other conditions except mucosal or cutaneous LP or immunobullous diseases.	Erosive oral lichen planus: 24 Reticular oral lichen planus: 29 Cutaneous lichen planus: 30 Healthy controls: 30	45.6 ±12.2yrs Age for different arms not specified	Total participants64/49 M/F for different arms not specified	Not excluded	Not reported	Not reported	REU	No
Zhang et al.	2017	Case control	Patients with OLP diagnosed according to modified WHO criteria. Exclusion criteria: Patients with any systemic disorders; any visible lesions on oral soft tissues; received any treatments for OLP and other systemic or topical anti-inflammatory or immunomodulatory drugs in recent 3 months; history of smoking and alcohol abuse. Controls: Age-gender matched healthy volunteers receiving orthognathic surgery.	Patients: 19 Healthy controls: 11	Patients:46yrs(range27-67) Healthy controls:36yrs(range18-58)	Patients: 13/6 Healthy controls:5/6	Not excluded	Not reported	Not reported	RAE	No
Azab et al.	2018	Case control	Oral lichen planus patients diagnosed according to the modified World Health Organization's diagnostic criteria; hepatitis C virus seropositive and other half hepatitis C virus seronegative. Control: Patients with no oral lesions; half were hepatitis C virus seropositive and other half healthy subjects. Exclusion criteria: Patients with suspected oral lichenoid reaction or histological signs of dysplasia; taking corticosteroids or other immunosuppressive drugs; current or previous malignancy and pregnant or breastfeeding mother.	Oral lichen planus -Hepatitis C virus seropositive: 15 Oral lichen planus -Hepatitis C virus seronegative: 15 Controls with no oral lesions -Hepatitis C virus seropositive: 15 Healthy controls -Hepatitis C virus seronegative: 15	Oral lichen planus 55.1 ± 8.3yrs Controls:45 ± 6.7yrs	Oral lichen planus: 9/21 Controls: 9/17	Excluded cases of lichenoid reactions	Not reported	Not reported	ODSS	No
Chauhan et al.	2018	Non randomised clinical trial	Patients with biopsy proven OLP; aged 18 years or older; moderate to severe involvement. Exclusion criteria: Patients with cutaneous involvement; dental restoration in situ or any contraindication for use of methotrexate.	Triamcinolone 0.1% oral paste: 15 Methrotrexate 0.3 mg/kg once/week): 15 Combination of topical triamcinolone 0.1% oral paste and methrotrexate 0.3 mg/kg once/week: 15	Triamcinolone 0.1% oral paste: 44.47 ±13.30yrs Methrotrexate 0.3 mg/kg once/week: 46.33 ±10.78yrs Combination of topical triamcinolone 0.1% oral paste and methrotrexate 0.3 mg/kg once/week: 45.53 ± 17.79yrs	Triamcinolone 0.1% oral paste: 3/12 Methrotrexate 0.3 mg/kg once/week: 6/9 Combination of topical triamcinolone 0.1% oral paste and methrotrexate 0.3 mg/kg once/week :7/8	Excluded patients with dental restorations.	Not reported	Not reported	Malhotra	Yes/(VAS)
Keller and Kragelund	2018	Randomised clinical trial	Symptomatic OLP patients diagnosed on the basis of clinical and histopathological findings. Exclusion criteria: Local steroid treatment of oral mucosa; antimycotic, antibiotic, or immunosuppressive	Probiotic: 10 Placebo: 13 Subjects completed: 22 Probiotic: 9 Placebo: 13 Subject flagged out: 1	Probiotic: 63.0yrs Placebo:71.0yrs	Probiotic (subjects completed):2/7 Placebo (subjects completed):8/5	Excluded patients with lichenoid contact lesions, suspicion of lichenoid drug reactions, or graft vs	Considered	Not reported	ODSS	Yes/(VAS and McGill Pain Questionnaire)

			therapy within the 3 months immediately prior to study inclusion; patients with lichenoid contact lesions; suspicion of lichenoid drug reactions; or graft versus host disease-related lichenoid lesions.				host disease-related lichenoid lesion				
Lee et al.	2018	Cross sectional	Patients with OLP diagnosed on the basis of clinical features and histopathologic examination. Exclusion criteria: Under 18 years old; history of topical or systemic corticosteroid usage for treating OLP in the past 4 weeks; history of using medications capable of inducing lichenoid reactions; history of taking the immunosuppressive medication; history of corticosteroid allergy; oral cavity malignancy; pregnancy and lactation; or unwilling to attend the study.	62	Not reported	22/40	Excluded cases of lichenoid drug reactions	Not reported	Not reported	ODSS	Yes/(VAS)
Mirza et al.	2018	Randomised clinical trial	Adult patients with erosive-atrophic biopsy-proven OLP on the tongue or buccal mucosa (size ≤3 cm). Exclusion criteria: Self-reported tobacco smokers; individuals using smokeless tobacco products; habitual alcohol users; active drug therapy; photosensitivity; systemic diseases; pregnancy, and patients who had lesions with dysplasia or received treatment for OLP at least 1 month prior to the beginning of the study.	Toluidine blue mediated photodynamic therapy: 15 Low level laser therapy: 15 Dexamethasone mouthwash: 15	Toluidine blue mediated photodynamic therapy: 52.6 ± 11.4yrs Low level laser therapy: 50.8 ± 14.7yrs Dexamethasone mouthwash: 49.2 ± 10.6yrs	Toluidine blue mediated photodynamic therapy: 3/12 Low level laser therapy: 1/14 Dexamethasone mouthwash: 4/11	Not excluded	Not reported	Not reported	Thongprasom and Author proposed criteria (Modified RAE)	Yes/(VAS)
Nosratzehi et al.	2018	Non randomised clinical trial	Biopsy confirmed OLP in combination with a compatible clinical appearance; atrophic-erosive lesions limited to two sites of the oral cavity. Exclusion criteria: Inability to undergo oral biopsy for diagnosis; age younger than 18 years; systemic diseases or malignancy; pregnancy; lesions with dysplasia; history of allergic reaction to corticosteroids or immunomodulatory drugs; lesions adjacent to an amalgam filling; current treatment of immunomodulatory agents	Corticosteroid: 20 Curcumin: 20	Corticosteroid :38.5 ± 7.03yrs Curcumin :41.9 ± 11.22yrs	Corticosteroid: 5/15 Curcumin: 9/11	Excluded lesions adjacent to amalgam filling	Not reported	Not reported	Thongprasom and Author proposed criteria (Grading of lesion on the basis of size)	Yes/(VAS)
Peng et al.	2018	Case control	Biopsy proven patients with OLP. Exclusion criteria: Patients with any other systemic disorders or received any treatment within 3 months. Controls: Age-sex-matched healthy individuals.	Patients: 19 Healthy controls: 11	Patients: 47.3 ± 8.0yrs Healthy controls:47.6 ± 6.1yrs	Patients: 9/10 Healthy controls:4/7	Not excluded	Not reported	Not reported	RAE	No
Radwan-Oczko et al.	2018	Cross sectional	Patients with OLP diagnosed on the basis of clinical features and histopathological examination Exclusion criteria: history of malignant diseases, hepatitis C infection and diagnosed psychiatric disorders; dysplasia in histologically OLP tissues tested.	42	59.6 ±12.44yrs	8/34	Not excluded	Not reported	Not reported	ODSS	Yes/(VAS)
Shirzad et al.	2018	Cross sectional	Chronic oral mucosal conditions (Group 1): Patients over 18 years of age; literate and easily read and write; presence of chronic oral mucosal conditions (recurrent aphthous stomatitis, oral lichen planus and pemphigus vulgaris and	Oral lichen planus: 40 Recurrent aphthous stomatitis:40 Pemphigus vulgaris: 15 Nonchronic oral mucosal conditions: 40	Oral lichen planus:49.28±4.24yrs Recurrent aphthous stomatitis:24.98±4.3yrs Pemphigus vulgaris: 51.07±5.59yrs Non chronic oral mucosal conditions: 34.25±10.21yrs	Total participants: 99/36 Oral lichen planus:34/6 Recurrent aphthous stomatitis: 22/18 Pemphigus vulgaris:11/4	Not excluded	Not reported	Not reported	ODSS	Yes/(VAS)

			mucous membrane pemphigoid) confirmed through medical history clinical examinations, haematological and histological evaluations. Non chronic oral mucosal conditions (Group 2): Patients with no chronic oral mucosal conditions but with other oral mucosal conditions (pigmented lesions, soft tissue exophytic lesions, etc).			Non chronic oral mucosal conditions:32/8					
Tadakamadla et al.	2018	Cross sectional	Oral lichen planus, oral leukoplakia and oral submucous fibrosis patients; all cases diagnosed clinically and confirmed by histopathologic examination; no other mucosal conditions or systemic diseases; undergoing treatment.	Oral lichen planus:50 Oral leukoplakia: 50 Oral submucous fibrosis: 50	Age for total participants: 39.8yrs Age for different arms not specified	Total participants: 95/55 M/F for different arms not specified	Not excluded	Not reported	Not reported	ODSS	No
Wei et al.	2018	Case control	Biopsy-confirmed OLP and compatible clinical appearance; aged greater than 18 years Controls: Healthy volunteers and patients with recurrent aphthous ulcer. Exclusion criteria: Patients who had undergone treatment with immunomodulatory agents or any medication potentially affecting the investigated parameters of the immune system in the previous 3 months. oral lichenoid contact and drug reactions; acute infections, cancer or systemic diseases; pregnant or lactating.	Oral lichen planus: 41 Recurrent aphthous ulcer: 14 Healthy controls: 14	Oral lichen planus: 56.27±13.03yrs Recurrent aphthous ulcer: 50.00±4.22yrs Healthy controls: 51.21±5.19yrs	Oral lichen planus :9/32 Recurrent aphthous ulcer :6/8 Healthy controls:6/8	Excluded cases of drug induced lichenoid lesions and oral lichenoid contact reactions	Not reported	Not reported	REU	No
Zaslansky et al.	2018	Randomised clinical trial	Diagnosis of erosive and/or ulcerative OLP confirmed by histopathology; level I–II according to the American Society of Anaesthesiologists (ASA) classification; 18–75 years old; either sex; deemed able to provide assessments of their pain and side effects. Exclusion criteria: Condition of alcohol abuse or addiction (opioids and/or benzodiazepines); known hypersensitivity to morphine; major renal or hepatic dysfunction; pregnancy or lactation; sleep-apnoea-syndrome; diabetes or participated in other studies.	Morphine 0.2%: 15 Morphine 0.4%: 16 Placebo: 14	Morphine 0.2%: 58 ± 10yrs Morphine 0.4%: 60 ± 14yrs Placebo: 65 ± 8yrs	Morphine 0.2%:3/12 Morphine 0.4%: 4/12 Placebo: 2/10	Not excluded	Not reported	Not reported	Thongprasom	Yes/(NRS)
Burke et al.	2019	Cross sectional	Male or female; age ≥18 years old; a clinical diagnosis of OLP with reticular, erythemic, atrophic, erosive and/or ulcerative lesions; OLP-related pain (chronically or intermittently); able to read and speak English; willing and able to provide written informed consent; willing and able to understand and comply with all study procedures; and able to complete face-to-face interviews. Exclusion criteria: Active signs of candidiasis and significant head and neck pain from a source other than OLP.	The United States: 11 Ireland: 6	The United States: 72yrs Ireland: 75yrs	The United States:3/8 Ireland:2/4	Not excluded	Not reported	Not reported	ODSS	Yes/(The 7-item OLP Symptom Severity Measure)
Ezzatt and Helmy	2019	Randomised clinical trial	Clinically and histologically confirmed painful erosive or atrophic OLP according to modified WHO criteria and using medical questionnaire guided by Cornell Medical Index; systemically free; both genders; aged 25 to 60 years.	Pimecrolimus 1% cream: 15 Betamethasone 17-valerate 0.1% cream: 15	Pimecrolimus 1% cream: 49.08 ±8.53yrs Betamethasone 17-valerate 0.1% cream: 50.75± 6.36yrs	Pimecrolimus 1% cream: 5/10 Betamethasone 17-valerate 0.1% cream: 3/12	Excluded cases of drug induced lichenoid lesions	Not reported	Not reported	Thongprasom	Yes/(VAS)

			Exclusion criteria: History of drug induced lichenoid lesion; potential treatment of OLP for less than 2 weeks by topical and 4 weeks systemic therapy before study; pregnancy; breast-feeding; smoking and known hypersensitivity or severe adverse effects to the treatment drugs or to any ingredient of their preparation.								
Lavaee and Shadmanpour	2019	Randomised clinical trial	Patients with clinical or histopathological diagnosis of bilateral atrophic or erosive OLP. Exclusion criteria: Patients with drug-induced or contact lichenoid reactions; received any treatment for OLP in 2 months prior to the study; pregnant or lactating women; uncontrolled systemic disease, and photosensitivity.	Toluidine blue mediated photodynamic therapy :11 lesions in 11 patients Topical corticosteroid: 11 lesions in 11 patients Subjects completed: 16 lesions in 8 patients Subjects flagged out: 6 lesions in 3 patients	Not reported	2/9	Excluded patients with drug-induced or contact lichenoid reactions	Not reported	Not reported	Thongprasom and Clinical severity Index (SI)	Yes/(VAS)
Mergoni et al.	2019	Randomised clinical trial	Biopsy proven cases of oral lichen planus according to the WHO criteria (1978); symptomatic gingival lesions; aged 18 or over; adults of both sexes; non edentulous Exclusion criteria: Patients unable to complete questionnaires; involved in other research studies.	Patients received a 30-min tailored motivational session on effective procedures to remove bacterial biofilm from buccolingual and proximal dental surfaces, supplied with two manual toothbrushes and dental picks with soft rubber bristles and flexible plastic stems: 29 Patients were asked to maintain with their normal oral hygiene habits and not received any advice: 31	Patients received a 30-minute tailored motivational session on effective procedures to remove bacterial biofilm from buccolingual and proximal dental surfaces, supplied with two manual brushes and dental picks with soft rubber bristles and flexible plastic stems: 57.9 ± 17.4yrs Patients were asked to maintain with their normal oral hygiene habits and not received any advice: 64.3± 12.2yrs	Patients received a 30-minute tailored motivational session on effective procedures to remove bacterial biofilm from buccolingual and proximal dental surfaces, supplied with two manual brushes and dental picks with soft rubber bristles and flexible plastic stems: 3/26 Patients were asked to maintain with their normal oral hygiene habits and not received any advice: 8/23	Not excluded	Not reported	Presence or absence of periodontal disease was assessed in subjects according to Eke et al. 2012.	Modified Escudier Index	Yes/(VAS)
Sadeghian et al.	2019	Randomised clinical trial	Patients diagnosed with OLP of erosive pattern using clinical and histopathologic criteria; an age range of 16–70yrs; severity of lesions with a score of 4 and 5 Thongprasom. Exclusion criteria: Presence of topical or systemic drugs for treating OLP at least 2 months before the study; pregnancy and lactation; use of drugs that produce lichenoid reaction such as beta blockers; immunodeficiency; the presence of any systemic disease other than lichen planus (such as viral infection and acute peptic ulcer); the presence of lesions in direct contact with the teeth treated with filling, sensitivity to corticosteroids and the use of denture.	Nano-based triamcinolone acetonide gel: 20 Conventional triamcinolone gel: 20	Nano-based triamcinolone acetonide gel: 44.3 ± 10.3years Conventional triamcinolone gel: 36.6 ± 10years	Nano-based triamcinolone acetonide gel: 6/14 Conventional triamcinolone gel: 4/16	Excluded cases of oral lichenoid lesions (drug induced and contact lichenoid reactions)	Not reported	Not reported	Thongprasom	Yes/(VAS)
Wang et al.	2019	Case control	Patients with clinical and histological diagnosis of oral lichen planus. Exclusion criteria: History of smoking and alcohol addiction; history of any medication within at least three months; patients with systematic diseases or any other visible oral lesions. Controls: Age and gender matched subjects.	Patients:28 Healthy controls:10	Patients: 48.79 ± 11.6yrs Healthy controls:38.40 ± 10.84yrs	Patients:14/14 Healthy controls: 3/7	Not excluded	Not reported	Not reported	RAE	No
Bakhshi et al.	2020	Randomised clinical trial	Clinically and biopsy proven cases of oral lichen planus.	0.1% triamcinolone plus 1% nanocurcumin gel: 14	0.1% triamcinolone plus 1% nanocurcumin gel: 59 ±15.12yrs	Total participants: 7/24	Excluded lichenoid reactions due to	Not reported	Not reported	REU	No

			Exclusion criteria: Patients who received topical, local, or systemic corticosteroid therapy during the past one month; use of analgesics or anaesthetic agents; lichenoid reactions due to medications or dental materials; pregnancy; history of malignancy; noncooperative patients; and patients not correctly follow the instructions on using the medications.	0.1%triamcinolone plus the placebo gel: 17	0.1%triamcinolone plus the placebo gel: 48± 12.71yrs	M/F for different arms not specified	medication intake or dental materials				
Cosgarea et al.	2020	Non randomised clinical trial	Histologically proven OLP with a minimal lesion size of 10mm; age >18 years. Exclusion criteria: Pregnancy, renal insufficiency; HIV; hepatitis C, and untreated heart disease.	20	62 ± 8.66yrs	3/17	Not excluded	Not reported	Not reported	Thongprasom and Autoimmune bullous skin disorder intensity scale (ABSIS)	Yes/(VAS)
Hijazi et al.	2020	Case control	Patients with biopsy confirmed ulcerative OLP and RAS diagnosed using accepted clinical criteria; no gingival involvement. Exclusion criteria: Chronic medical conditions; deranged haematological and biochemical profiles; abnormal vital signs; clinical indication of suboptimal oral intake; body mass index >30 or <20; smoking; pregnancy and lactation; use of antibiotics in the preceding 3 months; whole salivary flow rate <0.5ml/min; Candida count > 1,000 CFU/ml; removable prosthesis, prescribed medications; over-the-counter remedies (e.g. medications, probiotics, vitamins, supplements); any therapy for oral ulcers in the preceding 3 months; presence of other oral mucosal diseases (including trauma-related injury); periodontal disease (pocketing > 2.5mm as measured using a Florida Probe; bleeding on probing >10%); active carious lesions; Decayed Missing Filled Teeth index (DMFT) >3; plaque index >30%; high-sugar diet assessed by means of diary provided by the clinic (Department of Health, British Association for the Study of Community Dentistry 2009). Controls: Healthy controls matched for age, sex and ethnicity.	Recurrent aphthous stomatitis: 15 Oral lichen planus: 18 Healthy controls: 13	Recurrent aphthous stomatitis: 46.13 ± 11.84yrs Oral lichen planus: 50.17 ± 8.64yrs Healthy Controls: 48.62 ± 9.47yrs	Recurrent aphthous stomatitis:5/10 Oral lichen planus: 7/11 Healthy Controls :4/9	Not excluded	Not reported	Excluded cases of periodontal disease (pocketing > 2.5mm as measured using a Florida Probe, bleeding on probing >10%) and patients with any type of gingival diseases.	ODSS	Yes/(VAS for RAS group)
Khater and Khattab	2020	Non randomised clinical trial	Patients with erosive-atrophic OLP diagnosed clinically and confirmed by histopathological examination. Exclusion criteria: Histological findings of dysplasia or lichenoid reaction; patients with a history of taking corticosteroids or other immunosuppressive treatment within 1 month prior to the study.	24	52 ±14.9yrs	2/22	Excluded cases with histological findings of lichenoid reaction.	Not reported	Not reported	Thongprasom	Yes/(VAS)
Kia et al.	2020	Randomised clinical trial	Patients with OLP diagnosed based on modified WHO criteria. Exclusion criteria: Pregnancy; lactation; patients taking corticosteroids; elevated liver enzymes taking anticoagulants or anti-fungal drugs such as warfarin; orthodontic treatment; gastric ulcer; duodenal ulcer; and gallstone; the	Curcumin: 29 Prednisolone: 28	Curcumin: 51.86 ±9.94yrs Prednisolone:53.67 ±8.90yrs	Curcumin: 4/25 Prednisolone:5/23	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)

			presence of malignant or viral infection in the mouth; the presence of dysplasia in histopathology; receiving topical treatment for OLP within the last 2 weeks or systemic treatment for OLP within the last 4 weeks; taking azathioprine, cyclosporine, Psoralen plus ultraviolet A (PUVA), ultraviolet A (UVA), or ultraviolet B (UVB) within the last month; allergies to corticosteroids or herbal compounds, such as turmeric.								
Qataya et al.	2020	Randomised clinical trial	Patients with erosive oral lichen planus diagnosed based on the modified WHO criteria; symptomatic; normal range of liver and kidney function tests. Exclusion criteria: Smokers or tobacco users; pregnant and lactating females; patients with any systemic disease; history of cancer; dysplastic changes in confirmatory biopsy specimen; patients with extraoral lichen planus lesions; cases of lichenoid contact and drug reactions.	Topical corticosteroid: 11 Topical selenium hydrogel: 11 Oral systemic selenium capsules: 11 Subjects completed: Topical corticosteroid: 10 Topical selenium hydrogel: 11 Oral systemic selenium capsules :11 Subjects flagged out: Topical corticosteroid: 1	Topical corticosteroid: 46.50±11.98yrs Topical selenium hydrogel: 44.91±11.21yrs Oral systemic selenium capsules: 53.73±10.30yrs	Total participants: 2/31 M/F for different arms not specified	Excluded lesions of lichenoid contact reactions and lichenoid drug reactions.	Not reported	Not reported	Thongprasom	Yes/(NRS)
Veneri et al.	2020	Randomised clinical trial	Histopathological diagnosis of OLP according to the conventional WHO criteria; clinical erosive form, according to the clinical criteria of van der Meij and van der Waal (2003); symptomatic lesions. Exclusion criteria: Lesions showing OLP and dysplasia; lesions showing OLP and candidiasis; oral lichenoid lesions; patients who underwent corticosteroids or other immunosuppressive treatment	Ozonized water treatment combined with conventional corticosteroid therapy: 26 Conventional corticosteroid therapy: 25	Ozonized water treatment combined with conventional corticosteroid therapy: 65.73yrs Conventional corticosteroid therapy: 64.52yrs	Ozonized water treatment combined with conventional corticosteroid therapy: 8/18 Conventional corticosteroid therapy: 8/17	Excluded cases of oral lichenoid lesions	Not reported	Not reported	Thongprasom	Yes/(VAS)
Wiriyakijja et al.	2020	Cross sectional	Patients with OLP diagnosed according to modified WHO criteria. Exclusion criteria: Evidence of oral epithelial dysplasia; proven hypersensitivity to dental restorative materials; oral lichenoid lesions associated with graft-versus-host disease and systemic lupus erythematosus; coexisting chronic neuropathic orofacial pain such as burning mouth syndrome, persistent idiopathic facial pain and trigeminal neuropathic pain; patient-reported significant underlying systemic conditions (ASA 3 or more) and/or some psychiatric illnesses as defined by DSM-5; inability to read English language and understand questionnaires.	260	63.32 ± 11.22yrs	52/208	Excluded cases of oral lichenoid lesions associated with graft versus host disease and systemic lupus erythematosus.	Considered	Not reported	ODSS	Yes/(VAS and NRS)
Wiriyakijja et al.	2020	Cohort	OLP patients diagnosed according to modified WHO diagnostic criteria (van der Meij & van der Waal, 2003); aged 18yrs or older; able to understand and complete questionnaires; agree to participate. Exclusion criteria: Evidence of oral epithelial dysplasia in biopsy specimen; proven hypersensitivity to dental materials; oral lichenoid lesions associated with graft-versus-host disease and systemic lupus erythematosus;	157	65.5yrs (median age)	35/122	Excluded cases of oral lichenoid lesions associated with graft-versus-host disease and systemic lupus erythematosus	Not reported	Not reported	ODSS	Yes/(VAS and NRS)

			coexisting chronic neuropathic orofacial pain, such as post-traumatic trigeminal neuropathic pain, persistent idiopathic facial pain or burning mouth syndrome; Severe systemic disease (ASA 3 or more) and/or some psychiatric conditions.								
Yang et al.	2020	Case control	Patients with OLP diagnosed according to modified WHO criteria; at least 18 years of age; signed written informed consent. Exclusion criteria: History of smoking or alcohol abuse; pregnancy or lactation; subject with infectious, allergic, cardiovascular, haematological, endocrine, metabolic, and immune-related diseases; exposure to systemic or topical anti-inflammatory, immunomodulatory drugs at least within 3 months; patient with concomitant other oral lesions; oral lichenoid reactions, including lichenoid contact reactions, lichenoid drug eruptions, and lichenoid reactions of graft-versus-host disease; presence of epithelial dysplasia in histopathological examination. Controls: At least 18 years old; neither had any systemic disorders nor any other oral lesions; non-smokers and non-alcoholics.	Patients: 87 Healthy controls: 44	Patients: 48.3 ± 10.3yrs Healthy controls: 47.2 ± 12.5yrs	Patients:37/50 Healthy controls:20/24	Excluded participants with oral lichenoid reactions, lichenoid contact reactions, lichenoid drug eruptions, and lichenoid reactions of graft-versus-host disease.	Not reported	Not reported	RAE	No
Yiemstan et al.	2020	Cross sectional	Patients aged 18 or more; biopsy proven OLP or compatible with OLP as suggested by van der Meij and van der Waal (2003). Exclusion criteria: Presence of other oral mucosal lesions; pregnancy; smokers or inability to communicate.	69	55.1 ± 13.9yrs	14/55	Not excluded	Not reported	Not reported	Thongprasom	Yes/(NRS)
Abboud et al.	2021	Randomised clinical trial	Patients aged over 18years; biopsy proven OLP or compatible with OLP as suggested by van der Meij and van der Waal (2003); male or female. Exclusion criteria: Patients previously treated with PBM; pregnant or breastfeeding women; patients currently being treated for cancer; those who had used anti-inflammatory drugs (topic or systemic) in the last month; those who reported the use of drugs related to the development of oral lichenoid lesions, including imatinib, methyldopa, IFN-alpha and/or infliximab; patients with an uncontrolled systemic disease; presence of amalgam restoration near the OLP lesions; and/or those with a description of epithelial dysplasia in the histopathological evaluation of OLP.	Photobiomodulation: 17 Topical clobetasol propionate gel 0.05%: 17	Female: 62.2 ± 12.21 yrs Age for different arms not specified	Photobiomodulation: 1/16 Topical clobetasol propionate gel 0.05%: 1/16	Excluded patients who reported the use of drugs related to the development of oral lichenoid lesions and with amalgam restorations near the OLP lesions.	Not reported	Not reported	Thongprasom	Yes/(VAS)
Amirchaghmaghi et al.	2021	Case control	Patients with lichen planus or oral squamous cell carcinoma (OSCC); confirmed through clinical and histopathological investigations; new cases. Exclusion criteria: Subjects who had used vitamin supplements; previous malignancies or systemic comorbidities; histopathological result was reported as	Oral lichen planus: 28 Oral squamous cell carcinoma: 20 Healthy controls: 40	50.40 ± 12.31yrs Age for different arms not specified	Oral lichen planus:7/21 Oral squamous cell carcinoma: 14/6 Healthy controls: 22/18	Excluded patients with histopathological finding of lichenoid reactions.	Not reported	Not reported	Thongprasom	No

			lichenoid reaction; patients with OLP or OSCC, who had undergone treatment. Controls: Healthy individuals with no special lesion or systemic diseases. Exclusion criteria: Subjects who had used vitamin supplements; previous malignancies or systemic comorbidities.								
Amirchaghmaghi et al.	2021	Cross sectional study	Patients with oral lichen planus confirmed clinically and histopathologically; over 18years of age. Exclusion criteria: Patients who received systemic or topical lichen planus medication or vitamin supplements; patients with systemic diseases associated with immune disorders; diabetes mellitus; history of chemotherapy, radiation therapy; pregnancy or breast feeding , the presence of oral mucosal lesions, drug-induced and contact lichenoid reactions, and Graft versus host disease (GVHD) Controls: Healthy individuals with no oral lesions	Oral lichen planus: 24 Healthy controls: 25	Total participants: 46.26 ± 10.90 yrs Age for different arms not specified	Total participants: 17/32 M/F for different arms not specified	Excluded cases of drug-induced and contact lichenoid reactions, and Graft versus host disease (GVHD).	Not reported	Not reported	Thongprasom	No
Bennardo et al.	2021	Randomised clinical trial	Patients who presented symptomatic lesions (bilateral, symmetrical, white and/or red buccal lesions); clinical and histological diagnosis of OLP accordance to WHO criteria. Exclusion criteria: Under the age of 18; histopathologic signs of dysplasia; treatment with any drug that may induce lichenoid reactions; history of corticosteroid therapy in topical form (in the oral cavity) in the past 2 weeks or systemic in the past 4 weeks; allergy or contraindications to administration of corticosteroids; plaque like lesions, gingival localization or association of different variety of lesions (also skin and/or genital); chronic liver disease, immune system dysfunction, or haematological disease; and pregnancy or breastfeeding.	Platelet-rich fibrin injections: 9 lesions in 9 patients Triamcinolone acetonide: 9 lesions in 9 patients	59.56 ± 3.57yrs	3/6	Excluded the cases of drug induced lichenoid reactions	Not reported	Not reported	Thongprasom	Yes/(VAS)
Daye et al.	2021	Case control	Biopsy proven cases of OLP. Exclusion criteria: Pregnant women; patients using hypolipidemic drugs; alcohol dependence; known diabetes; hypertension; thyroid dysfunction; chronic kidney disease; chronic liver disease; a history of cardiovascular and neurologic disease. Control: Age and sex matched healthy subjects without any systemic disease.	Patients 98 Healthy controls: 99	Patients: 49.3 ± 14.4yrs Healthy controls: 50 ± 13.2yrs	Patients: 38 /60 Healthy controls: 44/55	Not excluded	Not reported	Not reported	ODSS	No
Deng et al.	2021	Cross sectional	Patients with clinical and histological diagnosis of OLP which met the modified World Health Organization (WHO) diagnostic criteria; aged≥18 years and agreed to participate in the study. Exclusion criteria: Pregnancy; patients diagnosed with periodontitis with a periodontal probing depth of ≥6 mm and clinical attachment loss of ≥6 mm; a history of malignancy or other	1021	50.4yrs	352/669	Not excluded	Considered	Excluded patients diagnosed with periodontitis with a periodontal probing depth of ≥6 mm and clinical	Thongprasom	No

			inflammatory or autoimmune diseases such as psoriasis, vitiligo, behçet's disease, lupus erythematosus, or rheumatoid arthritis; and taken antibiotics, or immunosuppressive or nephrotoxic drugs in the 6 months prior to the study.						attachment loss of ≥6 mm.		
Eita et al.	2021	Randomised clinical trial	Diagnosed cases according to the modified WHO criteria of oral lichen planus 2003; male and female patients; aged from 30 to 60 years; previously treated by topical corticosteroids (0.1% Triamcinolone Acetonide gel) along with topical antifungal (2% Miconazole gel) three times daily for at least six consecutive weeks; unresponsive OLP patients to the conventional topical steroids therapy. Exclusion criteria: Smoking and tobacco use in any form; pregnant and lactating females; patients with suspected lichenoid contact/drug reactions; systemic diseases (diabetes, liver disease, renal disease and any other autoimmune or collagen disease); lesions showing any dysplastic changes in the biopsy specimen and cutaneous LP patients.	Lycopene: 10 Corticosteroid: 20	Lycopene: 51.50±8.00yrs Corticosteroid: 45.90±9.63yrs	Lycopene:4/6 Corticosteroid: 2/8	Excluded patients with lichenoid contact and drug reactions.	Not reported	Not reported	ODSS	Yes/(NRS)
Elsabagh et al.	2021	Cross sectional	Adult patients with oral lichen planus diagnosed on the basis of clinical and histopathology findings. Exclusion criteria: Desquamative gingivitis caused by a vesiculobullous disease other than OLP.	40	49.50 ±7.31yrs	Not reported	Not excluded	Not reported	Not reported	Elsabagh scoring system and Thongprasom	Yes/(NRS)
Ferri et al.	2021	Randomised clinical trial	Patients over 18 years of age; OLP diagnosed based on the WHO criteria (1978) and modified by Van der Meji and Van Der Waal (2003). Exclusion criteria: Previously treated with phtobiomodulation (PBM); pregnant or breastfeeding women; patients currently being treated for cancer; used anti-inflammatory drugs (topic or systemic) in the last month; reported the use of drugs related to the development of oral lichenoid lesions, including imatinib, methyldopa, IFN-alpha and/or infiximab; uncontrolled systemic disease; presence of amalgam restoration near the OLP lesions; and/or those with a description of epithelial dysplasia in the histopathological evaluation of OLP.	Clobetasol propionate gel 0.05% with laser placebo: 17 Photobiomodulation: 17	Not reported	Clobetasol propionate gel 0.05% with laser placebo: 1/16 Photobiomodulation: 1/16	Excluded cases of drug related lichenoid reactions and lesions adjacent to amalgam restorations.	Not reported	Not reported	Thongprasom	Yes/(VAS)
Gabriella et al.	2021	Cohort	Patients with diagnosis of oral lichen planus (OLP) confirmed by histopathology and direct immunofluorescence assay; minimum age: 18yearscorrectly fitting removable dentures. Exclusion criteria: Patients with a malignant transformation; severe dysplasia in histopathology; carcinoma in situ; nicotine abuse; severe vitamin deficiency, pregnancy; age below 18 years; lactation period; nicotine abuse,	53	56.5 ± 13.7yrs	7/46	Not excluded	considered	Not reported	Thongprasom	Yes/(VAS)

			the presence of asymptomatic OLP; or oral mucositis of other origins (e.g., drug intake)).								
Ju et al.	2021	Non randomised clinical trial	Patients with OLP; first visited the Department of Oral Medicine at the Pusan National University Dental Hospital from January 2017 to December 2020; visited more than 3 times. Exclusion criteria: Subjects with other oral lesions; taking corticosteroids or immunosuppressive medications (due to OLP or other systemic diseases); a record of taking them within 6 months, patients who could not confirm treatment results due to no clinical photo, and with dysplasia.	Treatment completed (CT): 53 Under treatment (UT): 27 Dropped out during follow-up (DT): 52	Age for total participants: 59.63±10.63yrs Age for different arms not specified	Total Participants:35/97 M/F for different arms not specified	Not excluded	Not reported	Not reported	REU	No
Mao et al.	2021	Case control	Patients with suspected clinical diagnosis of OLP Exclusion criteria: Patients with systemic immune diseases; received immunotherapy, systemic medication, concomitant chemotherapy and/or radiotherapy in the past 3 months; amalgam in oral cavity; patients with pathologically diagnosed as erythema multiforme, benign mucous membrane pemphigoid, lichen planus pemphigoid, discoid lupus erythematosus, oral leukoplakia, white sponge nevus, and lichenoid reaction. Controls: Age and gender matched; no systemic diseases or problems associated with OLP and no soft tissue lesions in the oral cavity in the past.	Patients 42 Healthy controls: 47	Patients: 39.6±13.7yrs Healthy controls: 48.1±12.0yrs	Patients:16/26 Healthy controls:12/35	Excluded patients with amalgam restorations.	Not reported	Not reported	REU	No
Marlina et al.	2021	Randomised clinical trial	Biopsy proven cases of OLP as per WHO 1978 histological criteria; no evidence of oral epithelial dysplasia or malignancy; presence of painful intra- oral symptoms associated to OLP at the time of recruitment/start of the intervention; minimum severity of pain being ≥3 on a 0– 10 (Numerical Rating Scale); age >18 years; willing to participate in the study; receiving no therapy or receiving best standard therapy at the time of recruitment. Exclusion criteria: Use of systemic antibiotics, retinoid, corticosteroid or immunosuppressant agents within four weeks prior to enrolment in the study; pregnancy or receiving IVF treatment; history of systemic disorders affecting the immune system; active cancer or cancer in remission undergoing maintenance with chemotherapy or immunomodulatory agents; evidence of oral epithelial dysplasia or oral malignancy on biopsy.	Probiotic: 15 Placebo: 15	Probiotic:59.3 ± 8.3yrs Placebo:56.1 ± 11.8yrs	Probiotic: 3/12 Placebo:3/12	Not excluded	Not reported	Not reported	ODSS	Yes/(NRS)
Meng et al.	2021	Case control	Diagnosed OLP cases according to the modified WHO diagnostic criteria (2003) by two pathologists independently Exclusion criteria: Patients with other dental diseases; oral mucosal diseases or	Patients: 56 Controls without oral lichen planus: 44	Patients:39.38 ± 9.4yrs Controls without oral lichen planus:40.11± 10.02yrs	Patients: 9/47 Controls without oral lichen planus:5/39	Excluded patients with other oral mucosal diseases	Not reported	Not reported	RAE	No

			other infectious diseases; history of orthodontic treatment; taking antibiotics, immunomodulatory drugs, and other drugs that may affect the immune function in the last 3 months; and surgical treatment for oral diseases within 1 year; complicated hepatic and renal insufficiency; autoimmune diseases; or malignancy; severe infection or long-term infectious disease within the last 2 weeks; taken antibiotics, nonsteroidal anti-inflammatory drugs, immunomodulatory drugs, and other drugs that might affect the immune function within 90 days; lactating and pregnant women. Controls: Age and sex matched patients without oral lichen planus.								
Raj et al.	2021	Randomised clinical trial	Clinically active erosive OLP confirmed by a supportive biopsy report within 12 months of commencement of the study; systemically healthy elicited through detailed medical evaluation. Exclusion criteria: Patients with history of use of any pharmacotherapeutic agent for the treatment of the lesion within six months of the study; pregnancy or lactation; use of tobacco in any form; history of long-term non-steroidal anti-inflammatory drug therapy or antibiotic prophylaxis within 6 months of study; presence of amalgam restoration adjacent to the lesion; known hypersensitivity to hydroxychloroquine; extra oral lichen planus.	30	41.3±11.15yrs	12/18	Not excluded	Not reported	Not reported	REU	Yes/(VAS)
Samhan and Abdelhalim	2021	Randomised clinical trial	Patients aged 40–55 years; clinical and histopathological identification of erosive or atrophic OLP in the buccal mucosa; symptomatic lesions unresponsive to local corticosteroids Exclusion criteria: Individuals with current malignancy; corticosteroid application within 1 month before the study; pregnancy or lactation; diabetes mellitus; hypertension, or circulatory or vascular diseases.	Honey therapy combined with photobiomodulation: 23 Golden syrup combined with photobiomodulation: 23	Honey therapy combined with photobiomodulation: 47.6 ± 6.37yrs Golden syrup combined with photo biomodulation: 48.7 ± 6.21yrs	Honey therapy combined with photobiomodulation : 10/13 Golden syrup combined with photobiomodulation: 9/14)	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Wang et al.	2021	Case control	Diagnosed OLP cases according to the modified WHO criteria. Exclusion criteria: Cases with the age below 18 or above 70 years old; pregnant women; patients with oral lesions adjacent to metal crowns or amalgam fillings; individuals with other detectable oral lesions or systemic diseases; or received treatment 3 months before the sample collection; receiving any medication that can cause lichenoid reactions. Controls: Healthy individuals; no detectable oral lesions or systemic diseases.	Patients: 50 Healthy controls: 45	Patients: 48.52±12.33yrs Healthy controls:49.02±13yrs	Patients:14/36 Healthy controls:11/34	Excluded	Not reported	Not reported	RAE	No
Wiriyakijja et al.	2021	Cross sectional	Patients with OLP diagnosed according to modified WHO criteria.	300	63.2 ± 11.5yrs	66/234	Excluded cases of oral lichenoid lesions	Considered	Not reported	ODSS	Yes/(NRS)

			Exclusion criteria: Evidence of oral epithelial dysplasia; proven hypersensitivity to dental restorative materials; oral lichenoid lesions associated with graft-versus-host disease and systemic lupus erythematosus; coexisting chronic neuropathic orofacial pain such as burning mouth syndrome, persistent idiopathic facial pain and trigeminal neuropathic pain; patient-reported significant underlying systemic conditions (American Society of Anaesthesiologists 3 or more) and/or some psychiatric illnesses as defined by Diagnostic and statistical manual of mental disorders (DSM)-5; inability to read English language and understand questionnaires.				associated with graft versus host disease and systemic lupus erythematosus.				
Wiriyakijja et al.	2021	Cross sectional	Aged 18 years or older; able to understand and complete questionnaires; coexisting chronic neuropathic orofacial pain, such as post-traumatic trigeminal neuropathic pain, persistent idiopathic facial pain or burning mouth syndrome; agree to participate and provide written informed consent; affected by one of the following conditions (oral lichen planus, recurrent aphthous stomatitis, pemphigus vulgaris, mucous membrane pemphigoid). Oral lichen planus: Diagnosed cases of OLP according to modified WHO diagnostic criteria. Exclusion criteria: Evidence of oral epithelial dysplasia in biopsy specimen; proven hypersensitivity to dental materials and oral care product; clear temporal relationship of the development of lesions after the initiation of systemic medications; oral lichenoid lesions associated with graft-versus-host disease and systemic lupus erythematosus. Recurrent aphthous stomatitis: Having recurrent oral ulceration (ulcer episodes of at least twice a year) Exclusion criteria: Having RAS-like ulcerations associated with systemic disorders such as Behçet's disease, Sweet syndrome, Ulcerative colitis, Crohn's disease, Coeliac disease, auto-inflammatory syndromes or haematological abnormalities (severe anaemia, cyclic or chronic neutropenia). Pemphigus vulgaris: Direct immuno fluorescence (DIF)/Indirect immunofluorescence (IIF) or ELISA-proven PV Mucous membrane pemphigoid: DIF/IIF or ELISA-proven MMP	Oral lichen planus: 300 Recurrent aphthous stomatitis: 120 Pemphigus vulgaris: 32 Mucous membrane pemphigoid: 48	Oral lichen planus: 63.2± 11.5yrs Recurrent aphthous stomatitis: 43.4 ± 13.7yrs Pemphigus vulgaris: 59.4± 15.9yrs Mucous membrane pemphigoid: 68.1 ± 9.1yrs	Oral lichen planus: 66/234Recurrent aphthous stomatitis: 49/71 Pemphigus vulgaris: 10 /22 Mucous membrane pemphigoid: 16 /32	Excluded cases of oral lichenoid lesions associated with graft-versus-host disease and systemic lupus erythematosus	Not reported	Not reported	ODSS	Yes/(VAS and NRS)
Wiriyakijja et al.	2021	Cross sectional	Aged 18 years or older; diagnosed cases of OLP based on modified WHO diagnostic criteria (van der Meij & van	281	63.3 ± 11.3yrs	65/216	Excluded the cases of oral lichenoid lesions associated with graft-	Considered	Not reported	ODSS	Yes/(VAS and NRS)

			der Waal, 2003); able to understand and complete questionnaires; agree to participate. Exclusion criteria: Evidence of oral epithelial dysplasia in biopsy specimen; proven hypersensitivity to dental materials; oral lichenoid lesions associated with graft-versus-host disease and systemic lupus erythematosus; coexisting chronic neuropathic orofacial pain, such as post-traumatic trigeminal neuropathic pain, persistent idiopathic facial pain or burning mouth syndrome; severe systemic disease (ASA 3 or more) and/or some psychiatric conditions.				versus-host disease and systemic lupus erythematosus				
Zhu et al.	2021	Case control	Patients diagnosed with OLP based on clinical and histological features according to the modified WHO criteria; aged between 18 and 75years Exclusion criteria: Patients diagnosed with other oral mucosa diseases; severe systemic diseases; pregnancy; received topical or systemic treatment 1 month prior to the study; and moderate or severe periodontitis (clinical attachment loss 5 mm, probing depth 6 mm, and extension of bone loss to the apical portion of the root. Controls: Age and sex matched; healthy subjects	Reticular oral lichen planus: 30 Erosive oral lichen planus: 30 Healthy controls: 30	Reticular oral lichen planus: 53.27± 9.35yrs Erosive oral lichen planus: 54.73± 11.66yrs Healthy controls: 51.67± 12.17yrs	Reticular oral lichen planus: 8/22 Erosive oral lichen planus:7/23 Healthy controls: 8/22	Not excluded	Not reported	Excluded patients with moderate or severe periodontitis	REU	No
Abdeldayem et al.	2022	Case control	Patients diagnosed with OLP based on clinical and histological features according to the modified WHO criteria; agreed to participate. Exclusion criteria: Patients suffering from any systemic disease, local inflammatory disease, or infection; pregnant and lactating women; smokers. Controls: Age and sex matched	Reticular oral lichen planus: 13 Erythematous oral lichen planus: 13 Ulcerative oral lichen planus: 13 Controls: 13	Reticular oral lichen planus: 48.69±6.09yrs Erythematous oral lichen planus: 43.23±13.24yrs Ulcerative oral lichen planus: 48.85±6.99yrs Controls: 42.92±7.54yrs	Reticular oral lichen planus: 5/8 Erythematous oral lichen planus: 5/8 Ulcerative oral lichen planus: 5/8 Controls: 6/7	Not excluded	Not reported	Not reported	Thongprasom	Yes/(VAS)
Bhatt et al.	2022	Randomised clinical trial	Patients diagnosed with OLP based on clinical and histological features; 17 - 70years. Exclusion criteria: Patients with asymptomatic reticular oral lichen planus; uncontrolled diabetes mellitus, hypertension; pregnancy or lactation; histopathological features of dysplasia; metallic prosthesis or restorations near the lesion; patients taking any topical or systemic steroids in the last 6 months; active smoking or tobacco chewing habit; patients using any drug or agent (e.g., chewing gum, toothpaste) causing a lichenoid reaction and history of any allergy to aloe vera or its products.	Aloe vera extract 500 mg capsule mixed with carboxymethylcellulose powder and 10 drops of distilled water: 30 low-level laser therapy (LLLT) at 980nm: 30	Aloe vera extract 500 mg capsule mixed with carboxymethylcellulose powder and 10 drops of distilled water: 39.00±15.11yrs low-level laser therapy (LLLT) at 980nm: 42.47±13.01yrs	Aloe vera extract 500 mg capsule mixed with carboxymethylcellulose powder and 10 drops of distilled water: 10/20 low-level laser therapy (LLLT) at 980nm: 12/18	Excluded patients taking drugs causing lichenoid reaction and lesions adjacent to the restorations.	Not reported	Not reported	ODSS	Yes/(VAS)
Brennan et al.	2022	Randomised clinical trial	OLP patients with at least one visible and measurable symptomatic ulcerative OLP lesion and symptomatic lesion(s) coverable by ≤6 patches; 18years or above. Exclusion criteria: Patients with oral ulcers requiring >6 patches, oral candidiasis, viral infections, and non -	Mucoadhesive clobetasol patch 20 µg: 33 Mucoadhesive clobetasol patch 5 µg: 34 Mucoadhesive clobetasol patch 1 µg: 40 Placebo (non-medicated patch): 31	Mucoadhesive clobetasol patch 20 µg: 58.6 ±11.8yrs Mucoadhesive clobetasol patch 5 µg: 59.7± 10.5yrs Mucoadhesive clobetasol patch 1 µg: 62.2± 12.1 yrs Placebo (non-medicated patch): 63.9 ±11.5yrs	Mucoadhesive clobetasol patch 20 µg: 9/24 Mucoadhesive clobetasol patch 5 µg: 13/21 Mucoadhesive clobetasol patch 1 µg: 12/28 Placebo (non-medicated patch): 5/26	Not excluded	Not reported	Not reported	ODSS	Yes/(NRS)

			healed mucosal areas (e.g., a recent oral biopsy)								
Pakfetrat et al.	2022	Case control	Tissue samples from patients with OLP diagnosed according to modified WHO criteria. Tissue samples from patients with oral squamous cell carcinoma confirmed histopathologically. Exclusion criteria: Distorted samples; lichenoid reaction samples Controls: Tissue samples from patients with fibroma confirmed histopathologically Exclusion criteria: Distorted samples; fibroma samples with superficial epithelial hyperplasia and inflammatory infiltrate in connective tissue.	Oral lichen planus: 29 Oral squamous cell carcinoma: 29 Oral fibroma: 28	Oral lichen planus: 48.79±14.17yrs Oral squamous cell carcinoma: 59.24±15.04yrs Oral fibroma: 49.25±16.44yrs	Oral lichen planus: 9/20 Oral squamous cell carcinoma: 21/8 Oral fibroma: 9/19	Excluded tissue samples of lichenoid reaction	Not reported	Not reported	Thongprasom	No
Talungchit et al.	2022	Case control	Patients with OLP diagnosed based on clinical and histopathological findings. Patients with periodontitis Exclusion criteria: Patients who received topical and systemic medications within one month; participants with diseases or condition that might affect salivary production such as Sjögren's syndrome, cystic fibrosis, or previous radiotherapy; smokers; pregnant; participants with Candida infection and who had taken antibiotics within 6 months. Controls: Healthy subjects	OLP patients with periodontitis: 7 OLP patients without periodontitis: 10 Periodontitis patients without any visible oral mucosal lesions: 10 Healthy controls: 10	OLP patients with periodontitis: 56.29 ± 10.45yrs OLP patients without periodontitis: 55.4 ± 15.78yrs Periodontitis patients without any visible oral mucosal lesions: 51.7 ± 12.99yrs Healthy controls: 55.7 ± 12.98yrs	OLP patients with periodontitis: 1/6 OLP patients without periodontitis: 2/8 Periodontitis patients without any visible oral mucosal lesions: 3/7 Healthy controls: 2/8	Not excluded	Not reported	Included OLP patients with periodontitis and without periodontitis	REU	No
Wang et al.	2022	Case control	Patients with OLP diagnosed according to modified WHO criteria; at least 18 years old. Exclusion criteria: History of smoking or alcohol abuse; pregnancy, lactation; subjects with infectious, allergic, cardiovascular, haematological, endocrine, metabolic, and immune-related diseases; exposure to systemic or topical anti-inflammatory, immunomodulatory drugs at least within 3 months; concomitant other oral lesions; oral lichenoid reactions, including lichenoid contact reactions, lichenoid drug eruptions, and lichenoid reactions of graft-versus-host disease; presence of epithelial dysplasia in histopathological examination. Controls: Healthy; at least 18years old. Exclusion criteria: Smokers; alcoholics and patients with systemic disorders.	Oral lichen planus: 45 Healthy controls: 22	Oral lichen planus: 46.84 ± 12.16yrs Healthy controls: 41.05 ± 13.93yrs	Oral lichen planus: 15/30 Healthy controls: 7/15	Excluded cases of oral lichenoid reactions, including lichenoid contact reactions, lichenoid drug eruptions, and lichenoid reactions of graft-versus-host disease.	Not reported	Not reported	RAE	No
Wu et al.	2022	Randomised clinical trial	OLP patients diagnosed in accordance with the modified WHO diagnostic criteria; age between 18 and 65years. Exclusion criteria: Patients with history of eye disease; previous therapies for OLP during the last 3 months before the visit; pregnancy or breastfeeding; contact or drug oral lichenoid lesions; drug allergies; hepatorenal dysfunction; other immune system diseases and HIV seropositivity.	Total participants: 48 Sample size for different arms not specified	Total participants: 47.1 ± 16.5yrs Age for different arms not specified	Total participants: 12/36 M/F for different arms not specified	Excluded cases of oral lichenoid lesions	Not reported	Not reported	RHU (Reticulation, Hyperemia and Ulceration), REU	Yes/(NRS)

Yang et al.	2022	Case control	Patients with OLP diagnosed according to modified WHO criteria; at least 18 years old. Exclusion criteria: History of smoking or alcohol abuse; pregnancy, lactation; subjects with infectious, allergic, cardiovascular, haematological, endocrine, metabolic, and immune-related diseases; exposure to systemic or topical anti-inflammatory, immunomodulatory drugs at least within 3 months; concomitant other oral lesions; oral lichenoid reactions, including lichenoid contact reactions, lichenoid drug eruptions, and lichenoid reactions of graft-versus-host disease; presence of epithelial dysplasia in histopathological examination. Control: Healthy volunteers undergoing orthognathic surgery; at least 18 years old.	Patients: 20 Healthy controls: 10	Patients: 48.95 ± 9.85yrs Healthy controls: 49.37 ± 9.64yrs	Patients: 8/12 Healthy controls:4/6	Excluded patients with oral lichenoid reactions, lichenoid contact reactions, lichenoid drug eruptions, and lichenoid reactions of graft-versus-host disease.	Not reported	Not reported	RAE	No
Zhang et al.	2022	Cross sectional	Patients with OLP diagnosed based on history, clinical and histopathological findings; symmetrical lesions on both sides of buccal mucosa, lingual body, hard palate, soft palate, and gingiva; lesions appearing as white and gray–white stripes with small papule. Exclusion criteria: Patients diagnosed with other oral mucosal diseases; severe systemic diseases, tumors, and other autoimmune diseases such as psoriasis, behçet's disease, and bullous diseases; patients who received immune preparations within 3 months and used certain drugs or amalgam fillers that cause oral lichenoid lesions; patients with history of organ transplantation; and pregnant or lactating.	247	45.21 ± 12.72yrs	61/186	Excluded cases of oral lichenoid lesions	Not reported	Not reported	Thongprasom	No

Table S2: Qualitative assessment of the included studies using Joanna Briggs Institutes Standardized critical appraisal tools according to study design

a) Randomised controlled clinical trials

	Selection bias	Performance bias	Attrition and Performance bias	Detection Bias	Analysis Bias	Overall risk of bias within the study

Citation	*Was true randomization used for assignment of participants to treatment groups?*	*Was allocation to treatment groups concealed?*	*Were treatment groups similar at the baseline? (Measure of dispersion reported? SD must be mentioned, not just mean value)*	*Were participants blind to treatment assignment?*	*Were treatment groups treated identically other than the intervention of interest?*	*Were those delivering treatment blind to treatment assignment?*	*Were participants analysed in the groups to which they were randomized? (Any lost to follow up? Then put 'no')*	*Was the trial design appropriate, and any deviations from the standard RCT design (individual randomization, parallel groups) accounted for in the conduct and analysis of the trial?*	*Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed?*	*Were outcomes assessors blind to treatment assignment?*	*Were outcomes measured in the same way for treatment groups?*	*Were outcomes measured in a reliable way? (If intraexaminer reliability etc not mentioned – put no) Should be >1 exminer, should be calibrated, should be intra/interexaminer reliability.*	*Was appropriate statistical analysis used?*	
Abboud et al. 2021	No	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	No	Yes	High risk of bias
Aghahosseini et al. 2010	No	No	Unclear	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Amanat et al. 2014	No	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	High risk of bias
Amirchaghmaghi et al. 2016	Yes	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Arunkumar et al. 2015	No	No	Unclear	No	Yes	No	Yes	Yes	Yes	No	Yes	No	No	High risk of bias
Azizi and Lawaf. 2007	No	No	Unclear	No	Yes	No	No	Yes	Unclear	No	Yes	No	No	High risk of bias
Bakhtiari et al. 2017	No	No	No	No	Yes	No	Yes	Yes	No	Yes	No	Yes	Yes	High risk of bias
Bakshi et al. 2020	Yes	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Bennardo et al. 2021	No	Unclear	Unclear	No	Yes	No	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Bhatt et al. 2022	Yes	No	Yes	Yes	Yes	No	Yes	Yes	Yes	No	Yes	No	No	High risk of bias
Brennan et al. 2022	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Unclear	Yes	No	No	High risk of bias
Buajeeb et al. 1997	No	No	Unclear	Yes	Yes	Unclear	No	Yes	Yes	Unclear	Yes	No	Yes	High risk of bias
Buajeeb et al. 2000	No	No	Unclear	No	Yes	No	No	Yes	No	No	Yes	No	No	High risk of bias
Chainaini Wu et al. 2007	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Chainani Wu et al. 2012	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Chainani Wu et al. 2008	No	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	High risk of bias

Eita et al. 2021	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Ezzatt and Helmy. 2019	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Ferri et al. 2021	Yes	Yes	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Gorouhi et al. 2007	Yes	Yes	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Jajarm et al. 2011	No	No	No	No	Yes	No	No	Yes	No	No	Yes	No	No	High risk of bias
Jajarm et al. 2015	Yes	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	High risk of bias
Javadzadeh et al. 2008	Yes	No	No	Yes	Yes	No	No	Yes	No	Yes	Yes	No	No	High risk of bias
Kazancioglu and Erisen. 2015	Yes	No	Yes	Unclear	Yes	Unclear	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Keller and Kragelund. 2018	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Kia et al. 2015	Yes	No	No	Yes	Yes	Unclear	No	Yes	No	Yes	Yes	No	Yes	High risk of bias
Kia et al. 2020	Yes	Yes	No	Yes	Yes	No	No	Yes	No	Yes	Yes	No	No	High risk of bias
Lavaee and Shadmanpour 2019	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Lee et al. 2013	Yes	No	No	Unclear	Yes	Unclear	No	Yes	Yes	Unclear	Yes	No	No	High risk of bias
Malhotra et al. 2008	Yes	Unclear	No	No	Yes	No	No	Yes	Yes	No	Yes	No	Unclear	High risk of bias
Mansourian et al. 2011	Yes	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Marlina et al. 2021	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Mergoni et al. 2019	Yes	Yes	No	Unclear	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	High risk of bias
Mirza et al. 2018	Yes	Yes	No	Unclear	Yes	Unclear	No	Yes	Yes	Unclear	Yes	No	No	High risk of bias
Mostafa et al. 2017	No	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	No	High risk of bias
Pakfetrat et al. 2015	Yes	No	No	No	Yes	No	No	Yes	No	Yes	Yes	No	No	High risk of bias
Qataya et al. 2020	Yes	No	No	No	Yes	No	No	Yes	Yes	Yes	Yes	No	Yes	High risk of bias
Raj et al. 2021	No	No	Unclear	No	Yes	No	No	Yes	No	No	Yes	No	Yes	High risk of bias
Riaz et al. 2017	No	No	No	No	Yes	No	No	Yes	No	No	Yes	No	No	High risk of bias
Rogulj et al. 2014	No	No	Unclear	Unclear	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	No	No	High risk of bias

Sadeghian et al. 2019	Yes	No	Yes	Yes	Yes	Unclear	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Samhan and Abdelhalim. 2021	Yes	Yes	Unclear	Unclear	Yes	Unclear	Yes	Yes	Yes	Unclear	Yes	No	Yes	High risk of bias
Sanatkhani et al. 2014	Yes	No	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Siponen et al. 2017	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	No	High risk of bias
Stone et al. 2015	Yes	Yes	Unclear	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	High risk of bias
Stone et al. 2013	Yes	Yes	Unclear	No	Yes	No	No	Yes	Yes	No	Yes	Yes	Yes	High risk of bias
Veneri et al. 2020	Yes	No	No	No	Yes	No	No	Yes	Yes	No	Yes	No	Yes	High risk of bias
Wu et al. 2022	Yes	No	Unclear	No	Yes	No	Yes	Yes	Yes	No	Yes	No	No	High risk of bias
Yoke et al. 2006	Yes	Yes	No	Unclear	Yes	Unclear	Yes	Yes	Yes	Unclear	Yes	No	Unclear	High risk of bias
Zaslansky et al. 2018	Yes	Yes	No	Yes	Yes	No	No	Yes	Yes	Yes	Yes	No	No	High risk of bias
Zhou et al. 2016	Yes	No	No	Unclear	Yes	Unclear	No	Yes	Yes	Yes	Yes	No	No	High risk of bias

b) Nonrandomised clinical trials

	Selection and Confounding bias		Performance bias			Attrition and Performance bias	Detection bias		Analysis bias	Overall risk of bias within the study
Citation	*Was there a control group?*	*Were the participants included in any comparisons similar?*	*Were the participants included in any comparisons receiving similar treatment/care, other than the exposure or intervention of interest?*	*Is it clear in the study what is the 'cause' and what is the 'effect' (i.e. there is no confusion about which variable comes first)?*	*Were there **multiple** measurements of the outcome both pre **and** post intervention/exposure?*	*Was follow up complete and if not, were differences between groups in terms of their follow up adequately described and analysed? (Intention to treat analysis – if pts dropped out.Then NO. If no pts dropped out, put YES.)*	*Were the outcomes of participants included in any comparisons measured in the same way?*	*Were outcomes measured in a reliable way?*	*Was appropriate statistical analysis used? - "Normal distribution"/"normality test mentioned"? if not mentioned, put unclear.*	
Aghahosseini et al. 2006	No	No	Yes	Yes	No	Yes	Yes	No	No	High risk of bias
Chauhan et al. 2018	Yes	Yes	Yes	Yes	No	Yes	Yes	No	Yes	High risk of bias
Cosgarea et al. 2020	No	No	Yes	Yes	Yes	Yes	Yes	No	Unclear	High risk of bias
Ju et al. 2021	No	Yes	No	Yes	No	Yes	Yes	No	No	High risk of bias

Khater and Khattab 2020	No	No	Yes	Yes	No	Yes	Yes	No	Yes	High risk of bias
Kunz et al. 2016	No	No	Yes	Yes	Yes	No	Yes	No	No	High risk of bias
Malik et al. 2012	No	Unclear	Yes	Yes	No	Yes	Yes	No	Yes	High risk of bias
Nosratzehi et al. 2018	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	No	No	High risk of bias
Rogulj et al. 2014	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No	High risk of bias
Salgado et al. 2013	No	Unclear	Yes	Yes	No	Yes	Yes	No	Yes	High risk of bias
Thongprasom et al. 1992	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	No	No	High risk of bias
Xia et al. 2006	Yes	Unclear	Yes	Yes	Yes	Yes	Yes	No	No	High risk of bias

c) Case control studies

	Selection and Confounding bias	Selection bias		Information bias			Confounding bias		Analysis bias	Overall risk of bias within the study
Citation	*Were the groups comparable other than the presence of disease in cases or the absence of disease in controls? ("Individual matching" between cases and controls in all parameters except for disease – e.g. any difference in mean ages? If yes, put NO)*	*Were cases and controls matched appropriately?*	*Were the same criteria used for identification of cases and controls?*	*Was exposure measured in a standard, valid and reliable way?*	*Was exposure measured in the same way for cases and controls?*	*Were outcomes assessed in a standard, valid and reliable way for cases and controls?*	*Was the exposure period of interest long enough to be meaningful? (If exposure if related to a **gene** put YES)(Is an association between exposure and outcome clear? If not clear, write unclear).*	*Were confounding factors identified?*	*Were strategies to deal with confounding factors stated?*	*Was appropriate statistical analysis used? (Explanation of why a test is used, e.g. normality tested)*	
Abdeldayem et al. 2022	Yes	No	Yes	Yes	Yes	Yes	No	No	No	Yes	High risk of bias
Amirchaghmaghi et al. 2021	No	Unclear	Yes	Yes	Yes	Yes	No	No	No	Yes	High risk of bias
Azab et al. 2018	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Unclear	High risk of bias
Batu et al. 2016	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes	High risk of bias
Buajeeb et al. 2007	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	High risk of bias
Daye et al. 2021	Yes	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	High risk of bias
Ergun et al. 2009	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Yes	High risk of bias

Hashemy et al. 2016	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	High risk of bias
Hijazi et al. 2020	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	High risk of bias
Hu et al. 2013	No	No	Yes	Yes	Yes	Yes	Unclear	No	No	Yes	High risk of bias
Hu et al. 2015	No	No	Yes	Yes	Yes	Yes	Unclear	No	No	Yes	High risk of bias
Ke et al. 2017	Unclear	No	Yes	Yes	Yes	Yes	Unclear	No	No	No	High risk of bias
Mao et al. 2021	Unclear	Yes	Yes	Yes	Yes	Yes	Yes	Unclear	No	Unclear	High risk of bias
Meng et al. 2021	No	Yes	Yes	Yes	Yes	Yes	Unclear	No	No	No	High risk of bias
Pakfetrat et al. 2022	No	No	Yes	Yes	Yes	Yes	Yes	No	No	No	High risk of bias
Peng et al. 2018	No	Yes	Yes	Yes	Yes	Yes	Unclear	No	No	No	High risk of bias
Saruhanoglu et al. 2014	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	High risk of bias
Talungchit et al. 2022	No	No	Yes	Yes	Yes	Yes	No	No	No	Yes	High risk of bias
Vahide et al. 2017	No	Yes	Yes	Yes	Yes	Yes	No	No	No	Yes	High risk of bias
Wang et al. 2019	No	Yes	Yes	Yes	Yes	Yes	Unclear	No	No	Unclear	High risk of bias
Wang et al. 2021	No	Yes	Yes	Yes	Yes	Yes	Unclear	No	No	No	High risk of bias
Wang et al. 2022	No	Yes	Yes	Yes	Yes	Yes	No	No	No	No	High risk of bias
Wei et al. 2018	No	No	Yes	Yes	Yes	Yes	Yes	No	No	Yes	High risk of bias
Yang et al. 2020	No	Yes	Yes	Yes	Yes	Yes	Unclear	No	No	Yes	High risk of bias
Yang et al. 2022	No	No	Yes	Yes	Yes	Yes	Unclear	No	No	Yes	High risk of bias
Zhang et al. 2016	No	No	Yes	Yes	Yes	Yes	Unclear	No	No	Yes	High risk of bias
Zhang et al. 2017	No	No	Yes	Yes	Yes	Yes	Unclear	No	No	No	High risk of bias
Zhou et al. 2012	No	Yes	Yes	Yes	Yes	Yes	Unclear	No	No	Yes	High risk of bias
Zhu et al. 2021	No	Yes	Yes	Yes	Yes	Yes	Yes	No	No	Unclear	High risk of bias

d) Cross sectional studies

	Selection bias	Reporting bias	Information bias			Confounding bias		Analysis bias	Overall risk of bias within the study
Citation	*Were the criteria for inclusion in the sample clearly defined?*	*Were the study subjects and the setting described in detail?*	*Was the exposure measured in a valid and reliable way?*	*Were objective, standard criteria used for measurement of the condition?*	*Were the outcomes measured in a valid and reliable way?*	*Were confounding factors identified?*	*Were strategies to deal with confounding factors stated?*	*Was appropriate statistical analysis used?*	
Amirchaghmaghi et al. 2021	Yes	No	No	Yes	Yes	No	No	No	High risk of bias
Burke et al. 2019	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Chankong et al. 2016	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Deng et al. 2021	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	High risk of bias
Dvorak et al. 2015	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	High risk of bias
Elsabagh et al. 2021	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Escudier et al. 2007	No	No	No	Yes	Yes	No	No	Yes	High risk of bias
Gobbo et al. 2017	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Lee et al. 2018	Yes	No	No	Yes	No	No	No	No	High risk of bias
Lo´ pez-Jornet and Camacho-Alonso. 2010	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Park et al. 2012	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Piboonniyom et al. 2005	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Radwan-Oczko et al. 2018	Yes	Yes	No	Yes	No	No	No	No	High risk of bias
Shirzad et al. 2018	Yes	Yes	No	Yes	Yes	No	Yes	No	High risk of bias
Tadakamadla et al. 2018	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	High risk of bias
Tao et al. 2010	Yes	Yes	Yes	Yes	Yes	No	No	Yes	High risk of bias
Wiriyakijja et al. 2020	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	High risk of bias
Wiriyakijja et al. 2021	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Wiriyakijja et al. 2021	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	High risk of bias
Wiriyakijja et al. 2021	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	High risk of bias

Yiemstan et al. 2020	Yes	Yes	No	Yes	Yes	No	No	Yes	High risk of bias
Zhang et al. 2022	Yes	Yes	No	Yes	Yes	No	No	No	High risk of bias

e) Cohort studies

	Selection bias	Performance bias				Confounding bias		Detection bias	Reporting and Performance bias	Attrition and Performance bias	Analysis bias	Overall risk of bias within the study
Citation	*Were the two groups similar and recruited from the same population?*	*Were the exposures measured similarly to assign people to both exposed and unexposed groups?*	*Was the exposure measured in a valid and reliable way?*	*Were the groups/participants free of the outcome at the start of the study (or at the moment of exposure)?*	*Were strategies to address incomplete follow up utilized?*	*Were confounding factors identified?*	*Were strategies to deal with confounding factors stated? "Multivariable logistic regression analysis"*	*Were the outcomes measured in a valid and reliable way?*	*Was the follow up time reported and sufficient to be long enough for outcomes to occur?*	*Was follow up complete, and if not, were the reasons to loss to follow up described and explored?*	*Was appropriate statistical analysis used?*	
Bombeccari et al. 2017	Yes	Yes	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	High risk of bias
Gabriella et al. 2021	Single cohort	Not applicable	No	No	No	Yes	Yes	No	Yes	No	Yes	High risk of bias
Wiriyakijja et al. 2020	Single cohort	Not applicable	No	No	No	No	No	Yes	Yes	No	Yes	High risk of bias

f) Case series

	Selection bias		Information and selection bias	Reporting bias						Analysis bias	Overall risk of bias within the study
Citation	*Were there clear criteria for inclusion in the case series?*	*Were valid methods used for identification of the condition for all participants included in the case series?*	*Was the condition measured in a standard, reliable way for all participants included in the case series?*	*Did the case series have consecutive inclusion of participants?*	*Did the case series have complete inclusion of participants?*	*Was there clear reporting of the demographics of the participants in the study?*	*Was there clear reporting of clinical information of the participants?*	*Were the outcomes or follow up results of cases clearly reported?*	*Was there clear reporting of the presenting site(s)/clinic(s) demographic information?*	*Was statistical analysis appropriate?*	
Herrero-Gonzalez et al. 2016	Yes	Yes	No	Yes	Yes	No	Yes	Yes	Yes	Not applicable	High risk of bias
Wee et al. 2012	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low risk of bias

Table S3: Studies excluded after the full text review

Studies excluded	Reason for Exclusion
Abdallah et al. (2021)	Study with only PROMs
Adamo et al. (2021)	Study with only PROMs
Aguirre et al. (2004	Study with only PROMs
Arbabi-Kalati et al. (2017)	Non-English language
Bender et al. (2018)	Case series (n=3)
Bessar et al. (2021)	Study with only PROMs
Carcieri et al. (2016)	Study with PROMs and not a valid or reliable disease severity scoring system
Chang et al. (2008)	Case series (n=7)
Daume et al. (2021)	Study with only PROMs
Delavarian et al. (2010)	Study with only PROMs
Fädler et al. (2015)	Study with only PROMs
Ferri et al. (2015)	Study protocol
Germi et al. (2009)	Study with PROMs and not a valid or reliable disease severity scoring system
Gholizadeh et al. (2020)	Brief communication
Gholizadeh et al. (2021)	Not a valid or reliable disease severity scoring system
Kherlopian et al. (2022)	No use of disease severity scoring system
Kukreja et al. (2021)	Conference proceedings
Lopez-Jornet et al. (2016)	Study with only PROMs
McCaughey et al. (2011)	Study with PROMs and not a valid or reliable disease severity scoring system
Mirza et al. (2021)	No use of disease severity scoring system
Monshi et al. (2021)	Study with only PROMs
Ormond et al. (2022)	Research letter
Polizzi et al. (2021)	Not a valid or reliable disease severity scoring system
Resende et al. (2013)	Study with only PROMs
Riordain (2016)	Study with only PROMs
Rodstrom et al. (2001)	Study with only PROMs
Samiee et al. (2020)	Study with only PROMs
Shaqman et al. (2020)	Subjects with desquamative gingivitis not secondary to lichen planus
Trehan et al. (2004)	Study with only PROMs
Tvarijonaviciute et al. (2018)	Study with only PROMs
Velez et al. (2014)	Study with PROMs and not a valid or reliable disease severity scoring system for oral lichen planus
Vohra et al. (2016)	Not a valid or reliable disease severity scoring system
Voute et al. (1994)	Study with only PROMs

PROMs: Patient Reported Outcome Measures