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Original research

# Clinical and demographic profile of oral lichen planus in Sri Lanka: a retrospective study

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**Purpose**
Several relatively large series from developed countries have extensively described the demographic and clinical characteristics of oral lichen planus (OLP). However, such descriptions from developing countries are rare. This study aimed to investigate the differences in these aspects within a cohort of Sri Lankan patients affected by OLP.

**Materials and Methods**
Cases diagnosed with OLP between 1999 and 2019 were retrieved. Demographic data, clinical presentation, main complaints, age, sex, lesion sites, and histological information, were collected from the database. Cases with lichenoid reactions and incomplete data were excluded. Instances with multiple biopsies were treated as single cases. Frequencies were compared using chi-square statistics.

**Results**
The database identified a total of 3734 cases. The male-to-female ratio was 1:1.6, indicating an overall female predominance. The youngest patient reported was 1 year and 2 months old, presenting with brownish pigmentations on the right side of the buccal mucosa. The highest number of cases were observed in the 41-50-year age group, followed by the 51-60-year age group. The most common clinical type was the reticular type, followed by atrophic and erosive types. 200 patients presented with blackish pigmentations in the oral mucosa, experiencing a burning sensation without evidence of the typical reticular background. The plaque type was more common on the dorsal surface of the tongue, showing a statistically significant association ($p<0.05$). Ninety cases exhibited dysplastic changes ranging from mild to moderate degrees, accounting for 2.4% of the total sample.

**Conclusion**
While the malignancy rate is not significantly high enough to reduce morbidity and mortality from cancer arising on OLP lesions, regular follow-up and examinations are recommended for early diagnosis of malignant transformation.

***Keywords:*** *Oral lichen planus, reticular, dysplasia, prevalence, pigmented lesion*

## Introduction

Oral lichen planus (OLP) is a chronic mucocutaneous disease with an immune-mediated pathogenesis. The etiopathogenesis of OLP remains incompletely understood. This disease is multifactorial, triggered by various agents, including dental materials, drugs, viruses like hepatitis C, liver dysfunction, and psychological stress (1). Primarily affecting the oral mucosa, OLP can also involve other mucosal sites, such as the vulvar, vaginal mucosae, skin, particularly the flexor surfaces of hands and legs, scalp leading to alopecia, and nails. The prevalence of OLP may vary from 0.5% to 2.2%. In the general population, the average rate is 0.89%, and among clinical patients, it is 0.98% (2,3). Typically manifesting a female predilection, OLP is commonly observed in the 4th to 6th decade of life.

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The oral mucosal lesions in OLP are usually bilateral but not necessarily symmetrical, commonly found in sites such as the buccal mucosa, tongue, and gingiva, often leading to desquamative gingivitis. With multiple clinical presentations, some are asymptomatic, while others cause a significant burning sensation and pain. Although around 17 different clinical types have been described in the skin, only 6 types are identified in the oral mucosa such as papular, reticular, erosive, plaque-like, atrophic, and bullous (4).

The most common is the reticular type, often asymptomatic and characterized by a white line on the buccal mucosa, known as "Wickham striae." The papular type is rare, mostly asymptomatic, with small white raised areas and occasional whitish fine striae. Plaque-type OLP can resemble oral leukoplakia, appearing as thick white patches on the buccal mucosa and dorsum of the tongue. Erosive, atrophic, and bullous types appear reddish and are symptomatic. Erosive OLP presents as inflamed, ulcerated areas, often mixed with a reticular pattern, causing severe pain. Atrophic OLP exhibits diffuse reddish lesions and may coexist with other subtypes, notably the reticular type. Bullous OLP begins with blisters that rupture, resulting in painful ulcerations (1). Different clinical forms might coexist or merge in the same patient (2). The clinical features, especially in the asymptomatic "classic" reticular form, may be adequate for diagnosis. However, as several conditions with similar clinical appearances exist, histopathological confirmation through biopsy, although the clinical evidence is evident, can be essential (2).

Considered a potentially malignant disorder with a very low transformation potential, OLP patients who smoke, consume alcohol, are seropositive for HCV, or present reddish types, carry a higher risk of malignant transformation (4-6). Multiple mucosal lesions clinically and histopathologically resembling OLP are termed "oral lichenoid" lesions (OLL). The main differentiating factor between OLP and OLL is the identification of the etiological agent in OLL. Lichenoid lesions can stem from dental materials, drugs, or other systemic diseases. Contact of oral mucosa with dental materials used for restorations, particularly amalgam, can cause oral lichenoid contact lesions (OLCL) due to contact allergic mucositis (delayed immune-mediated hypersensitivity). Oral lichenoid drug reactions (OLDR) are associated with specific medications such as angiotensin-converting enzyme inhibitors, nonsteroidal anti-inflammatory agents, and oral hypoglycemic agents. Lichenoid lesions are also seen in graft-versus-host disease (OLL-GVHD) (2). Several relatively large series from developed countries have extensively described the demographic and clinical characteristics of oral lichen planus (OLP). However, such descriptions from developing countries are rare. This study aimed to investigate the differences in these aspects within a cohort of Sri Lankan patients affected by OLP.

## Materials and Methods

*Ethical approval*

The study protocol received approval from the Sri Lanka Peradeniya University Ethics Committee (project no: ERC/FDS/UOP/2016/06).

*Database search criteria*

Cases diagnosed as OLP were retrieved from the Oral Pathology database spanning 1999-2019 at the Department of Oral Pathology, Faculty of Dental Sciences, University of Peradeniya, Sri Lanka. Demographic data, including clinical presentation, main complaints, age, sex, lesion sites, and histological information, were collected. Cases with lichenoid reactions and inadequate data were excluded, while instances with multiple biopsies were consolidated into single cases.

*Data classification*

The gathered data were entered into a Microsoft Excel worksheet and categorized based on age to identify frequency distribution, as well as site of occurrence (right buccal mucosa, left buccal mucosa, bilateral buccal mucosae, palate, tongue - ventral, dorsal, lateral - lips, and gingiva). Additionally, data were categorized according to clinical types, such as reticular, atrophic, erosive, bullous, and pigmented. Patients presenting with the aforementioned clinical types and a pigmented background were included. OLP, as defined by the WHO, falls under the category of an oral potentially malignant disorder (OPMD). Hence, histological reports were assessed to identify cases exhibiting dysplastic changes.

*Statistical analysis*

Chi-square tests were employed to determine associations. Different combinations of each variable were analyzed to identify statistically significant relationships. A confidence interval of 95% was set, with the significance level considered at $p<0.05$.

## Results

*Inclusion criteria and demographics*

A total of 3734 cases met the inclusion criteria, comprising 1441 males and 2293 females, resulting in a male-to-female ratio of 1:1.6, demonstrating an overall female predominance. Within the study population, nearly 90% were of Sinhalese ethnicity, while Tamils and Muslims each represented 5%, reflecting the country's ethnic distribution (Table 1). The overall average age was 45.98 years. However, there were marked age-specific variations across each category (Table 1). Gender distribution also showed variability across different age groups (Figure 1a and Figure 1b).

*Clinical presentation and types*

The chief complaint among the majority of cases was a burning sensation. Clinically, OLP manifested as reticular, atrophic, erosive, and bullous types. The youngest reported patient was a 1-year and 2-month-old baby with brownish pigmentations on the right-side buccal mucosa. The highest number of cases appeared in the 41-50 age group, followed by the 51-60 age group. When categorizing the total sample by clinical type, the worst presentation was considered. For instance, if a lesion displayed erosions/ulcers against a back-

**Table 1.** *Number of OLP cases distribution within different age groups.*

| Age group | Number of cases | M | F | Average number of cases per decade |
|---|---|---|---|---|
| 1-10 | 51 | 20 | 31 | 5 |
| 11-20 | 173 | 74 | 99 | 17.3 |
| 21-30 | 439 | 199 | 240 | 43.9 |
| 31-40 | 699 | 266 | 433 | 69.9 |
| 41-50 | 861 | 311 | 550 | 86.1 |
| 51-60 | 798 | 271 | 527 | 79.8 |
| 61-70 | 524 | 209 | 315 | 52.4 |
| 71-80 | 163 | 80 | 83 | 16.3 |
| 81-90 | 26 | 11 | 15 | 2.6 |

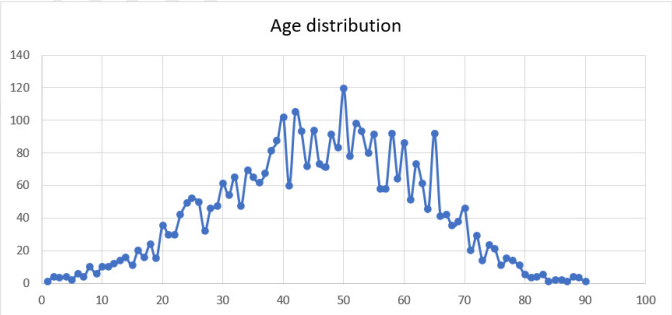


***Figure 1a.*** *Age distribution among the total sample.*

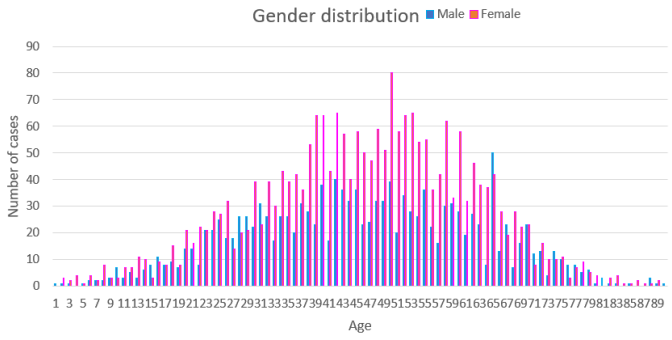


***Figure 1b.*** *Gender distribution within the test group.*

ground of reticular areas, it was classified as an erosive type. The most common type observed was the reticular type, followed by atrophic and erosive types. Notably, 200 patients presented with blackish pigmentations in the oral mucosa and a burning sensation, devoid of the typical reticular background (Figure 2a). It's intriguing to note the association of various clinical presentations with pigmentation (Figure 2b).

*Distribution and association*

Bilateral buccal mucosae harbored 42.7% of OLP cases (1595 cases), while the least common site was the palate (Figure 3). Moreover, the plaque type predominantly occurred on the dorsal surface of the tongue (Fig 4). A statistically significant association ($p<0.001$) was observed between the distribution of OLP types and the site of the tongue (Table 2). Figure 5a to Figure 5d illustrated typical clinical appearances of different OLP types.

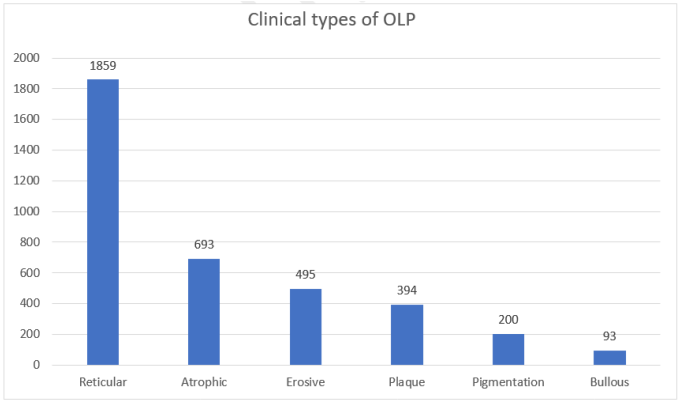


***Figure 2a.*** *Clinical presentation of OLP of the study sample.*

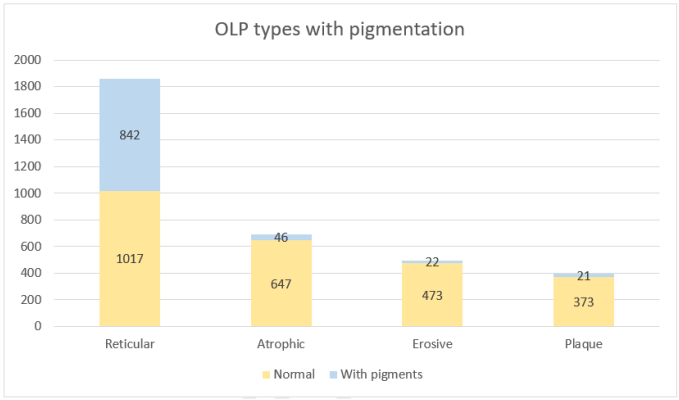


***Figure 2b.*** *OLP cases that showed blackish pigmentation*

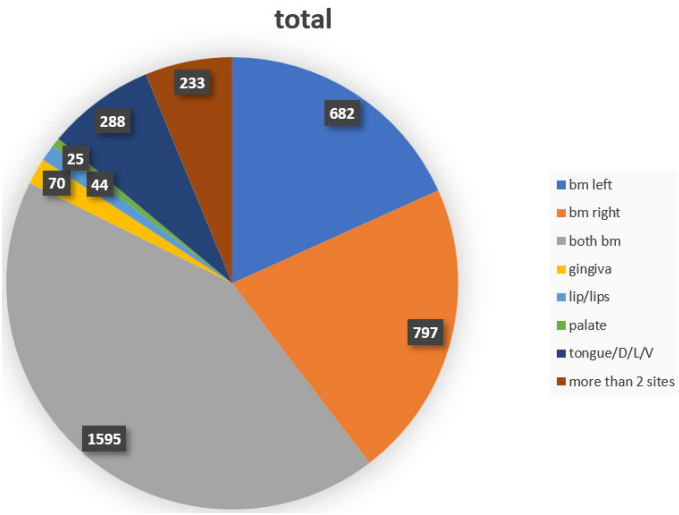


***Figure 3.*** *Site distribution of the OLP cases.*

*Reticular OLP*

The most common clinical type observed was the reticular type, constituting 49.8% of the total sample. Among these cases, 842 exhibited reticular lesions against a background of blackish/brownish pigmentation. The primary site affected by reticular lesions was the buccal mucosa, with the majority presenting bilateral lesions (54.2%). The right side of the buccal mucosa was more frequently affected, followed by the left side and the tongue, with 303, 342, and 62 cases respectively. A similar trend was observed when analyzing cases with pigmentation and those without as separate categories.

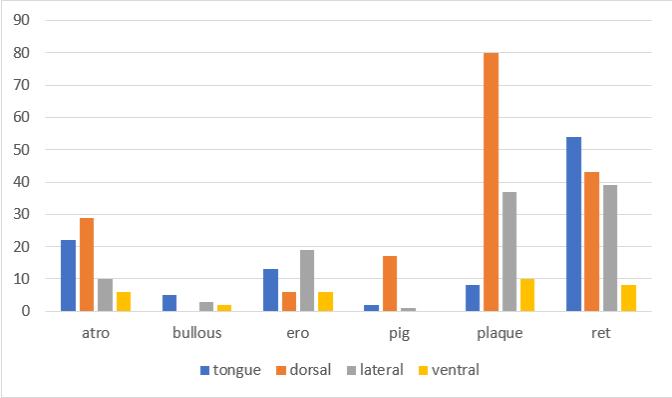


***Figure 4.*** *Distribution of differenet types of OLP that occurred in the tongue.*

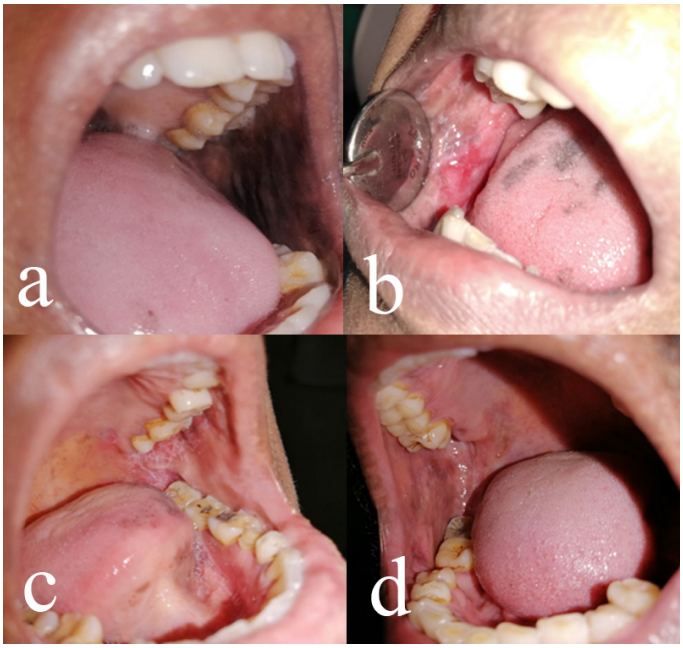


***Figure 5.*** *Types of OLP, (a) pigmented, (b) erosive with pigmentation, (c) typical reticular OLP, (d) athrophic OLP with pigmentation.*

**Table 2.** *The heat map presentation of the OLP distribution in the tongue. The chi-square statistic : 80.5769. p-value < 0.001.*

| | atrophic | bullous | erosive | pigmented | plaque | reticular |
|---|---|---|---|---|---|---|
| tongue | 22 | 5 | 13 | 2 | 8 | 54 |
| dorsal | 29 | 0 | 6 | 17 | 80 | 43 |
| lateral | 10 | 3 | 19 | 1 | 37 | 39 |
| ventral | 6 | 2 | 6 | 0 | 10 | 8 |

*Atrophic OLP*

Lesions characterized by erythematous areas within a background of white radiating striae at the periphery, accompanied by a burning sensation, are classified as the atrophic type. In this study, the atrophic type constituted 18.6% (693 cases), commonly affecting bilateral mucosa as the most prevalent presentation (43.7%). Among the total atrophic cases, 6.6% displayed a pigmented background (46 cases). Specifically, 152 cases were observed on the right-side buccal mucosa, and 130 on the left side. Additionally, 12.4% of cases were reported on the tongue, predominantly on the dorsal surface (24 out of 54).

*Erosive OLP*

Atrophic, erosive, or ulcerative types are situated within the same spectrum. In this study, ulcerative lesions were categorized as the erosive type, with most displaying a reticular background, some of which exhibited pigmentation (4.4%). Among the total sample, 13.3% were classified as the erosive type, frequently affecting, akin to the other mentioned types, bilateral buccal mucosae (158 cases), followed by the right and left buccal mucosae. A few cases were presented with a pigmented background (4.4%).

*Pigmentation associated with OLP*

An important observation in this study was the presence of pigmentation in OLP, distinct from the typical reticular white striated background. Out of the total sample, 200 cases (5.4%) purely exhibited patchy blackish pigmentation, predominantly affecting the buccal mucosa. Intriguingly, 85% of the 20 cases related to the tongue were located on its dorsal surface. Additionally, affected sites included the gingiva, lips, and palate. While literature suggests that pigmentation might be due to aging or multiple episodes of OLP, this series noted pigmented lesions without the typical OLP background in both the youngest child and the oldest individual.

*Bullous OLP*

Clinically, bullous OLP presents with ulcers covered by a fibrin coat, surrounded by an erythematous zone with radiating white striae. Distinguishing between erosive and bullous types is crucial. In this study, 2.5% of cases were of the bullous type, most of which were histologically confirmed to have epithelial separation from the underlying corium. No associated pigmented areas were reported in this OLP subset. The most common site was the buccal mucosa (bilateral - 21.5%, right - 17.2%, left - 11.8%), followed by the gingiva (19.4%).

*Plaque OLP*

In the total sample, 10.5% (394 cases) presented as well-demarcated homogenous white plaques, often with a reticular pattern. The tongue was the most common site, with 118 cases. 5.3% of these cases were associated with pigmentation. Notably, 65.5% of tongue lesions (74 cases) resembled leukoplakia lesions, primarily on the dorsal surface, followed by the lateral border of the tongue (32 cases). Only 34 cases were bilateral lesions.

*Intra oral sites*

A significant majority (82.3%) of cases occurred on the buccal mucosa, either bilaterally or on a single side (Figure 3). Bi-

lateral presentation accounted for 42.7% of the total sample. Involvement of the buccal mucosa with other sites was observed in 233 cases (6.2%). The distribution of different types of OLP on the tongue is detailed in Table 3 as a heat map and Figure 4, showing highly significant results ($p<0.001$).

*OLP as and OPMD*

Notably, 132 cases were reported with associated dysplastic changes or candida superinfection. Within this group, OLP cases with a background of oral submucous fibrosis (OSF) were also noted. Ages ranged from 24 to 82 years, with a mean age of 52 years. OSF, recognized as an OPMD, was reported in 6 cases, and all clinical types except the reticular type were observed. Candidal superinfection partly exacerbated the burning sensation, evident in 42 cases. Of these, 90 cases exhibited dysplastic changes ranging from mild to moderate degree (2.4% of the total sample). Mild dysplasia was predominant, observed in 47 cases of the reticular type, 19 cases of the atrophic type, 11 cases of the erosive type, and 10 cases of the plaque type. Moderate dysplasia was reported in 2 cases of the plaque type and 1 case of the reticular type. There was a male predominance in cases showing dysplastic changes, contrary to conventional OLP, with 42 cases in females and 48 in males.

## Discussion

In several relatively large series from developed countries, the clinical characteristics and demography of OLP have been well-described. However, such series from developing countries are rare and a possible reason for this may be the lower prevalence of OLP in Asian countries than in other countries (3). Therefore, this retrospective study was carried out with the aim to highlight the differences in these aspects in a cohort of Sri Lankan group of patients affected with OLP.

A study by Lauritano *et al.* (7) reports that OLP is a disease of elderly with a slight female predilection in 5th and 6th decades of life (2-7). The present study also confirms these results with many of patients belonging to the age group of 41-50 years (mean age 45.98 years) followed by 51-60 years. However, a study from India has reported a prevalence in 3rd decade of life with a mean age of 36.9 years (8) which is comparatively lower than mean ages reported from several other studies (9-11). The OLP prevalence in the elder population may be due to long-standing oral habits, lack of attention to oral hygiene, the age-related changes, decreased immunity, associated metabolic changes during aging, medication use, nutritional deficiencies, or denture wear (2-12). The occurrence of OLP in the paediatric population is extremely rare, with a prevalence of < 2-3% and the youngest patient reported in this study, was one year and two months old (13). The general acceptance is that the prevalence of OLP is higher in females than in males which is also evident in this present study as well. Fluctuating levels of oestrogen and progesterone in females could be the possible reasons especially during menstruation or menopause. However, Munde *et al.*(8), reported a male preponderance with a male to female ratio of 1.61:1.

As previously mentioned, even though the involvement of multiple oral sites is common in OLP, the lesions will typically and most commonly present in the bilateral, buccal mucosa in a symmetrical manner, followed by the gingiva and the tongue (8). In the Sri Lankan context, the involvement of bilateral buccal mucosae was observed 42.7% of OLP cases, while the palate was noted to be the least commonly affected site.

Many authors have described various clinical variants in the literature (14-16), however, the most common type found in this study was the reticular type, which was in par with the literature (3,10,11). Dark brownish pigments which are associated with OLP is frequently noted. A report by Cawson and Odell (17) indicated that the degenerative changes in basal keratinocytes frequently led to pigmentary incontinence. The melanin in pigment is ingested by macrophages in the superficial corium, resulting in a brownish-pigmented area in the mucosa, which can persist long after the OLP has resolved (17). However, various hypothesis has been reported in the literature regarding the hyperpigmentation associated with the OLP. A study proposed that the mechanism of hyperpigmentation is related to the GABA imbalance that occurs during stress and anxiety. They further indicated that 96.97% of patients having anxiety disorders showed OLP associated with hyperpigmentation. The imbalance of these patients might be passed through the cranial nerve, which stimulates the production of melanocytes, leading in large amount of melanin deposition in OLP (18). While Chitturi *et al.* (19) suggested that hyperpigmentation could be due to the results of inflammation in recurrence of flare-up and healing, which was mostly found in the chronic reticular form of OLP. In this present study almost, all types were associated with pigmentation and about 5.4% of cases were pigmented without reticular white striated background. Therefore, more studies are required to study further regarding the pigmentation associated with the OLP. It has been also suggested that the cytokines released by the band of lymphocytes stimulate the melanocytes (20). The exact mechanism of hyperpigmentation in OLP remains unclear, and needs further studies, to evaluate by means of immunohistochemistry or molecular biological techniques, in the occurrence of hyperpigmentation in OLP. Unfortunately, a main limitation of this study is that we could not exactly determine the mechanism of hyperpigmentation in our cases due to unavailability of details from the history.

In routine practice, evidence of dysplasia in a given lesion shows the cancer risk in OPMDs. However, the general acceptance of epithelial dysplasia as an accompanying histologic feature in OLP is subject to great controversy. Presence of dysplasia is considered by many pathologists as a criterion to exclude OLP when routinely reporting on OLP. The spreading of this practice among oral pathologists, has led to underestimate the malignant potential of OLP. In this present case 2.4 % of the patients demonstrated epithelial dysplasia. Therefore, OLP should be followed-up for a longer time, and should be investigated by a biopsy aiming to assess any dysplastic changes in the epithelium (21). Two cases of malignant transformation within Sri Lankan patients were also reported in the Sri Lankan literature (22).

## Conclusion

Up-to-date OLP is considered as a potentially malignant disorder by the WHO. Malignancy rate is very low with lower morbidity and mortality that are arising from OLP. However, regular follow-up is recommended for early diagnosis of malignant transformation. Further, we recommend further studies in order to resolve the controversies in the hyperpigmentation and presence of dysplasia in relation to OLP.

***Türkçe özet:*** *Sri Lanka'da oral liken planusun klinik ve demografik profili: retrospektif bir çalışma. Amaç: Gelişmiş ülkelerdeki nispeten geniş birkaç seride oral liken planusun (OLP) demografik ve klinik özelliklerini kapsamlı bir şekilde tanımlanmıştır. Ancak gelişmekte olan ülkelerde yapılmış bu tür çalışmalar oldukça enderdir. Bu çalışma, OLP'den etkilenen Sri Lankalı hastalardan oluşan bir kohortun özelliklerini incelemeyi amaçlamıştır. Gereç ve Yöntem: 1999-2019 yılları arasında OLP tanısı alan olgulara ulaşıldı. Veritabanından demografik veriler, klinik görünüm, ana şikayetler, yaş, cinsiyet, lezyon bölgeleri ve histolojik bilgiler toplandı. Likenoid reaksiyonları olan ve eksik verileri olan vakalar hariç tutuldu. Çoklu biyopsi vakaları tek vaka olarak değerlendirildi. Sıklıklar ki-kare istatistikleri kullanılarak karşılaştırıldı. Bulgular: Veritabanında toplam 3734 vaka tespit edildi. Erkek-kadın oranı 1:1.6 olduğundan genel olarak kadın hastalarda daha sık rastlanan bir durum olarak belirlendi. Bildirilen en genç hasta 1 yıl 2 aylıktı ve yanak mukozasının sağ tarafında kahverengimsi pigmentasyonları bulunmaktaydı. En fazla vaka 41-50 yaş grubunda görüldü, bunu 51-60 yaş grubu takip etti. En sık görülen klinik tip retiküler tip olup bunu atrofik ve eroziv tipler izlemekteydi. 200 hasta oral mukozada siyahımsı pigmentasyonlarla başvurdu ve tipik retiküler arka plan belirtisi olmaksızın yanma hissi yaşadığını belirtti. Plak tipinin dilin dorsal yüzeyinde daha yaygın olduğu ve istatistiksel olarak anlamlı bir ilişki gösterdiği görüldü (p<0,05). Doksan vakada hafiften orta dereceye kadar değişen displastik değişiklikler görüldü ve bu toplam hastaların %2,4'ünü oluşturdu. Sonuç: Malignite oranı, OLP lezyonlarından köken alan kanserden kaynaklanan morbidite ve mortaliteyi azaltacak kadar anlamlı düzeyde yüksek olmasa da, malign dönüşümün erken tanısı için düzenli takip ve muayeneler önerilmelidir. Anahtar kelimeler: Oral liken planus, retiküler, displazi, prevalans, pigmente lezyon*

**Ethics Committee Approval**: The study protocol was approved by the Sri Lanka Peradeniya University Ethics Committee (project no: ERC /FDS /UOP /2016/06)

**Informed Consent:** Participants provided informed constent.

**Peer-review:** Externally peer-reviewed.

**Author contributions:** SS, KH, RJ participated in designing the study. SS, KH, RJ participated in generating the data for the study. SS, KH, RJ participated in gathering the data for the study. SS, KH participated in the analysis of the data. SS wrote the majority of the original draft of the paper. SS, KH, RJ participated in writing the paper. SS, KH, RJ has had access to all of the raw data of the study. SS, KH, RJ has reviewed the pertinent raw data on which the results and conclusions of this study are based. SS, KH, RJ have approved the final version of this paper. SS, KH, RJ guarantees that all individuals who meet the Journal's authorship criteria are included as authors of this paper.

**Conflict of Interest:** The authors declared that they have no conflict of interest.

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