

A Comprehensive Systematic Review of Oral Lichen Planus (2004–2024): Epidemiology, Pathophysiology, Clinical Features, Diagnosis, and Management

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ABSTRACT

Oral lichen planus (OLP) is an immunologically based chronic inflammatory condition with an unclear etiology that affects the oral mucosa, impacting patient quality of life and can lead to malignant transformation. This systematic review synthesizes findings from 2004 to 2024, focusing on the epidemiology, pathophysiology, clinical features, diagnostic modalities, and management strategies for OLP. Medical databases from PubMed, Springer, and Elsevier were systematically reviewed to provide an evidence-based overview of developments over two decades. OLP has a global prevalence of approximately 1%, most often been reported in middle-aged and older women. Advances in understanding its immune-mediated pathogenesis, its clinical presentation, diagnosis of the disease become important for providing the right treatment, including topical and systemic therapies. Nonetheless, challenges remain regarding long-term management, recurrence, and cancer risk. Future research directions are highlighted to address gaps in knowledge and optimize patient outcomes.

KEYWORDS: OLP, pathophysiology, clinical features, diagnosis, management.

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I. INTRODUCTION

Oral lichen planus (OLP) is an ongoing inflammatory disorder with autoimmune components involves a T-cell mediated, epithelium directed inflammation in response to unknown antigen(s). First described over a century ago in 1869. It affects approximately 1% of the global population and disproportionately impacts middle-aged women. OLP is clinically significant not only for its painful and recurrent nature but also for its risk of developing oral squamous cell carcinoma (OSCC). Given the broad clinical spectrum of OLP, from reticular lacy patches to erosive forms, diagnosis and management can be challenging. Over the past two decades, advances in immunopathology and therapeutic interventions have provided new insights, though the condition remains a focus of active research. This comprehensive review aims to consolidate two decades of findings regarding OLP, emphasizing advancements in the

understanding of the diagnosis, etio- pathogenesis, and management.

METHODS

A systematic literature search was conducted from the using of PubMed, Springer, and Elsevier databases. The review covered studies published between January 2004 and November 2024, using the search terms “oral lichen planus,” “epidemiology,” “pathogenesis,” “malignant transformation,” and “management.” full Articles were deemed if they focused on OLP in human populations and were published in English. Exclusion criteria included non-English publications, studies on cutaneous lichen planus without oral involvement, and articles lacking full-text access. Data extraction was independently performed by two reviewers, any discrepancies in study selection were resolved by consensus. Meta-analyses, clinical trials,

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observational studies, and systematic reviews were prioritized for inclusion.

RESULTS

Epidemiology:

Lichen planus can affect any mucosal surface and most commonly involves the mouth or genitalia. Its prevalence is estimated at approximately 1% of the adult population. Oral involvement occurs in approximately 60% to 70% of patients with lichen planus and may be the only manifestation in 20% to 30%, with marked geographical differences across regions. Studies indicate a higher prevalence in Europe and the Americas compared to Asia. Although the disorder may occur in all age groups, women over the age of 50 years are most commonly involved, with a female-to-male ratio of 3:1 (Gonzalez-Moles et al., 2020). Hormonal influences, such as estrogen fluctuations, may contribute to this gender disparity (Alrashdan et al., 2016).

Pathophysiology:

The pathogenesis of the disease is unknown. Many contributing factors are implicated and include infection, immune, metabolic, and genetic causes. It is evident that specific immunologic mechanisms control the development of OLP. T-Cell mediated pathogenic alterations involving proinflammatory and counterregulatory mechanism function in the pathogenesis of the disorder.

The pathogenesis of OLP is primarily derived by immune-dysregulation, involving T-cell infiltration and keratinocytes apoptosis. CD4+ T-helper cells in the dermis and CD8+ cytotoxic cells play a crucial role, triggering apoptosis of basal keratinocytes via the Fas/FasL pathway (Farhi et al., 2012). Upregulated pro-inflammatory milieu of cytokines, such as IL-6, IL-17, and TNF- α , contribute to the inflammatory cascade. Environmental triggers, including infections (e.g., hepatitis C virus, varicella zoster), dental materials and stress, may exacerbate the condition. Genetic predisposition is also a consideration, as variation in genes associated with immune response such as specific HLA. (Sugerman et al., 2002).

Clinical Features:

OLP manifests in six primary forms: reticular, erosive, atrophic, plaque-like, papular, and bullous which present clinically with oral discomfort and pain.

- **Reticular OLP** is the most common subtype, characterized by interlacing white lines (Wickham's striae).
- **Erosive and atrophic forms** are distressing types and present with erythema, painful ulceration, and burning sensations, particularly when eating acidic foods.
- **Plaque-like OLP** similar to leukoplakia, while **bullous forms** involve blistering and ulceration.

Extraoral manifestations, such as genital lichen planus, may coexist, necessitating multidisciplinary care (Carrozzo & Thorpe, 2009).

Diagnosis:

OLP presents wide range of clinical manifestation and its diagnosis based on combination of clinical features, histopathological findings and other additional tests. Histologically, OLP exhibits hyperkeratosis in "saw tooth pattern", basal cell vacular degeneration, and a band-like lymphocytic infiltrate at the dermo-epithelial junction. Direct immunofluorescence can identify fibrinogen deposits along the basement membrane, aiding in differential diagnosis from lichenoid drug reactions and other conditions (Al-Hashimi et al., 2007).

Management:

Pharmacological Interventions:

Topical and intralesional corticosteroids, such as clobetasol propionate, triamcinolone and fluocinonide, are the primary approach in the disease treatment, demonstrating efficacy in reducing inflammation and lesion size. For recalcitrant cases, calcineurin inhibitors like tacrolimus offer an alternative (Thornhill et al., 2020).

Systemic corticosteroids and other systemic immunosuppressive therapies like azathioprine, retinoid and dapsone are reserved for severe cases when topical treatment prove ineffective, though long-term use is limited by adverse effects. Emerging therapies, such as biologics targeting TNF- α and IL-17, have shown promise in refractory cases (Zhou et al., 2018).

Non-Pharmacological Interventions:

Extracorporeal photopheresis, laser therapy, and PUVA therapy have all been reported as efficacious, have shown as adjunctive treatments options. These modalities reduce lesion size and improve symptom control, particularly in erosive OLP (Zhang et al., 2022).

Lifestyle and Supportive Care:

Patients are advised to minimizing exacerbating factors, such as contact allergens, tobacco, and trauma. Maintaining good oral hygiene with regular dental cleaning. Psychological counseling may benefit those experiencing stress-related flares. Regular follow-up is critical, given the risk of malignant transformation, reported in 0.5%–2% of cases (Gonzalez-Moles et al., 2020).

DISCUSSION

Lichen planus is a common chronic inflammatory disorder that can affect the mucous membranes, including the oral mucosa. Because of the anatomic, physiologic and functional peculiarities of the oral mucosa, oral variant requires specific evaluation. In this comprehensive review, we discuss the current developments in the understanding of the etiopathogenesis, epidemiology, clinical presentation, and treatment of oral LP.

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The management of OLP has evolved significantly over the past two decades. Improved understanding of its immune-mediated pathogenesis has facilitated the development of targeted therapies. However, the disease remains challenging due to its chronicity, recurrence, and risk for malignant transformation. Despite the efficacy of corticosteroids, their long-term use poses risks, emphasizing the need for alternative treatments.

The integration of adjunctive therapies, such as PDT and biologics, reflects a shift toward personalized medicine. Nevertheless, further research is needed to establish standardized protocols for diagnosis and treatment. Additionally, the identification of reliable biomarkers for malignant transformation remains a critical gap in the literature.

CONCLUSIONS

OLP is very common oral mucosal dermatosis with diverse presentations and a complex immune-mediated pathogenesis. While advancements in pharmacological and non-pharmacological therapies have improved symptom management, challenges persist in long-term care and cancer prevention. A proper understanding of the pathogenesis of the disease become important for providing the right treatment. OLP has the risk of developing into oral cancer so, future research should prioritize the identification of novel therapeutic targets and biomarkers for early detection of malignant transformation, and justifies the need for long term follow up.

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