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## ORIGINAL ARTICLE

# Oral lichen planus: a retrospective study of 690 British patients

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**OBJECTIVE: This is the largest UK patient group with oral lichen planus (OLP) to be studied in terms of the demographic and clinical characteristics.**

**MATERIAL AND METHODS: Data were taken from the medical records of 690 consecutive patients referred to Oral Medicine subsequently found to have clinical, and usually histopathological confirmatory features of OLP. Over two-thirds (68.7%) of the patients were Caucasians.**

**RESULTS: Eighty-two per cent of the patients had been referred to a specialist Oral Medicine service by general dental practitioners, 62% of the patients being referred as a consequence of oral mucosal and/or gingival pain. Reticular OLP was the most common intra-oral presentation, but 60% of such lesions were accompanied by other clinical types of OLP. 95% of lesions were bilateral. About 13% of patients reported symptoms or signs, or had a known history of lichen planus or possible lichen planus affecting non-oral epithelia. In only 13% of patients did all signs and symptoms of OLP resolve within 12–246 months (median 35 months). A malignant transformation rate of 1.9% was observed in the present group.**

**CONCLUSION: Oral lichen planus in UK persons almost always gives rise to bilateral reticular OLP, rarely resolves spontaneously, and has a low rate of malignant transformation.**

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**Keywords:** lichen planus; oral

## Introduction

Oral lichen planus (OLP) is a relatively common mucocutaneous disorder of middle aged and elderly persons, which seems to represent a spectrum of conditions that share a common background with clinical presentations ranging from mild painless white keratotic lesions to painful erosions and ulceration (Scully *et al*, 1998; Dissemond, 2004).

To date, most of the more detailed epidemiological and clinical studies of OLP have been undertaken in the United States and Scandinavia (Andreasen, 1968; Kovesi and Banoczy, 1973; Neumann-Jensen *et al*, 1977; Silverman *et al*, 1985, 1991; Axell and Rundquist, 1987; Thorn *et al*, 1988; Eisen, 2002) while studies on possible disease associations and immunopathogenesis have often been on UK and other European patients (Carrozzo *et al*, 1996, 2004; Porter *et al*, 1997; Lodi *et al*, 2000; Pilli *et al*, 2002; OFlatharta *et al*, 2003). Furthermore, some of the earlier studies of the demographic and clinical presentations of OLP included only relatively small numbers of patients.

The aim of this study was to undertake a retrospective examination of the general features and clinical presentation of a large cohort of patients in the UK with OLP.

## Material and methods

*Patient group*

The study group comprised 690 patients referred to one group of Oral Medicine specialists in London, England. All patients were interviewed with regard to chief symptoms, history of current illness, medical history, history of medications and dental history. Histopathological and blood studies were taken as indicated by the history and clinical examination. All patients were subsequently found to have clinical, and usually histopathological features, of OLP (Odell and Morgan, 1998; Scully *et al*, 1998). The patients had also been clinically monitored for at least 3 months after diagnosis of their OLP. The case records of all 690 patients were reviewed, and relevant retrospective data extracted systematically. The majority of case files contained the necessary data for analysis.

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*Clinical diagnostic criteria for oral lichen planus*
It is appreciated that different diagnostic criteria may have been applied over time due to increased knowledge and changing diagnostic criteria. However, the diagnosis has been given more consistency as most patients in this study were diagnosed by two clinicians experienced in the field of oral diseases (CS and SRP). Clinicians when diagnosing OLP were recording:

1 The presence of keratotic, pinhead sized, white, slightly elevated papules (papular lichen planus), which may be discrete or arranged in reticular (reticular lichen planus) or plaque-like (plaque like lichen planus) configurations (Scully *et al*, 1998).
2 Atrophic (erosive) lichen planus when there was a thinning of epithelium leading to the appearance of atrophic red areas within the white lesions (Sklavounou and Laskaris, 1983). These lesions when involving gingiva gave rise to desquamative gingivitis.
3 Ulcerative lichen planus when there were areas of well-defined ulceration within the above-mentioned lesions (Scully *et al*, 1998).
4 Bullous lichen planus when there was a presence or development of bullous areas within the above-mentioned lesions (Andreasen, 1968; Scully *et al*, 1998).
5 Lichenoid lesions; lesions clinically similar to classical lichen planus lesions, yet difficult to fit into any subtype of classical lichen planus, due to an atypical clinical presentation such as a lack of symmetry or where lesions were in proximity to dental restorations materials or were possibly attributable to drug use.

*Data analysis*
The case records of all 690 patients were reviewed, and relevant retrospective data extracted and recorded on a clinical epidemiological statistical package (Epi Info version 6) of the Centers for Disease Control and Prevention (Atlanta, GA, USA). This included a review of the social, family and medical histories of patients. Descriptive statistical analysis was used to summarize the demographic and clinical features of the study group.

## Results

*Patient gender*
Four hundred and thirty-nine patients (63.6%) were female, and 251 (36.4%) male, giving a female to male ratio of 1.75:1 (Figure 1). There were no readily apparent differences in the medical status or ethnicity between the two genders (chi-square analysis).

*Ethnic origin*
The majority (68.7%) of affected patients were Caucasian. Fifteen per cent had ethnic origins from the Indian subcontinent. Almost 8% of patients of known ethnic origin were blacks of African or Caribbean origin, Chinese or from the Mediterranean region. The ethnic groupings of 51 (7.4%) patients were not recorded.

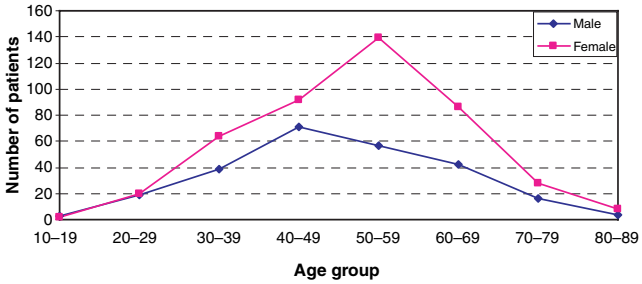


**Figure 1** Age and gender of 651 patients with oral lichen planus

*Maternal, parental and employment status*
The employment status of the patients was grouped according to the criteria of the Central Statistical Office Social Trends (Anonymous, 1985). Retired persons with unknown preretirement occupation and those who were unemployed were classified separately.

There was an unequal distribution of the patients across the socio-economic groups ranging from 2.3% of patients being employers or managers to 20% being semi-skilled manuals. Unsurprisingly a considerable number of patients (15%) were retired (Table 1).

Fifty-four per cent of the patients were married or living with a partner, 5.4% were divorced or separated, 7.8% were widowed and 10% were single. Almost 70% of patients had children (38% had two children, 23% had one, 23% had three and less than 4% had four or more).

*Age of onset of oral lichen planus*
The median age of likely onset of symptoms or signs of OLP, as determined from patient interview, was 52 years (53 years for females, and 48 years for males) with a range of 16–83 years. The majority of patients had an onset of disease in the fifth to sixth decade; less than 1% having developed OLP when under 20 years of age. There was a tendency of all types of OLP to peak in male patients at an earlier age than female patients.

*Source of referral of patients with oral lichen planus*
About 82% of the patients had been referred to Oral Medicine specialists by their general dental practitioners, 13.4% of these patients not being aware of the

**Table 1** Employment status of UK persons with oral lichen planus

| | *Patients* | |
|---|---|---|
| *Employment* | *n* | *% of total* |
| Unclassified | 172 | 24.9 |
| Semi-skilled manual | 138 | 20.0 |
| Retired | 106 | 15.4 |
| Unskilled manual | 82 | 11.9 |
| Intermediate and junior non-manuals | 62 | 9.0 |
| Skilled manual | 52 | 7.5 |
| Unemployed | 32 | 4.6 |
| Professional | 30 | 4.3 |
| Employers and managers | 16 | 2.3 |
| Total | 690 | 100.0 |

presence of any intraoral lesions, these being discovered by the attending dentist during routine oral examination. Seventy-five patients (10.9%) were referred from other dental specialities. Twenty-nine (4.2%) were referred by their general medical practitioners, and 14 (2%) by dermatologists. Only eight (1.2%) patients referred themselves to the clinic.

*Chief symptoms associated with oral lichen planus*

Oral soreness was the chief symptom in 431 (62.5%) patients; the buccal mucosa, tongue and gingiva were the main sites of discomfort (Table 2). Twenty-seven per cent of patients had asymptomatic oral white patches: 76 (11%) patients had these discovered by referring clinicians on routine oral examination and 113 (16.4%) patients had self-reported painless white patches. Fifty-nine patients (8.6%) complained of roughness of the mucosal surfaces. Eleven (1.6%) patients reported gingival soreness and bleeding as their chief oral complaint.

Just over 65% of patients had had some relevant oral complaints for $<12$ months prior to attendance in the Oral Medicine unit, a further 14% had had oral problems for up to 24 months, and about 7% of patients had had relevant oral complaints for over 60 months. The symptoms of some of these patients had supposedly been controlled by treatment provided by their attending clinicians for many years before being referred for more specialized care.

**Table 2** Chief complaints of 690 patients with oral lichen planus at time of initial clinical presentation

| *Chief oral complaint* | *n* | *%* |
|---|---|---|
| Oral discomfort and soreness | 431 | 62.5 |
| Symptomless white oral mucosal patches | 113 | 16.4 |
| Nil of note[a] | 76 | 11.0 |
| Mucosal roughness | 59 | 8.5 |
| Gingival soreness and bleeding | 11 | 1.6 |
| Total | 690 | 100.0 |

[a]Dentists discovered asymptomatic intraoral lesions.

*Clinical types of oral lichen planus*

Almost 95% of patients had a bilaterally symmetrical distribution of oral lesions. Reticular lesions were the most common predominant type of OLP, being present in 651 (94.3%) patients: 60% of these lesions were present in combination with other types of OLP. Erosive (atrophic) lichen planus was the next most common type, occurring in almost 37% of patients. Plaque-like OLP was seen in 32% and papular OLP in 11%. Bullous (4%) and ulcerative (2.3%) OLP were the most uncommon types of observed OLP.

Four hundred and nine (59.3%) patients had more than one type of OLP lesion at the time of initial examination: 268 (38.8%) had two types, 133 (19.3%) had three types, and eight (1.2%) had more than three types of OLP lesions. The frequency of the different types of OLP lesions was not influenced by patient gender or age.

The buccal mucosae were the most common sites affected by all types of OLP, followed by the lateral borders of tongue and gingivae. There were no readily apparent significant associations between the site and type of OLP (Table 3).

Confirmatory histopathological examination of an incisional biopsy was performed in 546 (79%) patients, and revealed the features of either classical lichen planus or lichenoid reaction (Odell and Morgan, 1998). Direct immunofluorescence studies in 161 patients showed fibrin deposition at the epithelial basement membrane zone and in colloid bodies in all.

*Natural history and complications*

In most patients, the lesions persisted throughout the period of observation. Eighty-five (13%) patients had complete resolution of both symptoms and signs within 12–246 months (median 35 months). Thirteen (1.9%) patients (eight males, five females, median group age 65) developed an oral malignancy, 12 squamous cell carcinoma and one carcinoma *in situ* with a median time from initial presentation until malignant development of 7 years. Malignant transformation occurred in 10 patients with erosive OLP and in three patients with plaque-like OLP.

**Table 3** Distribution of different types of oral lichen planus

| *Site* | *Reticular (n = 651) n %** | *Plaque-like (n = 225) n %* | *Papular (n = 78) n %* | *Atrophic (n = 256) n %* | *Ulcerative (n = 16) n %* | *Bullous (n = 27) n %* |
|---|---|---|---|---|---|---|
| Alveolar ridge | 106 (16.3) | 19(8.4) | 6 (7.7) | 6 (2.3) | 0 (0.0) | 0 (0.0) |
| Buccal | 622 (95.5) | 150 (66.7) | 55 (70.5) | 206 (80.5) | 11 (68.8) | 21 (77.8) |
| Buccal vestibule | 28 (4.3) | 2 (0.9) | 1 (1.3) | 10 (3.9) | 1 (6.3) | 3 (11.1) |
| Dorsum of tongue | 100 (15.4) | 50 (22.2) | 2 (2.6) | 37 (14.5) | 1 (6.3) | 2 (7.4) |
| Floor of the mouth | 19 (2.9) | 5 (2.2) | 0 (0.0) | 4 (1.6) | 0 (0.0) | 0 (0.0) |
| Gingiva | 85 (13.1) | 16 (7.1) | 2 (2.6) | 39 (15.2) | 3 (18.8) | 0 (0.0) |
| Lateral border of tongue | 184 (28.3) | 83 (36.9) | 8 (10.3) | 69 (27.0) | 1 (6.3) | 9 (33.3) |
| Lower labial | 39 (6.0) | 5 (2.2) | 1 (1.3) | 14 (5.5) | 1 (6.3) | 0 (0.0) |
| Palatal | 30 (4.6) | 10 (4.4) | 1 (1.3) | 18 (7.0) | 1 (6.3) | 6 (22.2) |
| Upper labial | 39 (6.0) | 4 (1.8) | 0 (0.0) | 13 (5.1) | 1 (6.3) | 1 (3.7) |
| Ventral surface of tongue | 21 (3.2) | 17 (7.6) | 1 (1.3) | 16 (6.3) | 0 (0.0) | 1 (3.7) |

*% of subgroup

*Non-oral lichen planus lesions*

Eighty-five patients (12.6% of total study group; 56 females, median age 52 years, age range 24–81 years) had symptoms of possible non-oral mucocutaneous LP, or a history of specialist-diagnosed lichen planus affecting the skin or non-oral mucous membranes. The age and gender distribution of the OLP patients with these lesions did not differ from those of patients without extraoral involvement. The majority of the patients with non-oral disease developed mucocutaneous lichen planus following the onset of their oral disease, only 10 patients had possible or proven non-oral skin lesions of LP prior to the onset of OLP. No patient had simultaneous development of both oral and extraoral mucocutaneous lesions. Eleven (12.9%) patients with possible or probable non-oral mucocutaneous lesions had LP of the genitalia, nine of whom were female.

## Discussion

In general, the results of the present UK study of OLP confirm observations from previous studies in the USA, Europe, Scandinavia, South America and China (Andreasen, 1968; Kovesi and Banoczy, 1973; Neumann-Jensen *et al*, 1977; Silverman *et al*, 1985, 1991; Axell and Rundquist, 1987; Thorn *et al*, 1988; Eisen, 2002; Machado *et al*, 2004; Xue *et al*, 2005). In agreement with studies of other predominantly Caucasian patient groups, the OLP of the present group of patients seemed to develop in middle to late life, but perhaps surprisingly could arise in adults as young as 16 years. However, no child was observed in this group, perhaps reflecting the rarity of OLP in childhood (Cottoni *et al*, 1993; Scully *et al*, 1994). In agreement with other similar studies, OLP developed at similar ages in both genders, although there was a tendency for all types of OLP to occur in male patients at an earlier age than in females. The precise reasons for this are unknown and are probably not of clinical or aetiological significance. OLP has previously been reported to be more frequent in females than in males (Scully *et al*, 1998). The same finding was shown by the present study; however, some epidemiological population studies have shown that men and women are affected almost equally (Pindborg *et al*, 1972; Bouquot and Gorlin, 1986).

In the present study OLP was reported in patients of different ethnic backgrounds, in agreement with results of population studies (Sigurgeirsson and Lindelof, 1991) that suggest that OLP affects all racial groups. Although not detailed in the present study, there were no significant differences in the demographical or clinical features between patients of different ethnic backgrounds. Results of previous European studies suggested that up to 2.4% of Caucasians may have lichen planus (Axell and Rundquist, 1987; Hogewind and van der waal, 1988; Banoczy and Rigo, 1991; Albrecht *et al*, 1992) while rates of 0.02–1.5% have been reported in studies of Indian patients (Pindborg *et al*, 1972).

Though there are little data on the socio-economic status of patients with OLP, the present study had insufficient data to examine the employment status of many of the patients. Of note, few of the patients with OLP were either professional or unemployed, the majority being manual workers or retired. None of the present group of patients reported that they had family members with a history of OLP. While this does not provide definitive insight into a genetic basis of OLP, there is no evidence to indicate that OLP commonly has a strong genetic aetiopathogenesis (Porter *et al*, 1997; Scully *et al*, 1998). Cytokine polymorphism (e.g. interferon-gamma) may influence the risk of developing OLP (Carrozzo *et al*, 2004); however, it would be most unlikely for patients to have a strong familial history of OLP (Singal, 2005). It is doubtful if the maternal or parental status in any way influenced the development of OLP of the present group of patients.

The majority of the present group of patients reported some degree of oral discomfort, which was typically generalized, but, as in other studies (Gorsky *et al*, 1996) patients with non-erosive or non-ulcerative OLP often still complained of oral discomfort. Indeed over 60% of the present group of patients with reticular OLP had some degree of oral soreness. Patients usually had had oral symptoms several months prior to referral.

As with studies of other cohorts of patients with OLP (Andreasen, 1968; Kovesi and Banoczy, 1973; Neumann-Jensen *et al*, 1977; Silverman *et al*, 1985, 1991; Axell and Rundquist, 1987; Thorn *et al*, 1988; Eisen, 2002; Machado *et al*, 2004; Xue *et al*, 2005), reticular observed and atrophic-erosive forms were the most common types in the present study, but only 2.3% of the patients had ulcerative lesions. In this study the lesions were only considered ulcerative when there was frank oral ulceration, whereas the lesions were considered atrophic-erosive when they were red atrophic with superficial erosions but no ulceration. It is evident that the majority of patients could have more than one type of OLP, often there being combinations of both white and atrophic-erosive lesions (Silverman *et al*, 1985), hence it would not be unexpected for a patient with predominantly non-erosive or ulcerative disease to have painful oral mucosal or gingival symptoms.

The lesions of OLP were typically symmetrical and, in agreement with previous studies, the buccal mucosa and tongue were the most commonly affected sites. Patients often had lesions affecting several oral mucosal surfaces but there were no notable differences in the frequencies of different types of OLP at different oral sites. As the palate was rarely affected, accurate diagnosis of OLP may be possible based upon clinical grounds alone and hence differentiation between most cases of typical OLP and lupus erythematosus may often be possible without detailed histopathological investigation (Brown *et al*, 1993). Perhaps reassuringly, all the present group of patients with clinical features suggestive of OLP who had biopsy of lesional tissue were found to have histological features of lichen planus or lichenoid reactions.

The long-term behaviour of OLP has rarely been reported, although data suggest that perhaps 17–20% of patients will have spontaneous resolution of signs and

symptoms of this disorder (Kovesi and Banoczy, 1973; Silverman *et al*, 1985; Thorn *et al*, 1988). In the present study, 13% of patients had complete resolution of OLP, this occurring within 12–246 months of presentation to the specialist unit. Thus unlike cutaneous LP (Eisen, 1993), the majority of individuals with OLP will continue to have signs of disease, and in view of the controversy of the associated malignant potential, will require careful monitoring by an appropriate trained clinician for very many years.

Only 1.9% of the present group of patients subsequently developed oral squamous cell carcinoma. Epithelial malignancy has been reported to range from 0% to 6.25% in retrospective and prospective studies (Lodi *et al*, 2005; Xue *et al*, 2005); however, such rates would suggest that almost all oral squamous cell carcinomas arise from OLP (Lodi *et al*, 2005), which is not the case. Nevertheless, in view of many patients with OLP having risk activities for potentially malignant and malignant disease of the mouth, it would seem essential that all patients with OLP be informed of the potential for a link between OLP and oral cancer.

Cutaneous and genital involvement of lichen planus can precede, arise concurrently with or appear after the development of OLP (Bermejo *et al*, 1990) and it is estimated that 20–34% of patients with OLP will have cutaneous or other mucosal lesions of LP (Silverman *et al*, 1985). In the present study 85 (12.3%) patients had a history of symptoms of possible non-oral LP. This is likely to be an overestimation of the frequency of non-OLP in the present group of patients with OLP; however, it is evident that patients with OLP can have symptoms and, possibly, signs of non-oral LP (Xue *et al*, 2005). There is thus good reason for specialists in Oral Medicine to carefully examine the skin of the hands, feet and legs of patients attending such clinics with possible OLP and, when relevant, refer the patient to an appropriate specialist. In view of the similarities between genital lichen planus and disorders such as lichen sclerosis et atrophicus (Edwards, 1989), it would seem prudent to arrange investigation by an appropriate specialist.

In view of the long-term nature of OLP and the possible risk of malignant transformation of OLP, there is a need for patients to be reviewed clinically. However, the time interval for review of patients with OLP is controversial, as the economic costs (particularly if all reviews are to be undertaken in specialist units) may outweigh the clinical benefit (Mattsson *et al*, 2002; van der Meij *et al*, 2002). A possible solution to ensure effective review of patients with OLP would be relevant continued professional development of primary dental healthcare workers. This controversial malignant potential of OLP is not, as indicated in this study, specific to erosive disease (Mattila *et al*, 2004), and thus patients with all types of OLP should also be advised to modify their lifestyle to reduce exposure to known causative agents of oral squamous cell carcinoma.

Retrospective observational surveys such as the present study have many limitations; however, the results of this study reveal that UK patients with OLP are typically middle-aged, complain of variable degrees of oral discomfort and usually have bilateral lesions affecting the buccal mucosa, tongue and gingivae. The lesions are usually reticular plaque-like and/or atrophic-erosive, although patients often have more than one type of OLP. Only a minority of patients develop lichen planus affecting other mucocutaneous regions, typically the skin of the extremities and only about 2% develop oral malignancy. However, as the majority of patients will have long-term OLP, and perhaps a risk of malignant transformation, it is essential that such individuals are carefully monitored by appropriately trained clinicians for very many years.

## References

Albrecht M, Banoczy J, Dinya E, Tamas G Jr (1992). Occurrence of oral leukoplakia and lichen planus in diabetes mellitus. *J Oral Pathol Med* **21:** 364–366.

Andreasen JO (1968). Oral lichen planus. 1. A clinical evaluation of 115 cases. *Oral Surg Oral Med Oral Pathol* **25:** 31–42.

Anonymous (1985). *Central Statistical Office Social Trends*. Her Majesty's Stationery Office: London, UK, pp. 1–200.

Axell T, Rundquist L (1987). Oral lichen planus – a demographic study. *Community Dent Oral Epidemiol* **15:** 52–56.

Banoczy J, Rigo O (1991). Prevalence study of oral precancerous lesions within a complex screening system in Hungary. *Community Dent Oral Epidemiol* **19:** 265–267.

Bermejo A, Bermejo MD, Roman P, Botella R, Bagan JV (1990). Lichen planus with simultaneous involvement of the oral cavity and genitalia. *Oral Surg Oral Med Oral Pathol* **69:** 209–216.

Bouquot JE, Gorlin RJ (1986). Leukoplakia, lichen planus, and other oral keratoses in 23,616 white Americans over the age of 35 years. *Oral Surg Oral Med Oral Pathol* **61:** 373–381.

Brown RS, Bottomley WK, Puente E, Lavigne GJ (1993). A retrospective evaluation of 193 patients with oral lichen planus. *J Oral Pathol Med* **22:** 69–72.

Carrozzo M, Gandolfo S, Carbone M *et al* (1996). Hepatitis C virus infection in Italian patients with oral lichen planus: a prospective case–control study. *J Oral Pathol Med* **25:** 527–533.

Carrozzo M, Uboldi de Capei M, Dametta E *et al* (2004). Tumor necrosis factor-alpha and interferon-gamma polymorphisms contribute to susceptibility to oral lichen planus. *J Invest Dermatol* **122:** 87–94.

Cottoni F, Ena P, Tedde G, Montesu MA (1993). Lichen planus in children: a case report. *Pediatr Dermatol* **10:** 132–135.

Dissemond J (2004). Oral lichen planus: an overview. *J Dermatolog Treat* **15:** 136–140.

Edwards L (1989). Vulvar lichen planus. *Arch Dermatol* **125:** 1677–1680.

Eisen D (1993). The therapy of oral lichen planus. *Crit Rev Oral Biol Med* **4:** 141–158.

Eisen D (2002). The clinical features, malignant potential and systemic associations of oral lichen planus: a study of 723 patients. *J Am Acad Dermatol* **46:** 207–214.

Gorsky M, Raviv M, Moskona D, Laufer M, Bodner L (1996). Clinical characteristics and treatment of patients with oral lichen planus in Israel. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* **82:** 644–649.

Hogewind WF, van der Waal I (1988). Prevalence study of oral leukoplakia in a selected population of 1000 patients from The Netherlands. *Community Dent Oral Epidemiol* **16:** 302–305.

Kovesi G, Banoczy J (1973). Follow-up studies in oral lichen planus. *Int J Oral Surg* **2:** 13–19.

Lodi G, Carrozzo M, Harris K *et al* (2000). Hepatitis C virus-associated oral lichen planus: no influence from hepatitis G virus co-infection. *J Oral Pathol Med* **29:** 39–42.

Lodi G, Scully C, Carrozzo M, Griffiths M, Sugerman P, Thongprasom K (2005). Current controversies in oral lichen planus: report of an international consensus meeting. Part 2. Clinical management and malignant transformation. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* **100:** 164–178.

Machado AC, Sugaya NN, Migliari DA, Matthews RW (2004). Oral lichen planus. Clinical aspects and management in fifty-two Brazilian patients. *West Indian Med J* **53:** 113–117.

Mattila R, Alanen K, Syrjanen S (2004). DNA content as a prognostic marker of oral lichen planus with a risk of cancer development. *Anal Quant Cytol Histol* **26:** 278–284.

Mattsson U, Jontell M, Holmstrup P (2002). Oral lichen planus and malignant transformation: is a recall of patients justified? *Crit Rev Oral Biol Med* **13:** 390–396.

van der Meij EH, Bezemer PD, van der Waal I (2002). Cost-effectiveness of screening for the possible development of cancer in patients with oral lichen planus. *Community Dent Oral Epidemiol* **30:** 342–351.

Neumann-Jensen B, Holmstrup P, Pindborg JJ (1977). Smoking habits of 611 patients with oral lichen planus. *Oral Surg Oral Med Oral Pathol* **43:** 410–415.

Odell EW, Morgan PR (1998). Lichenoid and psoriasiform lesions. In: *Biopsy pathology of the oral tissues*. Chapman & Hall: London, pp. 32–54.

OFlatharta C, Flint SR, Toner M, Butler D, Mabruk MJ (2003). Investigation into a possible association between oral lichen planus, the human herpesviruses, and the human papillomaviruses. *Mol Diagn* **7:** 73–83.

Pilli M, Penna A, Zerbini A *et al* (2002). Oral lichen planus pathogenesis: a role for the HCV-specific cellular immune response. *Hepatology* **36:** 1446–1452.

Pindborg JJ, Mehta FS, Daftary DK, Gupta PC, Bhonsle RB (1972). Prevalence of oral lichen planus among 7639 Indian villagers in Kerala, South India. *Acta Derm Venereol* **52:** 216–220.

Porter SR, Kirby A, Olsen I, Barrett W (1997). Immunologic aspects of dermal and oral lichen planus: a review. *Oral Surg Oral Med Oral Pathol Oral Radiol Endod* **83:** 358–366.

Scully C, de Almeida OP, Welbury R (1994). Oral lichen planus in childhood. *Br J Dermatol* **130:** 131–133.

Scully C, Beyli M, Ferreiro MC *et al* (1998). Update on oral lichen planus: etiopathogenesis and management. *Crit Rev Oral Biol Med* **9:** 86–122.

Sigurgeirsson B, Lindelof B (1991). Lichen planus and malignancy. An epidemiologic study of 2071 patients and a review of the literature. *Arch Dermatol* **127:** 1684–1688.

Silverman S Jr, Gorsky M, Lozada-Nur F (1985). A prospective follow-up study of 570 patients with oral lichen planus: persistence, remission, and malignant association. *Oral Surg Oral Med Oral Pathol* **60:** 30–34.

Silverman S Jr, Gorsky M, Lozada-Nur F, Giannotti K (1991). A prospective study of findings and management in 214 patients with oral lichen planus. *Oral Surg Oral Med Oral Pathol* **72:** 665–670.

Singal A (2005). Familial mucosal lichen planus in three successive generations. *Int J Dermatol* **44:** 81–82.

Sklavounou A, Laskaris G (1983). Frequency of desquamative gingivitis in skin diseases. *Oral Surg Oral Med Oral Pathol* **56:** 141–144.

Thorn JJ, Holmstrup P, Rindum J, Pindborg JJ (1988). Course of various clinical forms of oral lichen planus. A prospective follow-up study of 611 patients. *J Oral Pathol* **17:** 213–218.

Xue JL, Fan MW, Wang SZ, Chen XM, Li Y, Wang L (2005). A clinical study of 674 patients with oral lichen planus in China. *J Oral Pathol Med* **34:** 467–472.

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