Review Article

Effect of Probiotics on Oral Candida Colonization in Patients with Oral Lichen Planus: A Systematic Review

Niyati Shah, Shivayogi Charantimath, Vasanti Jirge, Vaishali Keluskar

From, Department of Oral Medicine and Radiology, KLE Academy of Higher Education and Research, KLE V. K. Institute of Dental Sciences, Belagavi – 590010, Karnataka, India

ABSTRACT

Background: Oral Lichen Planus (OLP) is a chronic immune-mediated inflammatory disorder of the oral mucosa, affecting middle-aged women. Despite increasing interest in probiotics as adjunctive therapy in OLP, evidence regarding their role in reducing oral Candida colonization and improving clinical outcomes remains limited. This review was done to systematically evaluate the effect of probiotic therapy on oral Candida colonization, recurrence of candidiasis, and related clinical outcomes in patients with oral lichen planus. **Materials and Methods:** A systematic review of randomized controlled trials was conducted following the PRISMA 2020 guidelines and registered with PROSPERO (CRD42024550624). Electronic searches were performed across multiple databases from January 2001 to March 2025. Trials assessing probiotic interventions with reported microbiological outcomes, including Candida load, recurrence, or fungal colonization, were included. Risk of bias was assessed using the Cochrane RoB 2 tool with domain-level judgments, and certainty of evidence was evaluated using the GRADE approach. **Results:** Four randomized controlled trials (RCTs) involving 110 participants were included, of which two specifically reported oral Candida-related outcomes. Considerable heterogeneity existed in probiotic strains, formulations, treatment regimens, and outcome measures. Probiotic monotherapy did not demonstrate consistent reduction in oral Candida colonization or recurrence when compared with placebo or standard therapy. In contrast, adjunctive probiotic use alongside topical corticosteroids was associated with a greater reduction in oral Candida colonization, decreased risk of steroid-associated candidiasis, and improved microbial balance. Secondary benefits included greater pain reduction and improved lesion scores in some studies. Immunological assessments showed non-significant trends toward reduced inflammatory markers. All probiotic interventions were well tolerated, with no serious adverse events reported. **Conclusion:** Probiotics do not appear to provide consistent clinical benefit as monotherapy for reducing oral Candida colonization in patients with oral lichen planus. However, their adjunctive use alongside topical corticosteroids may offer supportive benefits by reducing oral Candida load, improving microbial homeostasis, and enhancing treatment tolerability, particularly in patients at risk of steroid-associated candidiasis.

Key words: Lichen Planus, Probiotics, Candidiasis, Lactobacillus

Oral Lichen Planus (OLP) is a chronic immune-mediated inflammatory disorder of the oral mucosa, affecting approximately 0.5–2.2% of the general population, with a higher prevalence among middle-aged women [1,3]. It was classified by the World Health Organization (WHO) as an oral potentially malignant disorder in 2005 [2]. Clinically, OLP presents as reticular, erosive, atrophic, plaque-like, or ulcerative lesions, often associated with pain, burning sensation, and mucosal discomfort, significantly affecting quality of life [6,7]. The etiology of OLP is multifactorial and not fully understood, involving genetic predisposition, psychological stress, systemic diseases, hypersensitivity reactions, and microbial factors [7,8].

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Pathogenesis primarily involves a T-cell–mediated immune response in which $CD4^+$ and $CD8^+$ lymphocytes trigger basal keratinocyte apoptosis through cytokine-mediated inflammation, upregulation of nuclear factor-kappa B (NF-κB), and dysregulation of regulatory T cells, resulting in chronic mucosal inflammation and epithelial damage [5,10]. Topical and systemic corticosteroids remain the gold standard for OLP management because of their anti-inflammatory and immunosuppressive effects [9,11].

However, prolonged corticosteroid use is associated with adverse effects such as mucosal atrophy, opportunistic oral candidiasis, altered oral microbiota, and frequent disease

Correspondence to: Dr. Niyati Shah, Department of Oral Medicine and Radiology, KLE Academy of Higher Education and Research, KLE V. K. Institute of Dental Sciences, Belagavi – 590010, Karnataka, India.

Email: niyatishah3537@gmail.com

recurrence, limiting their long-term use [12,13]. The oral microbiome plays a critical role in maintaining mucosal immunity and homeostasis, and disruption of this balance may contribute to disease progression and secondary fungal colonization [14]. Probiotics are live microorganisms that confer health benefits by restoring microbial balance, inhibiting pathogenic organisms such as Candida species through competitive exclusion, and exerting immunomodulatory effects [15,16,17].

They may reduce pro-inflammatory cytokines such as Tumor Necrosis Factor- alpha (TNF-α) and Interleukin (IL-6), enhance anti-inflammatory cytokines like IL-10 and Transforming Growth Factor beta (TGF-β), and improve mucosal barrier integrity [18,19]. Unlike corticosteroids, probiotics may provide supportive therapeutic effects without systemic immunosuppression or increasing susceptibility to fungal overgrowth [8,20]. Despite increasing interest in probiotics as adjunctive therapy in OLP, evidence regarding their role in reducing oral Candida colonization and improving clinical outcomes remains limited and heterogeneous [21-24]. Since OLP patients, particularly those receiving corticosteroid therapy, are at increased risk of oral candidiasis and microbial dysbiosis, evaluating microbiological outcomes is clinically relevant [4,16]. Therefore, this systematic review aims to critically assess the effect of probiotics on oral Candida colonization, recurrence of candidiasis, and associated clinical outcomes in patients with oral lichen planus [13–16].

2. MATERIALS AND METHODS

2.1 Protocol and registration

This Systematic Review was prospectively registered in PROSPERO (CRD42024550624) and conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines. A comprehensive literature search was conducted independently by two reviewers (NS and SC) across PubMed/MEDLINE, Cochrane Library, Scopus, ProQuest, Clinical Key, OpenGrey, Library Hub Discover, and institutional repositories to identify human studies published in English between January 2001 and March 31, 2025, without restrictions on study setting.

The search strategy was based on the PICO (P – Patient / Population / Problem, I – Intervention, C – Comparison, O – Outcome) framework (Table 1) and utilized a combination of Medical Subject Headings (MeSH) and free-text terms related to Oral Lichen Planus, Probiotics, and oral Candida Colonization, including keywords such as “oral lichen planus,” “probiotics,” “Lactobacillus,” “Streptococcus salivarius,” “Bifidobacterium,” “Lacticaseibacillus rhamnosus GG,” “oral candidiasis,” “Candida load,” and “fungal colonization.” Randomized clinical trials (RCTs) involving patients aged 18 years and above with clinically and/or histopathologically diagnosed oral lichen planus were included. Studies reporting microbiological outcomes such as oral Candida load, recurrence of Candidiasis, or fungal colonization, with or without associated clinical outcomes, were considered eligible.

Case reports, case series, observational studies, narrative or systematic reviews, animal studies, and in vitro studies were excluded. Studies involving lichenoid drug reactions, graft-versus-host disease, or other clinically similar lichenoid lesions were excluded to avoid diagnostic overlap. Trials with unclear or non-standardized diagnostic criteria for OLP, as well as studies that did not evaluate probiotic interventions or failed to report relevant microbiological or clinical outcomes, were also excluded. Certainty of evidence for primary outcomes was assessed using GRADEpro GDT software across five domains: risk of bias, inconsistency, indirectness, imprecision, and publication bias. Sensitivity analyses were performed qualitatively to compare adjunctive probiotic therapy with probiotic monotherapy where applicable.

Table 1: PICO Framework and Search Strategy

No.	PICOTS Element	Main Term	Search Terms
1	**P**	Patients aged 18 years and above, diagnosed with oral lichen planus based on clinical and/or histopathological examination	“Oral lichen planus” OR OLP OR “oral mucosal lichen planus” OR “lichen planus oral”,“Candidiasis oral” MeSH: *Lichen Planus, Oral*
2	**I**	Probiotic therapy/preparations used for prevention or reduction of oral Candida colonization	Probiotic OR “probiotic therapy” OR “probiotic treatment” OR “probiotic supplement” OR “live bacteria” OR “beneficial bacteria” MeSH: *Probiotics*
3		Specific probiotic strains with antifungal or microbiome-modulating effects	Lactobacillus OR “Lactobacillus reuteri” OR “L. reuteri” OR “Lactobacillus rhamnosus” OR Bifidobacterium OR “Bifidobacterium animalis” OR “B. lactis HN019” OR “VSL#3” OR “multi-strain probiotic” OR “Streptococcus salivarius” OR “Lacticaseibacillus” MeSH: *Lactobacillus*; *Bifidobacterium*
4	**C**	Placebo, corticosteroids alone, or standard therapy	Placebo OR corticosteroid OR clobetasol OR “topical steroid” OR “conventional treatment” OR “standard care” MeSH: *Glucocorticoids*; *Anti-Inflammatory Agents*
5	**O**	Oral Candida-related microbiological outcomes	1. Reduction in oral Candida load/colony-forming units (CFU/mL) 2. Reduction in recurrence of oral candidiasis 3. Reduction in fungal colonization or recolonization

reactions, graft-versus-host disease, or other clinically similar lichenoid lesions were excluded to avoid diagnostic overlap. Trials with unclear, non-standardized, or unspecified diagnostic criteria for oral lichen planus, as well as studies that did not evaluate probiotics as an intervention, were also excluded.

3. RESULTS

3.1 Study selection

The literature search process is summarized in the PRISMA 2020 flow diagram (Figure 2).

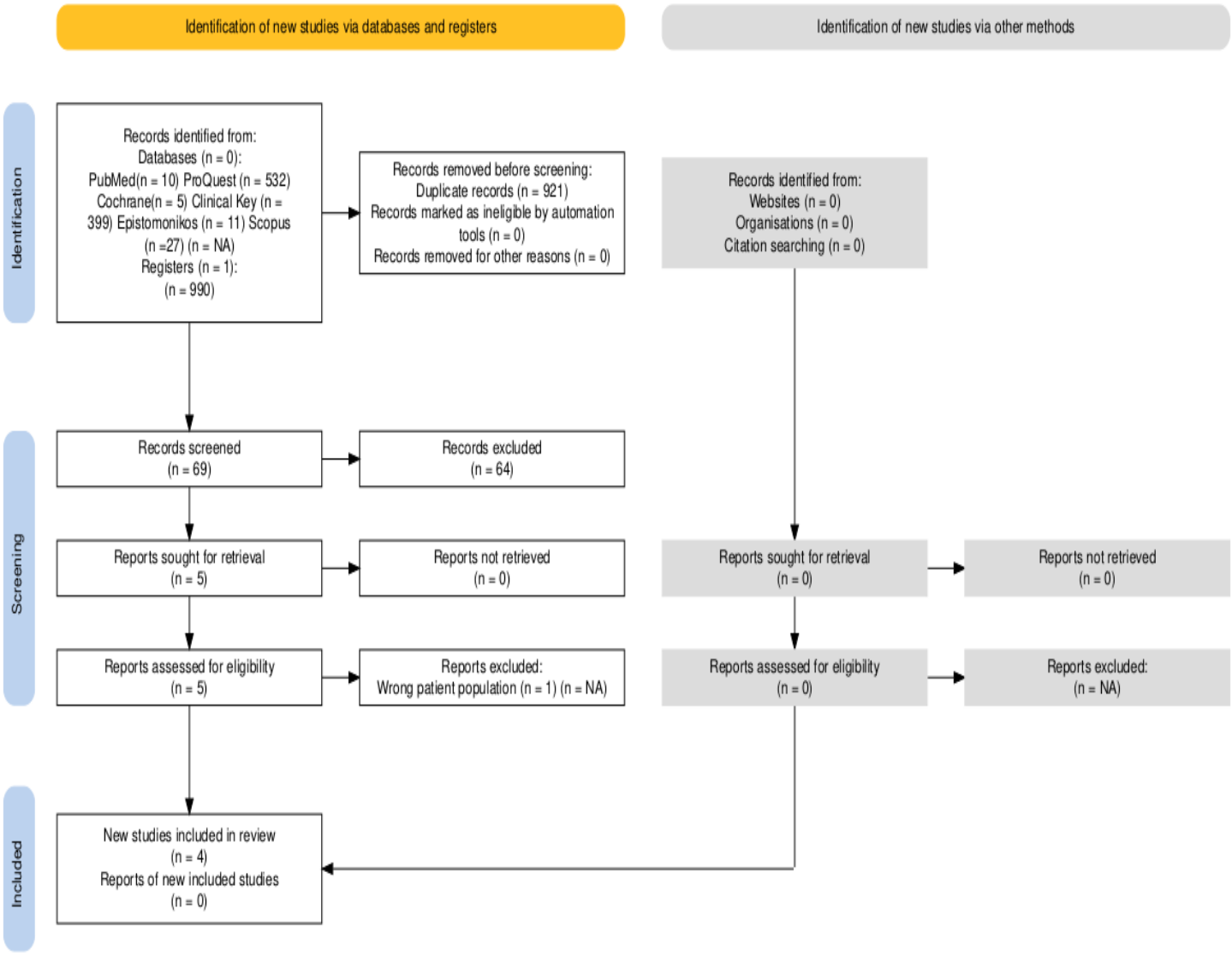

Figure 1: PRISMA 2020 flow diagram

A total of 990 records were identified through electronic databases and manual searches. After duplicate removal, 69 records remained for title and abstract screening. Of these, 64 were excluded for not meeting the inclusion criteria. Five full-text articles and a thesis were assessed for eligibility. One study by Thomsen et al. was excluded because it was an observational 16S rRNA microbiome analysis without primary clinical or microbiological Candida-related endpoints, and probiotics were used only as a secondary adjunct. Ultimately, four RCTs were included in the qualitative synthesis. The characteristics of the included studies are summarized in Table 2.

Table 2: Study Characteristics

Study (Author, Year)	Sample Size (n)	Study Design	Intervention	Comparator	Primary Outcome	Secondary Outcomes	Key Findings	Certainty of Evidence (GRADE)
Ana Carolina Fragoso Motta et al., 2022	22	Randomized double-blind controlled trial	*Bifidobacterium animalis* subsp. *lactis* HN019	Placebo	Pain reduction (VAS/NRS)	Cytokine levels (IL-6, IFN-γ), histopathology	No statistically significant clinical improvement; borderline reduction in IL-6 and IFN-γ ($p = 0.052$)	Medium
Erni Marlina, Richard N. Goodman et al., 2022	30	Randomized double-blind parallel-group trial	Multi-strain probiotic (VSL#3)	Placebo	Pain reduction (VAS/NRS)	Cytokine levels, symptom scores	No significant difference in pain reduction; non-significant immunological trend ($p = 0.082$)	High
Mette K. Keller et al., 2018	22	Randomized placebo-controlled trial	*Lactobacillus reuteri* lozenges	Placebo	Oral candidiasis recurrence	OLP symptom severity	No significant difference in candidiasis recurrence or OLP symptoms between groups	Medium
Amira Abdel et al., 2025	36	RCT	Probiotic capsules + topical clobetasol	Clobetasol alone	Lesion size reduction (Thongprasom score)	Pain reduction, Candida load	Significant improvement in lesion size and pain reduction with adjunctive probiotic therapy; reduced Candida colonization	Low

3.2 Study characteristics and participant demographics

The four included RCTs demonstrated heterogeneity in participant demographics, probiotic formulations, outcome measures, and methodological quality. Across the included studies, participant ages ranged approximately from 25 to 65 years, with mean ages reported between 48 and 52 years. Female-to-male ratios ranged from 1.8:1 to 2.5:1. All participants were adults aged 18 years and above and were diagnosed with OLP based on clinical examination, with histopathological confirmation performed in three studies to exclude clinically similar lesions such as lichenoid reactions and graft-versus-host disease. Sample sizes ranged from 22 to 60 participants per study arm, with a total of 110 participants included across all studies [13–16].

3.3 Outcome assessment methodologies

The included studies assessed a range of microbiological and clinical outcomes. Oral Candida colonization was evaluated by quantifying colony-forming units per milliliter (CFU/mL) using chromogenic agar culture or by assessing recurrence of oral candidiasis during follow-up. Clinical symptoms such as pain and burning sensation were measured using the Numeric Rating Scale (NRS) or Visual Analog Scale (VAS). Lesion severity and extent were assessed using the Thongprasom score or Oral Disease Severity Score (ODSS). Immunological outcomes included salivary or serum inflammatory markers such as interferon-gamma (IFN-γ), interleukin-6 (IL-6), and CXCL10 measured using Enzyme-Linked Immunosorbent Assay (ELISA). Histopathological and immunohistochemical analyses were performed in selected studies, assessing basal keratinocyte apoptosis and $CD8^+$ T-cell infiltration. Health-related quality of life was assessed in one study using the Oral Health Impact Profile-14 (OHIP-14) [13–16].

3.4 Probiotic interventions and comparators

The probiotic interventions varied in strain composition, dosage, route, and treatment paradigm. These included multi-strain formulations such as VSL#3 containing *Lactobacillus* spp., *Bifidobacterium* spp., and *Streptococcus thermophilus*; single-strain preparations including *Lactobacillus reuteri* DSM 17938/ATCC PTA 5289 and *Bifidobacterium animalis* subsp. *lactis* HN019; and oral probiotic capsules used adjunctively with topical clobetasol. Comparator groups received placebo formulations or clobetasol 0.05% monotherapy [13–16].

3.5 Primary outcomes

3.5a Oral Candida colonization and recurrence

Two of the four included studies specifically evaluated oral Candida-related outcomes. Oral Candida colonization was quantified using CFU/mL counts on chromogenic agar culture, while recurrence of oral candidiasis was assessed clinically during follow-up. In the adjunctive probiotic trial by Kamal et al. (2025), probiotic therapy combined with topical clobetasol resulted in a significantly greater reduction in salivary Candida counts compared with clobetasol monotherapy (88% vs 62%; $p < 0.001$), suggesting a

protective effect against steroid-associated candidiasis [14]. In contrast, Keller et al. (2018), who primarily investigated recurrent oral candidiasis, reported no statistically significant difference in Candida load or recurrence rates between probiotic lozenges and placebo [16]. None of the included studies evaluated long-term recurrence beyond 16 weeks. Therefore, the long-term efficacy of probiotics in preventing recolonization or recurrent candidiasis remains uncertain [14,16].

3.6 Secondary outcomes

3.6a Pain reduction

Pain reduction was reported across all included studies and assessed using either the NRS or VAS. Marlina et al. (2022) reported no statistically significant difference in pain reduction between the VSL#3 probiotic group and placebo at 30 days (mean NRS change −0.5 vs −0.7; p = 0.82) [13]. Similarly, Keller et al. (2018) reported no benefit of probiotic lozenges over placebo, with pain scores favoring placebo (p = 0.037), although interpretation is limited due to attrition and the study's primary focus on candidiasis recurrence [16]. In contrast, Kamal et al. (2025) demonstrated significantly greater pain reduction in the adjunctive probiotic plus clobetasol group compared with clobetasol monotherapy at both two and four weeks [14]. Motta et al. reported some improvement in pain scores in the probiotic arm; however, overall clinical outcomes remained inferior to corticosteroid therapy [15].

3.6b Lesion severity and extent

Lesion severity was assessed using the Thongprasom score or ODSS. Only the adjunctive probiotic study demonstrated statistically significant superiority, with a 72% reduction in lesion severity in the probiotic plus clobetasol group compared with 55% in the clobetasol-only group at four weeks (p = 0.02) [14]. Other studies reported no significant intergroup differences, and probiotic monotherapy was inferior to topical corticosteroids in achieving lesion resolution [13,15].

3.6c Immunological and histopathological outcomes

Two studies evaluated inflammatory cytokines using ELISA. Probiotic therapy was associated with non-significant reductions in IFN-γ and IL-6 levels, indicating possible immunomodulatory trends without consistent clinical translation [13,15]. One study reported reduced basal keratinocyte apoptosis and decreased $CD8^+$ T-cell infiltration on histopathological and immunohistochemical analysis following probiotic treatment [15]. Microbiome analysis using 16S rRNA sequencing demonstrated modest shifts in bacterial composition favoring *Firmicutes*; however, alpha and beta diversity indices did not reach statistical significance [16].

3.6d Quality of life

Only one study evaluated health-related quality of life using the OHIP-14. Marlina et al. reported small, non-significant improvements in both probiotic and placebo groups, with changes below the minimal clinically important difference [13].

3.6e Safety and compliance

All probiotic interventions were well tolerated, with no serious adverse events reported. Minor adverse effects such as transient gastrointestinal discomfort or taste disturbances were self-limiting and did not require discontinuation. Compliance rates ranged from 82% to 100% [13–16].

3.6f Follow-up durations

Follow-up durations ranged from 15 days to 16 weeks. None of the included studies evaluated long-term recurrence or sustained suppression of oral Candida colonization beyond six months [13–16].

3.6g Risk of bias

Risk of bias was independently assessed by two reviewers using the Cochrane RoB 2 tool (Figure 2). One study was judged to have low risk of bias across all domains [13]. The remaining studies demonstrated either some concerns or high risk of bias due to inadequate reporting of randomization, unclear allocation concealment, attrition, selective reporting, and reliance on subjective outcomes [14–16].

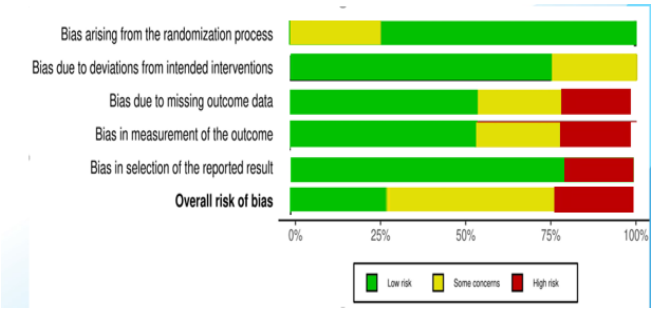

Figure 2: Risk of Bias Assessment

4. META-ANALYSIS

A meta-analysis was not performed due to substantial clinical and methodological heterogeneity among the included studies. Sources of heterogeneity included differences in probiotic strains, treatment regimens (monotherapy versus adjunctive), formulations, microbiological outcome measures, and follow-up durations [13–16]. Statistical heterogeneity (I^2) could not be calculated due to insufficient comparable data and a lack of standardized reporting across studies.

5. GRADING OF THE EVIDENCE (GRADE)

The certainty of evidence for critical outcomes was assessed using the GRADE approach (Table 2). Evidence ranged from very low to moderate certainty. Studies were downgraded

primarily due to risk of bias, inconsistency, indirectness, and imprecision related to small sample sizes and heterogeneous methodologies. The strongest evidence supported adjunctive probiotic use in reducing oral Candida colonization and improving related clinical outcomes, while evidence for probiotic monotherapy remained weak and inconsistent [13–16].

DISCUSSION

This systematic review provides a comprehensive PRISMA-compliant synthesis of the available RCTs evaluating the efficacy of probiotics in reducing oral *Candida* colonization and preventing recurrent oral candidiasis in patients with OLP, while also assessing associated clinical, immunological, and histopathological outcomes. Oral candidiasis represents a clinically relevant complication in OLP due to chronic mucosal inflammation, epithelial barrier disruption, and the widespread use of topical corticosteroids, which may predispose patients to opportunistic fungal overgrowth and microbial dysbiosis [4,7,11]. Across the four included RCTs involving 110 participants, the effect of probiotics varied according to strain composition, dosage, route of administration, treatment duration, and whether they were used as monotherapy or adjunctive therapy [13–16].

A key finding of this review was that probiotics appeared to demonstrate greater benefit when used as adjunctive therapy rather than as monotherapy. In the RCT by Kamal and Abdel, adjunctive probiotic capsules combined with topical clobetasol significantly reduced salivary *Candida* counts compared with clobetasol monotherapy alone (88% vs 62%; $p < 0.001$), suggesting a protective role against steroid-associated oral candidiasis [14]. This study also reported significant improvements in pain reduction and lesion severity, indicating that a reduction in fungal colonization may correlate with improved symptomatic outcomes. These findings are particularly relevant because topical corticosteroids, while considered the gold standard for OLP treatment, can suppress local immunity and promote fungal overgrowth [11]. By restoring oral microbial homeostasis, probiotics may mitigate one of the major adverse effects associated with long-term corticosteroid use [8,9].

In contrast, the evidence supporting probiotic monotherapy was inconsistent. Keller et al. evaluated *Lactobacillus reuteri* lozenges primarily for the prevention of recurrent oral candidiasis and reported no statistically significant reduction in candidiasis recurrence or oral *Candida* colonization compared with placebo [16]. Similarly, no significant improvements in OLP symptom severity were observed. However, interpretation of these findings should be cautious due to the pilot nature of the study, small sample size, high attrition rates, and limited follow-up duration. It is possible that the probiotic strain used, dosage, or duration of administration was insufficient to achieve a sustained antifungal effect. Furthermore, recurrence of candidiasis is influenced by multiple host factors, including salivary flow, oral hygiene, systemic immunity, and concurrent medication use, which may have confounded outcomes [4,16].

The findings regarding pain and lesion severity were similarly heterogeneous. Marlina et al. investigated the multi-strain probiotic formulation VSL#3 in symptomatic OLP patients and found no statistically significant improvement in pain scores or lesion severity compared with placebo after 30 days [13]. However, trends toward improvement in oral health-related quality of life and salivary inflammatory biomarkers were observed. Motta et al. reported some improvement in pain scores and histopathological findings in the probiotic arm, although overall clinical outcomes remained inferior to corticosteroid therapy [15]. Only the adjunctive probiotic trial demonstrated statistically significant superiority in lesion resolution, with greater reductions in Thongprasom scores compared with corticosteroid monotherapy [14]. These findings suggest that probiotics alone may not exert sufficiently potent anti-inflammatory effects to replace corticosteroids, but they may enhance treatment response when combined with standard therapy.

The immunological and histopathological findings provide additional insight into the potential mechanism of action of probiotics in OLP and oral candidiasis prevention [5,7]. Motta et al. demonstrated reductions in IL-6 and IFN-γ levels following probiotic administration, along with reduced $CD8^+$ T-cell infiltration and decreased basal keratinocyte apoptosis on histopathological examination [15]. Marlina et al. similarly observed favourable but non-significant trends in salivary IFN-γ and other inflammatory markers [13]. Although these immunological improvements did not consistently translate into immediate clinical benefit, they suggest that probiotics may modulate the inflammatory microenvironment and improve mucosal resilience over time.

The antifungal role of probiotics is biologically plausible and supported by evidence from both in vitro and clinical studies. Probiotics can inhibit *Candida* species through competitive exclusion at epithelial adhesion sites, production of antimicrobial substances such as lactic acid, hydrogen peroxide, and bacteriocins, and interference with fungal hyphal formation and biofilm development [8,9,17]. Burton and Fidel demonstrated that *Lactobacillus reuteri* has direct antifungal effects against oral *Candida* species and may suppress fungal growth and virulence [17]. In OLP patients, oral *Candida* colonization may exacerbate mucosal inflammation, worsen symptoms such as burning sensation, and increase the risk of superinfection in erosive lesions [4]. Therefore, probiotic-mediated reduction in fungal burden may indirectly improve both microbial and clinical outcomes.

Recent studies have highlighted the role of oral dysbiosis in OLP pathogenesis. Jawhara et al. reported alterations in both the oral mycobiome and bacteriome in erosive and non-erosive OLP, including increased abundance of opportunistic

fungal organisms and altered bacterial diversity [4]. Such dysbiosis may contribute to persistent inflammation, epithelial damage, and susceptibility to fungal colonization. Probiotics may help restore microbial equilibrium and reinforce oral mucosal homeostasis. Similar effects have been observed in other oral diseases. In periodontitis, *Bifidobacterium animalis* subsp. *lactis* HN019 has demonstrated antimicrobial effects against key periodontal pathogens and improvement in clinical parameters [19,23]. Probiotics have also shown benefit in halitosis management and denture stomatitis by reducing pathogenic microbial load and improving oral ecology [20,22,24]. *Streptococcus salivarius* K12 has shown protective effects in oral mucositis and maintenance of mucosal integrity [18]. These findings collectively support the broader role of probiotics in oral microbial regulation.

The variability in findings across the included studies may be attributed to several factors. Different probiotic strains possess distinct mechanisms of action, and not all strains have proven antifungal or immunomodulatory properties [17,20]. The included studies used different formulations, including lozenges, capsules, and sachets, which may influence oral retention time and local efficacy. Duration of treatment ranged from 15 days to 16 weeks, which may not be sufficient to observe sustained microbial or clinical changes. Additionally, differences in microbiological outcome measures, such as CFU/mL counts, recurrence assessment, or microbiome sequencing, limited comparability across studies [13–16].

Another important limitation in interpreting the evidence relates to methodological quality. While one study demonstrated low risk of bias, the remaining studies had some concerns or high risk of bias due to inadequate reporting of randomization, unclear allocation concealment, attrition bias, and selective reporting [13–16]. Sample sizes were generally small, reducing statistical power. None of the included trials evaluated long-term recurrence of oral candidiasis or sustained suppression of *Candida* colonization beyond six months. Moreover, only one study evaluated oral health-related quality of life using OHIP-14, and none explored patient-centered outcomes such as treatment satisfaction or adherence in depth [13].

Overall, the findings of this review indicate that probiotics may have a supportive role in reducing oral *Candida* colonization and improving treatment tolerability in OLP patients, particularly when used as adjunctive therapy alongside topical corticosteroids. Their effects appear to be mediated through microbial modulation, antifungal activity, and immunological regulation rather than direct anti-lichenoid action. However, variability in strain-specific efficacy, treatment protocols, and outcome assessment methods currently limits direct comparison across studies and highlights the need for more standardized future investigations. [13–24].

CONCLUSION

The findings of this systematic review indicate that probiotic therapy, when used as monotherapy, does not consistently demonstrate superior clinical efficacy over placebo or conventional corticosteroid therapy in the management of oral lichen planus. However, the adjunctive use of probiotics in combination with topical corticosteroids may offer supportive benefits, particularly in reducing oral Candida colonization and improving patient-reported symptoms and treatment tolerability. Nevertheless, the current body of evidence is limited by methodological heterogeneity, small sample sizes, and low to moderate certainty of evidence. Therefore, definitive clinical recommendations regarding the routine use of probiotics in oral lichen planus cannot yet be established.

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