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# The Interplay Between Vitamin D Status and Oral Lichen Planus: A Literature Review of Nutrient Deficiency, Treatment Potential and Psychosomatic Influences

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## ABSTRACT

**Introduction:** This review evaluates the complex interplay between oral lichen planus - a chronic T-cell-mediated inflammatory disease - and the significant roles that vitamin D status and psychosomatic factors play in its clinical pathogenesis and management. **Aim:** This study aimed to review the literature on the role of Vitamin D in the pathophysiology and treatment of oral lichen planus, with particular emphasis on underlying biological mechanisms, clinical findings, potential therapeutic implications, and psychosomatic influences. **Material and methods:** For this review, we selected the cited studies from PubMed and Google Scholar. The search included studies between January 1977 and February 2026. The search terms included 'oral lichen planus,' 'vitamin D,' 'vitamins,' 'depression,' and 'anxiety'. **Results:** Nutrient deficiency (especially Vitamin D) exacerbates the symptoms and lesion size of oral lichen planus. Psychological stress plays a big role in managing OLP, and we must manage it to keep the autoimmune disorder in control. **Conclusions:** Effective management of oral lichen planus creates a multidisciplinary approach which integrates traditional pharmacotherapy with nutrient supplementation - particularly addressing vitamin D and micronutrient deficiencies, as well as psychological interventions to break the "vicious circle" of psychosomatic-driven exacerbations, and restore oral homeostasis.

**Keywords:** oral lichen planus, Vitamin D, nutrients, psychological stress, depression

## 1. INTRODUCTION

Oral lichen planus (OLP) is a chronic (Ismail et al., 2007) inflammatory disease of the oral mucosa. It is mediated by T-lymphocytes. The condition is considered an autoimmune disease in which an aggravated autoimmune response leads to the apoptosis of basal keratinocytes. Topical corticosteroids have remained the essential treatment for many years. Steroids' long-term efficacy is often inhibited by resistant lesions and potential local or systemic side effects (Abdusalamova et al.,

2025). That continues to drive the search for effective supplementary treatment. Because of its anti-inflammatory and immunomodulatory properties, Vitamin D has gained more significance in recent years (Shalaby et al., 2025). The properties of vitamin D are caused by the Vitamin D Receptors (VDR) present on T-lymphocytes. VDRs regulate cytokine production, which directly controls mucosal homeostasis (Aboushousha et al., 2025). Clinical evidence consistently demonstrates that individuals with OLP exhibit statistically significantly lower serum and salivary vitamin D levels compared to healthy patients (Nosratzahi, 2023). Furthermore, OLP is more often perceived as a psychosomatic disorder (Ismail et al., 2007), where psychological stress, anxiety, and depression might trigger clinical exacerbations and also interfere with vitamin D metabolism by down-regulating receptor expression. This review evaluates the interplay between vitamin D status, its impact on OLP lesion intensity, and the connection of psychosomatic influences with the pathogenesis and management of this disease.

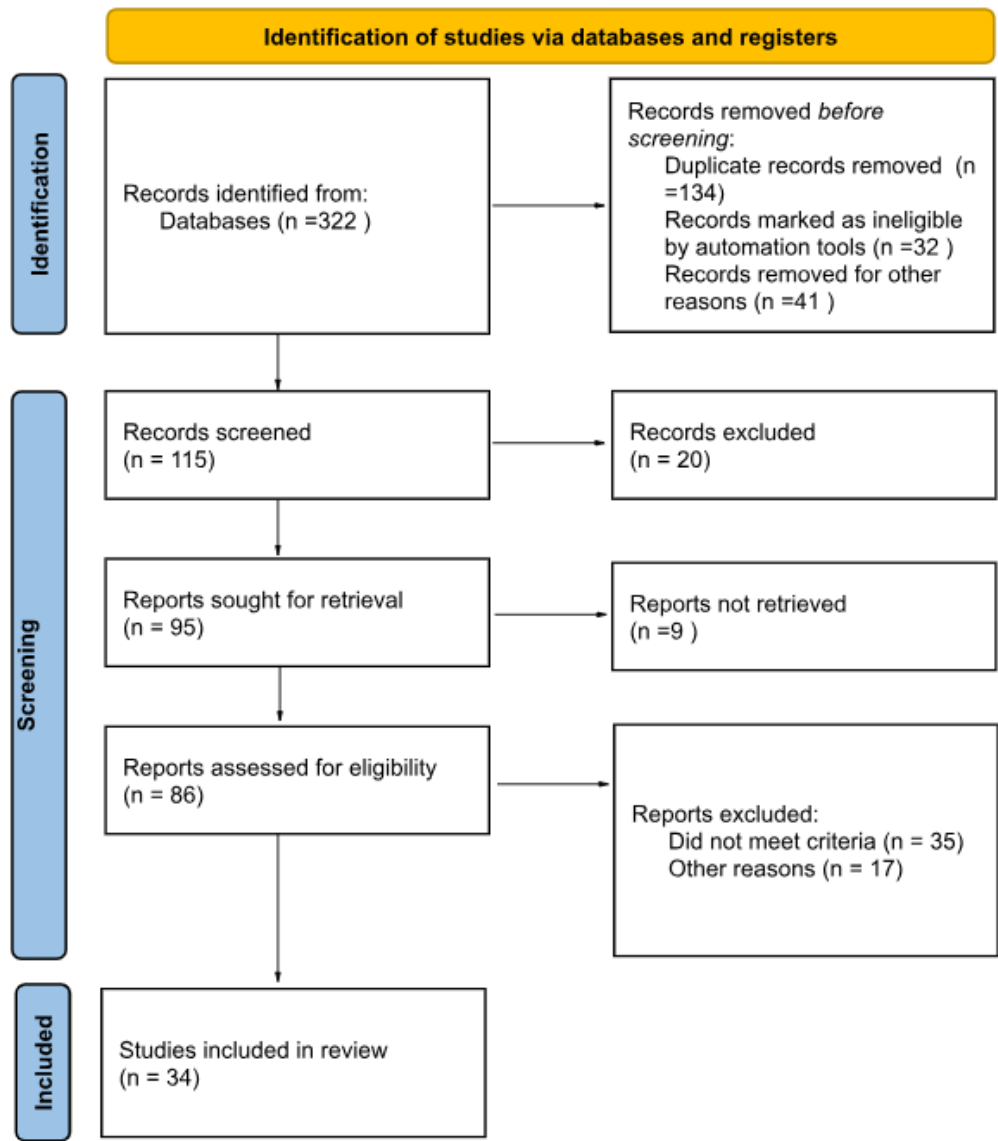


Figure 1. PRISMA flow diagram.

## 2. REVIEW METHODS

This narrative review relies on a systematic and specific search of peer-reviewed medical literature on the interplay between Vitamin D status and Oral Lichen Planus. It was with the aim of exploring the pathophysiological mechanisms, treatment methods, nutrient deficiencies, and psychological management. Research articles were published in open-access medical databases, mostly PubMed and Google Scholar, with various combinations of the “oral lichen planus”, “Vitamin D”, “nutrients”, “psychological stress”, and

“depression” keywords, which guided our literature search. Finally, We considered a total of 34 studies published between January 1985 and February 2026. We focused on original research articles, systematic reviews, meta-analyses, and clinical guidelines published in the English language. We screened titles and abstracts for topic relevance and assessed full-text articles for inclusion. Our team concentrated mainly on the association between vitamin D status, depressive symptoms, and the intensity of OLP symptoms. Authors excluded in-vitro studies, opinions, letters to the editor, and conference abstracts without peer review (Figure 1).

3. RESULTS AND DISCUSSION

Pathogenesis and the Biological Basis of OLP - Immunopathology of OLP

Oral lichen planus (OLP) is a common, chronic autoinflammatory disease characterized by a T-cell-mediated immune response against the oral mucosa (Roopashree et al., 2010). While the precise etiology remains unknown (Ismail et al., 2007), the condition is considered a multifactorial process potentially triggered by predisposing factors such as systemic diseases (De Porras-Carrique et al., 2022), genetic susceptibility - especially when it comes to lesion malignancy, psychological stress (Scully and El-Kom, 1985; Szymczak-Paluch and Kłosek, 2023), and exposure to local antigens like dental materials (amalgam, gold etc.) or medications such as NSAIDs, antihypertensive agents, angiotensin converting enzyme inhibitors or diuretics (Ismail et al., 2007). Both specific and non-specific immune processes work together to gather T-cells and damage the oral tissues (Roopashree et al., 2010). In the antigen-specific process, Langerhans cells find an unknown trigger and present it to CD4+ helper T-cells, which then turn on CD8+ cytotoxic T-lymphocytes (Nosratzahi, 2018; Roopashree et al., 2010). These active CD8+ T-cells directly eliminate the oral skin cells (keratinocytes) through apoptosis (Abdusalamova et al., 2025; Ismail et al., 2007). At the same time, non-specific processes keep mast cells releasing inflammatory chemicals like TNF-α and activate MMP-9 (Aboushousha et al., 2025; Roopashree et al., 2010). These enzymes break down the basement membrane of the tissue, which helps T-cells move deeper into the oral lining (Scully and El-Kom, 1985). This entire environment creates a Th1 immune reaction, whereas interferon-gamma (IFN-γ) supports the chronic inflammation (Chiang et al., 2018). Ultimately, these complex immune pathways cause T-cells to build up and destroy the mucous base layer (Scully and El-Kom, 1985), creating the typical clinical and microscopic signs of oral lichen planus (Table 1).

Table 1. Roles of immune components in the OLP

| Immune Component       | Specific role in OLP mechanism       |
|------------------------|--------------------------------------|
| Langerhans cells       | Present cells to CD4+ helper T-cells |
| CD4+ Helper T-cells    | Activation of CD8+ cytotoxic T-cells |
| CD8+ Cytotoxic T-cells | Apoptosis of keratinocytes           |
| Mast cells             | Release inflammatory TNF-α           |
| MMP-9                  | Basal membrane breakage              |
| IFN-γ                  | Sustaining chronic inflammation      |

The Immunomodulatory Role of Vitamin D

Vitamin D is a multifunctional, fat-soluble (Nosratzahi, 2023; Shalaby et al., 2025) hormone. This vitamin has many properties: anti-inflammatory, antioxidant, and immunomodulatory (Aboushousha et al., 2025). Those properties are essential for maintaining correct bone metabolism, oral health, and calcium-phosphate balance (Moszura et al., 2026). The main way of obtaining this vitamin is not from diet. When sunlight hits the epidermis, it transforms 7-dehydrocholesterol to vitamin D3. Humans also acquire vitamin D from dietary products such as egg yolks, liver, fatty fish, and fortified foods (milk, cheese, orange juice, etc.). After it enters the bloodstream, the liver converts the vitamin into [25(OH)D] (25-hydroxyvitamin D), which is the main circulating form. Then the kidneys process it into the active biological form, known as calcitriol (Pfortenhauer and Shubbrook, 2017). This metabolite enters body cells. It binds directly to the Vitamin D Receptor (VDR). Finally, the calcitriol-receptor complex moves into the cell nucleus and binds to Vitamin D response elements (VDRE) in order to regulate the expression of genes related to cell differentiation, proliferation, and anti-inflammatory

responses (Moszura et al., 2026; Rahmadhini et al., 2025). It affects homeostasis in the oral cavity and significantly impacts the development of autoimmune-regulated diseases (Rahmadhini et al., 2025).

### Vitamin D as a Biomarker of Disease Severity

Clinical research features a variance in 25-hydroxyvitamin D [25(OH)D] concentrations between individuals affected by oral lichen planus and healthy people. Plenty of research confirms that OLP-affected patients have statistically significantly lower serum levels of this hormone than those in the healthy control group. Meta-analyses show that the average concentration of serum vitamin D in OLP patients is below the standard serum level. Sometimes it falls into the clinical range of deficiency or insufficiency. Research from Egypt (Shalaby et al., 2025) shows that patients affected by the erosive variant of OLP tend to have lower vitamin D levels than patients with the reticular form. Scholars from Lublin, Poland (Thum-Tyzo et al., 2024) found that male patients with OLP show lower serum levels than women with diagnosed OLP. However, none of the examined persons had met the medical standards of vitamin D concentration. It is important to note that a subset of case-control studies did not find a significant difference in serum levels between OLP groups and control groups (Gholizadeh et al., 2020). In the researchers' opinion, this may be caused by many factors such as regional sunlight exposure, sampling season, age, BMI, dietary variations, or sample sizes. Some studies report that nearly 99% of affected patients suffer from either a deficiency or an insufficiency (Thum-Tyzo et al., 2024).

### Vitamin D supplementation in the Management of OLP

Medical professionals now view vitamin D as a supplementary tool for dealing with oral lichen planus. It serves as an adjunctive therapy with conventional topical corticosteroids, such as betamethasone valerate, triamcinolone acetonide, or fluocinolone acetonide (Abdusalamova et al., 2025). Clinicians from Egypt demonstrated that adding Vitamin D to a patient's regimen reduces their subjective pain scores on the visual analog scale (VAS) (Aboushousha et al., 2025; Saeed et al., 2022). Patients on this treatment report a big decrease in the burning sensations. Otherwise, it may handicap their speaking and eating motions if the vitamin is being administered daily. The combination of steroids and Vitamin D leads to a faster reduction in the size of oral mucosa lesions compared to using steroids alone. Researchers note that this approach is effective for postmenopausal women (Saeed et al., 2022). They exhibit a high incidence of the disease. Studies observed that patients who take 50,000 IU once a week or 6000 IU every day achieve noticeable results after eight weeks (Pfortenhauer and Shubrook, 2017). After continuous supplementation, OLP wounds are less painful and heal more quickly. Vitamin D achieves these outcomes by inhibiting the production of proinflammatory proteins (TNF- $\alpha$  and interferon-gamma) (Rahmadhini et al., 2025). It also protects the skin's base layer from premature cell death (Shalaby et al., 2025). This approach offers some hope for patients who struggle with recalcitrant cases that are resistant to standard immunosuppressants (Nosratzahi, 2018). Even without additional psychological help, Vitamin D supplementation provides significant improvements in objective symptoms. Because of these clear benefits, many experts advocate for the routine screening of Vitamin D status (Rahmadhini et al., 2025) in every OLP patient. Fixing a nutritional deficiency might improve long-term healing outcomes, keep the disease in remission for extended periods, and reclaim the appropriate quality of life.

### Co-existing Micronutrient Deficiencies

Vitamin D is not the only nutrient appealing to the advancement of oral lichen planus. Other vitamins and microelements are also crucial to keep the lesions under control. Patients with oral lichen planus frequently exhibit multi-nutrient imbalances that extend beyond a single nutritional factor (Gholizadeh and Sheykhbahaei, 2021). Clinical evaluations of saliva by Rezazadeh et al. identified lower concentrations of minerals like zinc, iron, and magnesium in the saliva of affected individuals (Rezazadeh et al., 2019). Zinc is a vital component for repairing the epithelium and the proper functioning of T-lymphocytes (Gholizadeh and Sheykhbahaei, 2021). Deficiency of zinc drives the body to produce more proinflammatory chemicals and fail to heal damaged oral tissues (Aboushousha et al., 2025). It was examined that using mouthwash with 0.2% zinc added alleviated the pain and burning sensation and reduced the surface area of OLP (Mehdipour et al., 2010).

Iron deficiency leads to oral lining thinning and increases tissue permeability and furthermore results in a higher prevalence of mucosal damage (Gholizadeh and Sheykhbahaei, 2021). Researchers link it with lower levels of iron-related markers, ferritin and hemoglobin (Chang et al., 2025). Magnesium plays a noteworthy role as well, as it stabilizes the cellular membrane (Gholizadeh and Sheykhbahaei, 2021), controls enzymes and proliferation of fibroblasts and keratinocytes, which are crucial for repairing damage to mucous membranes. Some authors also emphasize the importance of selenium and have demonstrated that topical and/or systemic

administration of this element may be effective in the treatment of erosive OLP. All the above-mentioned mineral gaps continue to weaken the mucosal barrier, which cannot defend itself against chronic inflammation.

Beyond minerals, OLP patients often suffer from significant deficits in the B-vitamin complex, especially folate (B9), B1, B6, and B12, as well as vitamin C, A, and E. Jolly and Nobile, (1977) demonstrated that the harshest deficiencies were in vitamin C, followed by vitamin B1 and B6. It also might have a correlation with a low intake of citrus fruits and food containing hematinics, for example, liver, legumes, leafy greens, and fortified grains. These deficiencies trigger a rise in homocysteine, a metabolic byproduct that correlates directly with increased disease severity and painful clinical flare-ups (Gholizadeh and Sheykhbahaei, 2021). Additionally, the disease process involves high levels of oxidative stress, which systematically depletes the body's stores of antioxidant vitamins C and E (Scrobotă et al., 2011). Rai et al. proved that curcumin treatment significantly increases the level of those vitamins (Rai et al., 2010). Buajeeb et al. examined the effectiveness of topical retinoid acid, declaring that it has lower therapeutic potency than steroids alone (Buajeeb et al., 1997), although according to Dalirsani et al., it might enhance the anti-inflammatory properties of steroids (Dalirsani et al., 2010). Other authors reported that adding vitamin B12 supplementation to regular immunomodulatory therapy reduces inflammation and alleviates the painful symptoms (Wu et al., 2024). Supplement therapy of B6, B12, and folic acid lowers homocysteine to a normal level (Chiang et al., 2018). Even though some research showed that supplementation does not provide complete remission of oral lesions, the majority of subjects felt a major improvement (Jolly and Nobile, 1977). Because many patients remain unaware of these underlying shortages, clinicians suggest that a complete blood examination should be a crucial step for successful long-term treatment (Chiang et al., 2018). Addressing these co-existing deficits might help restore the oral biological balance, alleviate the symptoms, and slowly reestablish the overall quality of life for the patient (Table 2).

**Table 2.** Functions of various nutrients.

| Nutrient          | Its function                               |
|-------------------|--------------------------------------------|
| Vitamin D         | immunomodulator                            |
| Iron              | maintains the integrity of the oral mucosa |
| Selenium          | reducing inflammation                      |
| Zinc              | epithelial repair                          |
| Magnesium         | stabilizes the cellular membrane           |
| Vitamin B1, B6    | lower homocysteine levels                  |
| Vitamin B9        | lowers homocysteine levels                 |
| Vitamin B12       | reduces inflammation                       |
| Vitamin C, vit. E | reduce oxidative stress                    |
| Vitamin A         | has anti-inflammatory properties           |

**Psychological Comorbidities in OLP**

Oral lichen planus' correlation with psychosomatic disorders has been a generally accepted feature for many years (Kövesi and Bánóczy, 1973). Researchers identify a very high frequency of mental health disorders in individuals with oral lichen planus. Clinical investigations show that these patients suffer from anxiety more than half of the time (approx. 54%). About one-third of the OLP population experiences clinical depression, which occurs significantly more often than in the general population (De Porras-Carrique et al., 2022). Managing the symptoms of OLP while being in a depressed state of mind is arduous, leading to even less motivation to treat the chronic disease. Nonetheless, stress is still being mentioned time and again as one of the main and common provocateurs of the disease (Ismail et al., 2007; Roopashree et al., 2010; Scully and El-Kom, 1985), impacting around 70% of examined women. Clinicians

note that OLP patients frequently struggle with suppressed anger, which further increases their internal emotional tension. Mehdi pour et al., (2016) stated that OLP patients with anger issues use their oral cavity as a shock organ, which might be a reflection of their current psychological state. These comorbidities commonly result in mood swings. Many patients also display neuroticism as a dominant personality trait. It specifically leads to chronic worry, irritability, and emotional instability, as well as higher depression levels (Gaitán-Cepeda et al., 2023). All of the above-mentioned disorders quite often tend to cluster together, posing a substantial challenge for both clinicians and society at large. Because of these strong comorbidities, medical professionals more and more view oral lichen planus as a psychosomatic disorder and focus on a multi-specialized, individual treatment.

### **Depression as a sign of OLP exacerbation**

Medical professionals confirm that psychological stress and depression often act as primary triggers for the clinical exacerbations of oral lichen planus (Ismail et al., 2007; Nosratzahi, 2018). Patients frequently report that their OLP symptoms worsen during periods when their emotional distress increases (De Porras-Carrique et al., 2022). It is regulated by a reaction that involves the hypothalamus-pituitary-adrenal (HPA) axis. As a result of emotional stimulation, this structure increases cortisol production (Gaitán-Cepeda et al., 2023; Saeed et al., 2022). These hormonal shifts may disrupt the immune balance and increase the production of proinflammatory cytokines in the oral tissues. When patients experience a worsening depressive state or stressful life events, the disease begins its more aggressive phase. Patients with erosive and atrophic types report higher rates of severe anxiety and depression in comparison with patients affected by asymptomatic reticular forms (Shalaby et al., 2025). During those aggressive flare-ups, the oral mucosa develops larger, wider, and more painful atrophic or erosive lesions (Ismail et al., 2007). It leads to an escalated risk (up to 10%) of malignant transformation to cancer (Gaitán-Cepeda et al., 2023). More likely to manifest depression, paranoia, and anxiety are patients with those symptoms. This relationship creates a dangerous vicious circle where the autoimmune damage causes more stress, which then leads to further clinical destruction. A sudden decrease in a patient's mental stability often leads to a transition from a stable reticular form to a symptomatic and malignant erosive pattern.

### **Correlation of Vitamin D depletion with depression**

Clinical research proves that individuals with mood disturbances often spend less time outdoors due to their altered emotional state and reduced psychosocial functioning (De Porras-Carrique et al., 2022). This lifestyle limits exposure to natural ultraviolet radiation (UV light). It reduces the internal synthesis of vitamin D in the skin. Consequently, these patients more often suffer from a nutritional gap that fails to support serotonin levels in the brain. A lack of this ligand removes a critical check on the immune system and triggers the accelerated apoptosis of basal keratinocytes. This biological failure causes the intraoral lesions to become significantly larger, wider, and more painful. VD depletion may also increase the risk of epithelial dysplasia, although it has yet to be studied (Shalaby et al., 2025). While not all affected people have trouble with going outside, they might suffer from Seasonal Affective Disorder (SAD), which occurs as a form of annual recurrent depression (Jahan-Mihan et al., 2024). It affects mostly women with depressive episodes developing during fall/winter. SAD manifests with insomnia, anxiety, poor appetite, agitation, and weight loss. Some authors say that vitamin D deficiency is more representative of Seasonal Affective Disorder than of classic depression (Jahan-Mihan et al., 2024). Clinicians have shown that the prevalence of depressive symptoms varies more by geographic area than by lesion placement. This worsening state creates a dangerous vicious circle for the affected individual. The constant physical pain in the oral cavity and progressive mucosal damage diminish the patient's quality of life and exacerbate their depressive state. Ultimately, the aggravating symptoms keep the patient trapped in a cycle of social isolation and physiological distress.

### **Psychological treatment potential on OLP**

Medical professionals nowadays acknowledge psychological involvement as a crucial pillar for managing oral lichen planus. Standard treatments show higher success rates when doctors engage in mental health treatment as part of the principal support. Authors suggest the use of relaxation techniques, such as Jacobson's Progressive Muscle Relaxation. They effectively lower the intensity of perceived oral pain by teaching patients how to reduce physical tension (Szymczak-Paluch and Kłosek, 2023). Patients who incorporate these relaxation exercises into their treatment report better results than patients who rely mostly on pharmacological drugs. It aims at the emotional tension that drives outbursts and results in mucosal damage. Including psychological treatment also stimulates patients' obedience and improves the overall healing process (Gaitán-Cepeda et al., 2023). Kalkur drew attention to the role of psychotherapy in the treatment of not only OLP but also recurrent aphthous stomatitis, burning mouth syndrome, and TMD disorders (Kalkur et al.,

2015). Some authors noted that herbs may be useful for controlling lichen planus lesions and their recurrence, such as Aloe vera, purslane, and thunder god vine (Yarnell and Abascal, 2010). Others find the use of valerian root extract to reduce anxiety and substitute diazepam as the conventional method of premedication (Shahinfar et al., 2016).

Clinicians say that regular visits to a psychologist help in minimizing severe symptoms of OLP. Symptoms such as burning sensations are common in erosive cases (Saeed et al., 2022). To establish a truly patient-centered care plan, researchers advise performing routine mood screenings (Szymczak-Paluch and Kłosek, 2023). Before clinical symptoms worsen, regular assessments of a patient's psychological state allow practitioners to intervene with supportive therapy. Stabilizing emotional health helps with normalizing immune responses. It also reduces systemic inflammation. Compared to using topical steroids alone, this therapeutic model often leads to a much faster resolution of painful lesions. To manage their chronic condition with more confidence and less fear, pro-health education empowers patients. Patients who receive this care experience an improvement in their daily social and physical functioning (De Porras-Carrique et al., 2022). Therefore, managing the patient's emotional well-being is a vital, cost-effective tool for maintaining long-term oral health (Table 3).

**Table 3.** Comparison of Oral Lichen Planus Treatment Methods

| Comparison of Oral Lichen Planus Treatment Methods |                                                                                                                            |
|----------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|
| Treatment Method                                   | Description                                                                                                                |
| Topical Corticosteroids                            | standard treatment; betamethasone or triamcinolone; long-term anti-inflammatory properties                                 |
| Vitamin D Supplementation                          | serves as an adjunctive therapy; it reduces pain and accelerates lesion healing.                                           |
| Psychological Treatment                            | counseling, psychotherapy, Jacobson's Progressive Muscle Relaxation; lowers emotional tension, stabilizes patients' sanity |
| Micronutrient Supplementation                      | repairs epithelium (Zn), stabilizes cellular membrane (Mg) and reduces homocysteine levels (B vitamins)                    |
| Antioxidant therapy:                               | curcumin, vitamin C and E, decreases inflammation                                                                          |
| Herbal & Alternative Remedies:                     | aloe vera, purslane, etc.; control lesion recurrence                                                                       |

4. CONCLUSION

Oral lichen planus is a complex, multifaceted inflammatory disease that requires advanced treatment strategies other than customary topical corticosteroids. Evidence suggests that vitamin D deficiency is highly common among patients with oral lichen planus and functions as an important biomarker of disease severity. Supplementation with vitamin D improves clinical outcomes by reducing pain scores and accelerating mucosal lesion healing through immunomodulatory and anti-inflammatory effects. The strong link between oral lichen planus and psychosomatic disorders (mainly anxiety, depression, and chronic stress) aggravates the need for psychological interventions and routine mood screenings as part of standard care. Noticing co-existing micronutrient deficiencies (especially zinc and B-complex vitamins) and interrupting the cycle of psychological stress and vitamin D depletion are the keys to reaching sustained remission. A multidisciplinary approach is necessary for doctors to restore oral homeostasis and improve their patients' quality of life.

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**Informed consent**

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**Ethical approval**

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**Conflict of interest**

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**Data and materials availability**

All data associated with this study will be available based on the reasonable request to corresponding author.

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