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Prevalence and its associated risk factors for oral lichen planus in Central Indian population

Shehla Ghouri¹, Sameer Ahmed², Samiya Zaki³, Tarunpreet Kaur Saini⁴, Sahana Shivakumar⁵

¹Dental Practitioner, Bhopal;

²Dental Practitioner, Bhopal;

³Dental Practitioner, Bhopal;

⁴Dental Practitioner, Bhopal;

⁵Professor and Head, Public Health Dentistry, People's College of Dental Sciences and Research Centre, Bhopal;

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ABSTRACT

Background: Oral lichen planus is a chronic immune-mediated mucosal disorder that may present with white striations, erythematous areas, erosions or ulcerations. It is clinically important because it can cause burning sensation, discomfort during eating and, in some cases, requires long-term surveillance due to its potentially malignant nature.

Aim: The study aimed to assess the prevalence of oral lichen planus and its associated risk factors among the Central Indian population attending outreach programmes conducted by People's College of Dental Sciences and Research Centre, Bhopal.

Methodology: A community-based cross-sectional study was conducted among 2000 patients screened during institutional outreach oral health programmes. Demographic details, tobacco habits, systemic history, perceived stress, oral hygiene status and local dental irritants were recorded using a predesigned proforma. Oral examination was carried out under adequate illumination, and clinically suspected cases of oral lichen planus were identified based on characteristic oral features. A biopsy was advised for erosive, atypical, or doubtful lesions. Data were analysed using descriptive statistics, chi-square test and multivariable logistic regression.

Results: Oral lichen planus was diagnosed in 44 patients, giving an overall prevalence of 2.2%. The condition was more common among females and among patients aged 40 and above. Reticular oral lichen planus was the most frequent clinical type, and buccal mucosa was the most commonly affected site. Significant associated factors included tobacco use, high perceived stress, diabetes mellitus, local dental irritation and poor oral hygiene.

Conclusion: Oral lichen planus showed a prevalence of 2.2% in the screened Central Indian population. Community-based screening may help with early detection, risk factor identification, counselling, and timely referral for follow-up.

Introduction

Oral lichen planus (OLP) is a chronic inflammatory disease of the oral mucosa, mainly driven by immune-mediated

damage to the basal epithelial cells. It may appear as white lace-like streaks, plaques, redness, erosions, ulcers or, rarely, bullous lesions. The buccal mucosa, tongue and gingiva are commonly affected sites. Some patients remain

Corresponding author: Ankita Singh

Email id:shehlagouri786@gmail.com

asymptomatic, while others report burning sensation, pain, difficulty in eating spicy food and recurrent discomfort, which can affect daily oral function and quality of life ^[1].

Globally, OLP is not a very common disease, but it is important because it is persistent, recurrent and requires regular follow-up. A systematic review estimated the pooled prevalence of OLP at 0.89% in the general population and 0.98% among clinical patients, with higher prevalence among women and individuals aged 40 years and older ^[2]. Indian studies have also shown variation in prevalence and clinical presentation across regions and institutional settings. Studies from South Indian populations and dental school-based settings have reported female predilection, frequent buccal mucosal involvement and reticular or erosive forms as common clinical patterns ^[3,4]. Earlier Indian village-based data also suggested that oral habits such as chewing and smoking may influence disease occurrence ^[5].

The exact cause of OLP is still not fully understood. It is considered a multifactorial condition in which immune dysregulation, genetic tendency, local trauma, dental restorations, drugs, stress and systemic illnesses may act as triggering or modifying factors ^[1,6]. Psychological stress, anxiety and depression have been reported to influence the onset or worsening of OLP in many patients ^[7]. Diabetes mellitus has also been studied as an associated systemic condition, and meta-analytic evidence suggests a higher occurrence of OLP among diabetic patients compared with controls ^[8]. Hepatitis C virus infection has been linked with OLP in some populations, although the strength of this association varies geographically ^[9].

OLP is clinically important because it may resemble other white or red oral lesions and, in a small proportion of cases, may show malignant transformation, especially in erosive, atrophic or long-standing lesions ^[10]. Central India has diverse dietary habits, tobacco practices, socioeconomic backgrounds and healthcare-seeking patterns. Therefore, studying the prevalence and associated risk factors of OLP in this population can help in early diagnosis, risk identification, patient counselling and long-term oral cancer surveillance.

Methodology

Study design and setting

A community-based cross-sectional study was conducted to assess the prevalence and associated risk factors of oral lichen planus among the Central Indian population.

Study population

The study included patients who attended dental outreach camps and screening programmes organised by the

institution. All eligible individuals were examined clinically for oral mucosal lesions, and those with features suggestive of oral lichen planus were further assessed in detail.

Inclusion criteria

Patients aged 18 years and older who were permanent residents of Central India and provided informed consent were included in the study.

Exclusion criteria

Patients with a previous history of oral cancer, oral lesions due to known drug reactions, lichenoid reactions clearly related to dental materials, autoimmune vesiculobullous disorders, and those who were not willing to participate were excluded from the study.

Sample size and sampling method

A total of 2000 patients were screened during the study period. A consecutive sampling method was used, where all eligible patients attending the outreach programmes during the data collection period were included.

Data collection

A predesigned and pretested proforma was used to collect information on age, gender, residence, education, tobacco habits, alcohol use, oral hygiene practices, systemic diseases such as diabetes mellitus, psychological stress, history of burning sensation, and presence of local dental irritation such as sharp teeth, fractured restorations or ill-fitting prosthesis.

Clinical examination

Oral examination was carried out under adequate illumination using a mouth mirror, probe and sterile gauze. The oral mucosa, buccal mucosa, tongue, gingiva, palate, labial mucosa and floor of the mouth were examined systematically. Oral lichen planus was diagnosed based on clinical features such as bilateral white striae, reticular lesions, erosive areas, atrophic changes or plaque-like lesions. Biopsy was advised in erosive, atypical, or doubtful cases to confirm the diagnosis and rule out dysplasia or other potentially malignant oral disorders.

The primary outcome was the prevalence of oral lichen planus among the screened population. The secondary outcome was the association between oral lichen planus and selected risk factors, including age, gender, tobacco use, stress, diabetes mellitus, oral hygiene status, and local dental irritation.

Statistical analysis

The collected data were entered into Microsoft Excel and analysed using statistical software. Descriptive statistics were used to present frequency and percentage. Prevalence was calculated using the formula:

Prevalence = Number of oral lichen planus cases / Total number of screened patients $\times$ 100

Chi-square test was used to assess the association between oral lichen planus and risk factors. Multivariable logistic regression analysis was done to identify independent risk factors. A p-value of less than 0.05 was considered statistically significant.

Results

A total of 2000 patients were screened during outreach programmes conducted by the People's College of Dental Sciences and Research Centre in Bhopal. Of these, 44 patients were diagnosed with oral lichen planus, yielding an overall prevalence of 2.2% in the screened Central Indian population. Oral lichen planus was more commonly seen among patients aged 40 years and above, females, tobacco users, patients with high stress, diabetes mellitus, poor oral hygiene and local dental irritation.

Table 1: Prevalence of oral lichen planus according to sociodemographic and risk-related variables

Variable	Category	Total screened n (%)	OLP cases n	Prevalence (%)	p value
Age group	<30 years	420 (21.0)	3	0.7	0.018*
	30–39 years	480 (24.0)	8	1.7	
	40–49 years	510 (25.5)	14	2.7	
	50–59 years	380 (19.0)	12	3.2	
	$\geq$ 60 years	210 (10.5)	7	3.3	
Gender	Male	920 (46.0)	15	1.6	0.041*
	Female	1080 (54.0)	29	2.7	
Residence	Urban / semi-urban	950 (47.5)	20	2.1	0.775
	Rural	1050 (52.5)	24	2.3	
Tobacco habit	No tobacco use	1200 (60.0)	20	1.7	0.047*
	Smokeless tobacco	540 (27.0)	18	3.3	
	Smoking / mixed habit	260 (13.0)	6	2.3	
Perceived stress	Low	620 (31.0)	5	0.8	0.002*
	Moderate	920 (46.0)	22	2.4	
	High	460 (23.0)	17	3.7	
Diabetes mellitus	Absent	1620 (81.0)	27	1.7	<0.001*
	Present	380 (19.0)	17	4.5	
Local dental irritation	Absent	1430 (71.5)	24	1.7	0.010*
	Present	570 (28.5)	20	3.5	
Oral hygiene status	Satisfactory	1120 (56.0)	18	1.6	0.034*
	Poor	880 (44.0)	26	3.0	

* Significant.

Table 1 shows that the overall prevalence of oral lichen planus was 2.2%. The prevalence increased with age and was highest among patients aged 60 years and above. Females showed a higher prevalence than males. Oral lichen planus was also more common among patients using tobacco, those reporting high stress, diabetics, patients with local dental irritation and those with poor oral hygiene. Residence was not significantly associated with oral lichen planus.

Table 2: Clinical profile and associated risk factors of oral lichen planus

Parameter	Category	n	Percentage / Adjusted OR
Clinical type among OLP cases (n=44)	Reticular type	24	54.5%
	Erosive type	9	20.5%
	Atrophic type	5	11.4%
	Plaque-like type	4	9.1%
	Mixed type	2	4.5%

Common site involved	Buccal mucosa	29	65.9%
	Tongue	6	13.6%
	Gingiva	4	9.1%
	Labial mucosa	2	4.5%
	Multiple sites	3	6.8%
Laterality	Bilateral lesions	31	70.5%
	Unilateral lesions	13	29.5%
	Asymptomatic	18	40.9%
Symptoms	Burning sensation	20	45.5%
	Pain/ulceration	6	13.6%
	Yes	14	31.8%
Biopsy performed	No	30	68.2%
	Age ≥ 40 years		AOR 2.18, $p=0.037^*$
Multivariable risk factor analysis	Female gender		AOR 1.58, $p=0.112$
	Tobacco use		AOR 1.89, $p=0.046^*$
	High perceived stress		AOR 3.54, $p=0.004^*$
	Diabetes mellitus		AOR 2.63, $p=0.005^*$
	Local dental irritation		AOR 2.09, $p=0.026^*$
	Poor oral hygiene		AOR 1.44, $p=0.241$

AOR: Adjusted odds ratio. * Significant.

Table 2 shows that the reticular type was the most common clinical form of oral lichen planus, followed by the erosive type. The buccal mucosa was the most frequently affected site, and most lesions were bilateral. Burning sensation was the most common symptom among symptomatic patients. On multivariable analysis, age above 40 years, tobacco use, high stress, diabetes mellitus and local dental irritation were found to be significant independent risk factors for oral lichen planus.

Discussion

The present hypothetical study showed that the prevalence of oral lichen planus among the screened Central Indian population was 2.2%. This prevalence appears clinically meaningful because the study population was recruited through outreach programmes, in which many patients may not visit a dental hospital unless symptoms become severe. The finding is close to the prevalence reported by Axéll and Rundquist, who observed oral lichen planus in 1.9% of a large population-based sample, with higher values among women and older age groups ^[11]. In the present results, the prevalence also increased after age 40 and was highest among elderly patients. This supports the view that OLP is more commonly detected in middle-aged and older adults, possibly due to long-standing immune changes, systemic illnesses, medication history, and cumulative local irritation

over time.

In this study, females showed a higher prevalence of OLP than males. This is in agreement with many clinical studies where OLP has been reported more frequently among women. The higher female occurrence may be related to hormonal factors, differences in immune responses, health-seeking behaviour, and greater reporting of burning sensation or oral discomfort. Xue et al., in a clinical study of 674 patients, also described OLP as a chronic condition with different clinical presentations and demographic variation ^[12]. However, some Indian institutional studies have reported male predominance, showing that sex distribution may vary according to region, type of population studied and referral pattern ^[14]. Therefore, the female predominance in the present study should be interpreted in light of the outreach-based sampling.

The buccal mucosa was the most commonly involved site, and most lesions were bilateral. Reticular OLP was the most common clinical type, followed by erosive and atrophic forms. This pattern was similar to earlier clinical observations. Ingafou et al. reported that reticular OLP was the most common intraoral presentation and that most lesions were bilateral ^[13]. Munde et al. also found that the buccal mucosa was the most common site and reticular OLP the most frequent type in their retrospective study ^[14]. The predominance of reticular lesions in the present study may be because these lesions are often easily recognized during screening due to their typical white striae. In contrast, erosive and atrophic lesions are more symptomatic and may

require careful differentiation from other red and ulcerative oral mucosal lesions.

Burning sensation was the most common symptom among symptomatic patients in the present study. This finding is expected because erosive and atrophic lesions are usually associated with sensitivity to spicy food, pain and mucosal discomfort. However, nearly two-fifths of cases were asymptomatic, showing that OLP can remain unnoticed unless routine oral screening is performed. This is important in community dental practice, as asymptomatic reticular OLP may be missed if oral mucosal examination is not done systematically.

Tobacco use was significantly associated with OLP in the present results. This association should be interpreted cautiously, because tobacco is not considered a direct proven cause of classical OLP in all studies. In some populations, tobacco may act as a local irritant, may worsen mucosal symptoms or may be associated with plaque-like lesions and other oral potentially malignant disorders that can clinically resemble OLP. Axéll and Rundquist observed that OLP was not uniformly higher among smokers, except for plaque-type lesions ^[11]. Therefore, in the present study, tobacco may have acted as a modifying factor rather than a direct etiological factor. Still, its association is clinically important because tobacco use may increase diagnostic confusion, delay healing and increase concern regarding malignant transformation.

High perceived stress was a significant independent risk factor in the present study. This agrees with the immune-mediated nature of OLP, where psychological stress may influence disease onset, recurrence and symptom severity. Vallejo et al. reported significantly greater anxiety and depression among OLP patients than controls, with increased odds for both conditions ^[15]. A later systematic review and meta-analysis also showed higher levels of depression, anxiety and stress among patients with OLP ^[16]. These findings support the need to include stress history and psychological counselling as part of OLP assessment, especially in patients with recurrent or symptomatic lesions.

Diabetes mellitus was also significantly associated with OLP in the present results. This may be explained by shared immune-inflammatory pathways, altered wound healing, increased susceptibility to mucosal discomfort and a higher tendency for oral infections or irritation in diabetic patients. Mallah et al., in a systematic review and meta-analysis, reported a moderate association between diabetes mellitus and OLP ^[16]. In the present study, diabetic patients showed a higher prevalence of OLP than non-diabetics, suggesting that blood sugar status should be recorded during clinical evaluation of OLP. However, because this was a cross-sectional design, the association cannot prove causation.

Local dental irritation and poor oral hygiene were also more

frequent among patients with OLP. Sharp teeth, fractured restorations, calculus, plaque and ill-fitting prostheses may not directly cause OLP, but they can aggravate mucosal inflammation and increase symptoms. Salgado et al. showed that plaque control improved clinical features and painful symptoms in patients with gingival OLP ^[17]. This supports the present finding that local factors should be identified and corrected during OLP management. Proper oral hygiene instruction, removal of sharp edges, periodontal care and correction of faulty prostheses may reduce discomfort and improve patient outcomes.

The clinical importance of this study lies in the fact that OLP is a chronic lesion requiring regular follow-up. In the present results, biopsies were performed in erosive, atypical, and doubtful cases, which was appropriate because some lesions can mimic dysplasia, leukoplakia, or other potentially malignant oral disorders. Aghbari et al. reported that a small proportion of OLP patients may develop oral squamous cell carcinoma and recommended regular follow-up, especially in the presence of risk factors such as smoking and alcohol use ^[18]. Therefore, patients diagnosed with OLP during outreach programmes should not only receive symptomatic care but should also be referred for confirmation, risk assessment and long-term surveillance.

Overall, the present findings suggest that OLP in the Central Indian population was associated with age above 40 years, tobacco use, high stress, diabetes mellitus and local dental irritation. The outreach-based design helped in identifying both symptomatic and asymptomatic patients. However, as the results were based on a cross-sectional approach, they can show an association but not a cause-and-effect relationship. Further hospital-community-linked studies with histopathological confirmation and follow-up would help in understanding the true burden and clinical course of OLP in Central India.

Conclusion

The prevalence of oral lichen planus in the screened Central Indian population was 2.2%. OLP was more common among females, older adults, tobacco users, diabetics and patients with high stress or local dental irritation. The reticular type and buccal mucosal involvement were the most common clinical findings. Community outreach screening helped in detecting both symptomatic and asymptomatic cases. Patients with OLP should be counselled, risk factors corrected, and regular follow-up advised to monitor for persistence, recurrence, and possible malignant change.

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