Research Article

iMedPub Journals
http://www.imedpub.com

Journal of Adenocarcinoma
ISSN 2572-309X

2017
Vol. 2 No. 1: 01

DOI: 10.21767/2572-309X.100015

Malignant Transformation of Oral Lichen Planus – Systematic Review

Hannah R

Dental Department, Madras Dental College Alumini Association (MDCCA), Chennai, Tamil Nadu, India

Corresponding author: Hannah R

rgrace_89@yahoo.co.in

Member of Madras Dental College Alumini Association (MDCCA), Moorthy Nagar, Chettiar Agaram, Thiruverkadu Post, Chennai-600 077, Tamil Nadu, India.

Tel: +914425340441

Citation: Hannah R. Malignant Transformation of Oral Lichen Planus – Systematic Review. J. Adenocarcinoma. 2017, 2:1.

Abstract

The aim of this systematic review is to evaluate the malignant transformation rate of oral lichen planus and to analyse the type of oral lichen planus and site in the oral cavity with maximum potential for malignant transformation.

Keywords: Oral Lichen planus; Oral potentially malignant disease; Malignant transformation rate

Received: February 22, 2017; **Accepted:** February 23, 2017; **Published:** February 25, 2017

Background

Oral lichen planus is a common chronic inflammatory disease, seen mostly in buccal mucosa, tongue and sometimes gingiva and palate [1]. Oral lichen planus (OLP) has a prevalence of about 0.5-2% in the general population. It is a disease affecting the middle-aged and the elderly and the female-to-male ratio is about 2:1. The diagnosis of OLP is based on a combination of characteristic clinical findings, history and histopathology [2].

Oral lichen planus is termed as an immunologically mediated mucocutaneous disease. The etiology and pathogenesis of OLP are unknown though several molecular hypotheses have been presented. The etiology of OLP involves the degeneration of the epithelial basal cell layer, induced by cell-mediated immunologic reactions [3]. Clinically, OLP maybe occur in 6 clinical variants as reticular, papular, plaque-like, erosive, atrophic and bullous. [4] The most common are reticular and erosive forms. [5] Histopathologically, OLP is characterized by dense sub epithelial mph histiocytic infiltrate, increased numbers of intraepithelial lymphocytes, and degeneration of basal keratinocytes [4]. Genital and cutaneous lichen planus are associated with approximately 20% and 15% of OLP, respectively. The most concerning fact about OLP is its potential to develop into oral squamous cell carcinoma Therefore the World Health Organization classified OLP as potentially malignant disorder in 1978 [6]. The chronic stromal inflammation considered a possible factor driving the malignant transformation [7]. Therefore, every patient diagnosed with OLP should be regularly monitored since malignant transformation can occur in all forms of OLP.

The World Health Organization (WHO) classifies oral lichen planus, leukoplakia and erythroplakia as potentially malignant disorders. However, the risk of progression of oral lichen planus to oral carcinoma is lower than the risk of leukoplakia and erythroplakia. Nonetheless, the malignant transformation rate of oral lichen planus and the factors that influence this rate are still questionable. According to the literature frequency of malignant transformation varies from 0 % to 12.5% [6]. The purpose of this study was to evaluate the malignant transformation rate of oral lichen planus and the various factors affecting the malignant transformation, by a systematic review of prospective and retrospective cohort studies.

Methods

Search strategy for the identification of studies

The search strategy was in accordance with the Cochrane guidelines for systematic reviews. Articles relevant to the search strategy were identified from search data bases of PUBMED and MEDLINE till the year 2016. No timeline was included for the search. The article search included only those from the English literature. An internet search was also done to obtain the relevant articles of our interest. The title of the articles and abstracts were reviewed. The full text of selected were retrieved and further analysed **(Figure 1; Table 1).**

Search methodology

The search methodology applied in PUBMED was using the following keywords: Search (Oral lichen planus OR Lichen planus

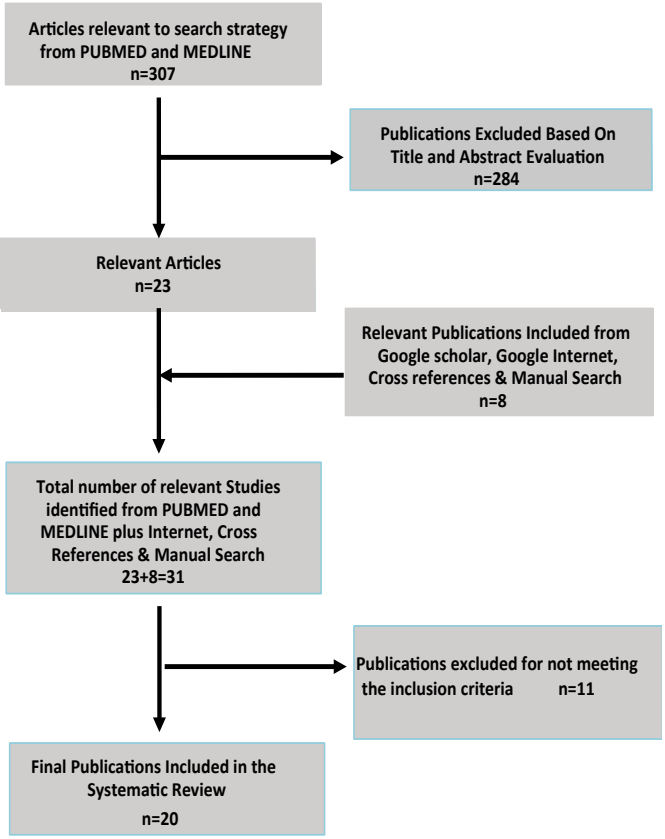

Figure 1 Search strategy for the identification of studies.

Table 1 Variables of interest.

S No	Variables
1	Number of cases showing malignant transformation
2	Malignant transformation rate
3	Type of OLP with maximum malignant transformation potential
4	Site of malignant lesion
5	Type of malignancy associate with OLP

OR Oral rubber lichen planus OR Erosive lichen planus OR Atrophic lichen planus OR Bullous lichen planus OR Ulcerative lichen planus OR Oral potentially malignant disease OR PMD OR OLP OR Oral premalignant lesion OR Oral premalignant condition OR Oral potentially malignant lesion OR Oral potentially malignant condition OR OSCC OR SCC OR Squamous cell carcinoma of oral cavity OR Squamous cell carcinoma of mouth OR Oral carcinoma OR Oral cancer OR Carcinoma of oral cavity and Malignant transformation rate. In addition, an internet search was also done using the key words "Oral Lichen planus", "Oral potentially malignant disease" and "Malignant transformation rate" **(Table 2).**

Selection of studies

Inclusion criteria (Tables 3 and 4)

A. Original studies on Malignant transformation rate of Oral Lichen Planus.

B. Retrospective and Prospective cohort studies.

C. Studies which are solely observational in nature.

D. Studies involving human participants.

E. Full length English language articles were included.

F. Studies published in peer reviewed journal.

G. All the oral lichen planus cases in the study must be proven by means of biopsy results at initial diagnosis.

Table 2 Search methodology.

Search	Query	Items found
#31	Search (Oral lichen planus) OR Lichen planus) OR Oral rubber lichen planus) OR Erosive lichen planus) OR Atrophic lichen planus) OR Bullous lichen planus) OR Ulcerative lichen planus) OR Oral potentially malignant disease) OR PMD) OR OLP) OR Oral premalignant lesion) OR Oral premalignant condition) OR Oral potentially malignant lesion) OR Oral potentially malignant condition) OR OSCC) OR SCC) OR Squamous cell carcinoma of oral cavity) OR Squamous cell carcinoma of mouth) OR Oral carcinoma) OR Oral cancer) OR Carcinoma of oral cavity)) AND Malignant transformation rate	304
#30	Search Malignant transformation rate	2155
#29	Search (Oral lichen planus) OR Lichen planus) OR Oral rubber lichen planus) OR Erosive lichen planus) OR Atrophic lichen planus) OR Bullous lichen planus) OR Ulcerative lichen planus) OR Oral potentially malignant disease) OR PMD) OR OLP) OR Oral premalignant lesion) OR Oral premalignant condition) OR Oral potentially malignant lesion) OR Oral potentially malignant condition) OR OSCC) OR SCC) OR Squamous cell carcinoma of oral cavity) OR Squamous cell carcinoma of mouth) OR Oral carcinoma) OR Oral cancer) OR Carcinoma of oral cavity	148096
#28	Search Carcinoma of oral cavity	25033
#27	Search Oral cancer	114324
#26	Search Oral carcinoma	46574
#25	Search Squamous cell carcinoma of mouth	16266
#24	Search Squamous cell carcinoma of oral cavity	18077
#21	Search SCC	16613
#20	Search OSCC	4223
#19	Search Oral squamous cell carcinoma	25905
#18	Search Oral potentially malignant condition	337
#17	Search Oral potentially malignant lesion	205
#16	Search Oral premalignant condition	6900
#15	Search Oral premalignant lesion	1025
#14	Search OLP	1264
#11	Search PMD	1746
#10	Search Oral potentially malignant disease	301
#9	Search Ulcerative lichen planus	423
#8	Search Bullous lichen planus	348
#5	Search Reticular lichen planus	226
#7	Search Atrophic lichen planus	414
#6	Search Erosive lichen planus	777
#4	Search Oral rubber lichen planus	138
#3	Search Lichen planus	8486
#2	Search Oral lichen planus	3785

Table 3 Description of Included Studies.

Author	Year	Country	Type of study	Total cases of oral lichen planus	Number of Cases transformed to malignancy	Malignant transformation rate%	Follow up years
Gupta et al. [15]	1989	India	Prospective study	344	1	0.3	3.7
van der meij et al. [14]	2003	NA	Prospective study	62	0	0	2.7
Lanfranchi et al. [19]	2003	Argentina	Retrospective study	719	32	4.45	NA
Jing Ling Xue et al. [18]	2005	China	Retrospective study	674	4	0.6	NA
Laejendecker et al. [2]	2005	Netherlands	Retrospective study	200	3	1.5	84-156 months
Bornstein et al. [20]	2006	Switzerland	Retrospective study	141	4	2.84	NA
Ingafou et al. [23]	2006	UK	Prospective study	690	13	1.9	2.11
Hsue et al. [21]	2007	Taiwan	Prospective study	143	3	2.1	3.7
Pakfetrat et al. [24]	2009	Iran	Retrospective study	420	3	0.07	NA
Fang et al. [22]	2009	China	Retrospective study	2119	23	1.1	1.4
Bermejo-Fenoll et al. [25]	2010	South eastern Spain	Retrospective study	550	5	0.9	NA
Torrente-Castells et al. [26]	2010	Spain	Retrospective study	65	1	1.5	0.25-212 months
Bombeccari et al. [27]	2011	Italy	Prospective study	327	8	2.4	6.10
Zheng-Yu Shen [17]	2012	China	Retrospective study	518	5	0.96	NA
Kaplan Ilana et al. [16]	2012	Israel	Retrospective study	171	6	3.5	12-192 months
Budimir et al. [7]	2014	Croatia	Retrospective study	563	4	0.7	7.6
Wang et al. [28]	2014	Taiwan	Prospective study	381	2	0.52	NA
Casparis et al. [24]	2015	NA	Retrospective analysis	692	8	1.2	NA
Irani et al. [8]	2016	Iran	Retrospective study	112	1	0.8	NA

Table 4 Description of Included Studies.

Author	Year	Type of olp with maximum malignant transformation	Type of cancer	Site of malignant transformation
Gupta et al. [15]	1989	NA	NA	NA
van der meij et al. [14]	2003	NA	NA	NA
Lanfranchi et al. [19]	2003	17-erosive 11- Keratotic	21-squamous cell carcinoma 7-verrucuos carcinoma 4-both	16-Tongue 11-Buccal mucosa
Jing Ling Xue et al. [18]	2005	3-Erosive 1-Atrophic	NA	3- Buccal mucosa 1-Tongue
Laejendecker et al. [2]	2005	1-Erosive 1-Hyperkeratotic 1-Atrophic	3-Squamous cell carcinoma	2-tongue 1-buccal mucosa
Bornstein et al. [20]	2006	NA	NA	NA
Ingafou et al. [23]	2006	10 –Erosive 3 – Plaque like	12 – Squamous cell carcinoma 1 – Carcinoma in situ	NA
Hsue et al. [21]	2007	NA	3 – squamous cell carcinoma	NA
Pakfetrat et al. [24]	2009	3 – erosive lichen planus	NA	2– tongue 1-Buccal mucosa
Fang et al. [22]	2009	NA	NA	tongue
Bermejo-Fenoll et al. [26]	2010	NA	5 – Squamous cell carcinoma	NA
Torrente-Castells et al. [26]	2010	Red lesion	1 – Squamous cell carcinoma	1-tongue
Bombeccari et al. [27]	2011	NA	8- Squamous cell carcinoma	NA
Zheng-Yu Shen [17]	2012	4-erosive 1-plaque like	5- Squamous cell carcinoma	2- buccal mucosa 1- Ventral tongue 1-Gingiva 1- Lip
Kaplan Ilana et al. [16]	2012		6-Squamous cell carcinoma	4-Tongue 2-gingiva
Budimir et al. [7]	2014	2-Erosive 1-Atrophic 1-Plaque like	NA	NA
Wang et al. [28]	2014	NA	NA	2- Tongue
Casparis et al. [29]	2015	NA	NA	NA
Irani et al. [8]	2016	Erosive	Squamous cell carcinoma	Lateral border of tongue

Exclusion criteria (Table 5)

A. Studies not done in Oral lichen planus.

B. Studies done on epithelial dysplasia

C. Case-control studies.

D. Studies in animal models were excluded.

E. Individual case studies.

Data extraction: Once the articles to be reviewed were finalized, data was extracted from each article, tabulated and was verified and interpreted.

Outcomes: The outcomes assessed in this review examined and analysed the malignant transformation rate of oral lichen planus and the various factors affecting the malignant transformation rate.

Discussion

In the past, Oral Lichen Planus was a benign condition. However recently, several cases of malignancy have been reported from previously diagnosed cases of Oral Lichen Planus. Several authors have also reported malignancy to arise from unaffected sites in individuals proven with Oral Lichen Planus [8-10]. Literature underlines the following controversies: (i) Oral Lichen Planus transforms into carcinoma (ii) Oral Lichen Planus affected epithelium is more vulnerable to carcinogens (iii) carcinoma could appear in coincidence with OLP [11].

The putative link between Oral Lichen Planus and squamous cell carcinoma appears to be magnified due to the errors in initial diagnosis of Oral Lichen Planus. Some of the cases reporting carcinomatous changes in OLP could have been other red and white lesions with dysplastic features that mimic OLP clinically and histologically [12]. "Lichenoid Dysplasia", a separate entity, as explained by Eisenberg and Krutch off, represents a potentially precancerous lesion which was frequently overlooked as Oral Lichen Planus [12,13]. To avoid this confusion, 'epithelial dysplasia' was included as an exclusion criterion in the diagnostic criteria for Oral Lichen Planus [13,14].

The wide range of malignant transformation rates as obtained in this analysis, 0-4.45%, can be attributed to the diagnostic criteria used, mean follow-up years and the number of cases evaluated. The number of malignant cases reported was nil, despite a follow-up period of 2.7 years [15]. Generally, higher rates of neoplasia were observed in researches with a longer period of mean follow-up period. In contrary, [16] in their retrospective study in 2011, reported 10 out of the 171 strictly diagnosed cases of Oral Lichen Planus, developed malignancy, yielding a high malignant transformation rate of 5.8% with a mean follow-up of 4.3 years [17]. This result calls for an enhanced evaluation of the study population for the prevalence of risk factors or racial predilection.

The incidence of neoplasia in Oral Lichen Planus **(Table 6)** is observed to be slightly more in females as compared to men, in accordance with the fact that overall prevalence of Oral Lichen Planus is higher in females [1,13]. Erosive lichen is at a higher risk of carcinomatous transformation when compared to the other types, as emphasized by majority of the studies reviewed. In contrast, one retrospective study done in Switzerland, reported higher rates of malignancy in white lichen and mixed lichen respectively [18].

Typically, lesions of Oral Lichen Planus were observed bilaterally, with buccal mucosa being the most common site of involvement followed by tongue [19-21]. With reference to the malignant transformation rates **(Tables 7 and 8)**, reverse statistics have been observed; the incidence of carcinoma is reported to be higher in tongue followed by buccal mucosa.

Table 5 Studies on the Number of Oral Lichen Planus Cases with Malignant Transformation. The total number of cases observed in theses 19 articles was 8891. The number of malignant transformation observed was 126.

Author	Year	Total cases of oral lichen planus	Number of Cases transformed to malignancy
Gupta et al. [15]	1989	344	1
van der meij et al. [14]	2003	62	0
Lanfranchi et al. [19]	2003	719	32
Jing Ling Xue et al. [18]	2005	674	4
Laejendecker et al. [2]	2005	200	3
Bornstein et al. [20]	2006	141	4
Ingafou et al. [23]	2006	690	13
Hsue et al. [21]	2007	143	3
Pakfetrat et al. [24]	2009	420	3
Fang et al. [22]	2009	2119	23
Bermejo-Fenoll et al. [25]	2010	550	5
Torrente-Castells et al. [26]	2010	65	1
Bombeccari et al. [27]	2011	327	8
Zheng-Yu Shen [17]	2012	518	5
Kaplan Ilana et al. [16]	2012	171	6
Budimir et al. [7]	2014	563	4
Wang et al. [28]	2014	381	2
Casparis et al. [24]	2015	692	8
Irani et al. [8]	2016	112	1

Table 6 Studies on the Malignant Transformation Rate.

Author	Year	Malignant transformation rate%
Gupta et al. [15]	1989	0.3
van der meij et al. [14]	2003	0
Lanfranchi et al. [19]	2003	4.45
Jing Ling Xue et al. [18]	2005	0.6
Laejendecker et al. [2]	2005	1.5
Bornstein et al. [20]	2006	2.84
Ingafou et al. [23]	2006	1.9
Hsue et al. [21]	2007	2.1
Pakfetrat et al. [24]	2009	0.07
Fang et al. [22]	2009	1.1
Bermejo-Fenoll et al. [25]	2010	0.9
Torrente-Castells et al. [26]	2010	1.5
Bombeccari et al. [27]	2011	2.4
Zheng-Yu Shen [17]	2012	0.96
Kaplan Ilana et al. [16]	2012	3.5
Budimir et al. [7]	2014	0.7
Wang et al. [28]	2014	0.52
Casparis et al. [24]	2015	1.2
Irani et al. [8]	2016	0.8

S No	Year	Malignant transformation rate
1	1989 – 2016	126/8891 = 1.4%

Results from the studies on malignant transformation rate of Oral Lichen Planus (1989-2016).

Table 7 Studies on the Type of Oral Lichen Planus with Maximum Potential for Malignant Transformation**.** Details on the type of oral lichen planus with maximum potential for malignant transformation has been given by 9 of the articles. Of the 62 lesions mentioned, 41(66.1%) were of erosive type, 12(19.3%) keratotic, 5(8.1%) plaque like, 3(4.8%) atrophic and 1(1.6%) red lesion. Erosive lichen planus was found to be the lesion with the maximum malignant potential.

Author	year	Type of OLP with maximum malignant transformation
Lanfranchi et al. [19]	2003	17-erosive 11- Keratotic
Jing Ling Xue et al. [18]	2005	3-Erosive 1-Atrophic
Laejendecker et al. [2]	2005	1-Erosive 1-keratotic 1-Atrophic
Ingafou et al. [23]	2006	10 –Erosive 3 – Plaque like
Pakfetrat et al. [24]	2009	3 – erosive lichen planus
Torrente-Castells et al. [26]	2010	Red lesion
Zheng-Yu Shen [17]	2012	4-erosive 1-plaque like
Budimir et al. [7]	2014	2-Erosive 1-Atrophic 1-Plaque like
Irani et al. [8]	2016	Erosive

The type of oral malignancy associated with oral lichen planus was found to be predominantly Squamous cell carcinoma. Nevertheless, considering the many patients with Oral Lichen Planus who present risk activities for malignant diseases of the mouth, it would seem essential that all patients with Oral Lichen Planus be informed of the potential link between Oral Lichen Planus and oral cancer [22].

Limitations of the Review

We acknowledge that the potential presence of publication bias might have occurred within this review. The number of articles reviewed is minimal. Our search also included publications in the English literature only. No retracted articles were included. Further studies must be performed evaluating the Malignant transformation **(Tables 9)** of oral lichen planus in the same platform in order to generate a more homogenous and unbiased

Table 8 Studies on the Malignancies Associated with Oral Lichen Planus. The type of malignancy associated with lichen planus have been enlisted by 11 articles. Out of 77 cases 65 (84.4%) were squamous cell carcinoma, 7 (9.1%) were verrucous carcinoma, 4 (5.2%) were a combination of squamous cell carcinoma and verrucous carcinoma and 1 (1.3%) was carcinoma *in situ*. Squamous cell carcinoma was found to be the most common malignancy associated with oral lichen planus.

Author	year	Type of cancer
Lanfranchi et al. [19]	2003	21-squamous cell carcinoma 7-verrucuos carcinoma 4-both
Laejendecker et al. [2]	2005	3-Squamous cell carcinoma
Ingafou et al. [23]	2006	12 – Squamous cell carcinoma 1 – Carcinoma in situ
Hsue et al. [21]	2007	3 – squamous cell carcinoma
Bermejo-Fenoll et al. [26]	2010	5 – Squamous cell carcinoma
Torrente-Castells et al. [26]	2010	1 – Squamous cell carcinoma
Bombeccari et al. [27]	2011	8- Squamous cell carcinoma
Zheng-Yu Shen [17]	2012	5- Squamous cell carcinoma
Kaplan Ilana et al. [16]	2012	6-Squamous cell carcinoma
Irani et al. [8]	2016	Squamous cell carcinoma

Table 9 Studies on the Site of Malignant Lesion. The site of malignancy of 53 cases have been given, of which 31 (58.4%) were found in the tongue, 18 (34%) in the buccal mucosa, 3 (5.7%) in the gngiva and 1 (1.9%) in the lip. Tongue was found to be the most common site of malignant transformation.

Author	year	Site
Lanfranchi et al. [19]	2003	16-Tongue 11-Buccal mucosa
Jing Ling Xue et al. [18]	2005	3- Buccal mucosa 1-Tongue
Laejendecker et al. [2]	2005	2-tongue 1-buccal mucosa
Pakfetrat et al. [24]	2009	2– tongue 1-Buccal mucosa
Fang et al. [22]	2009	1-tongue
Torrente-Castells et al. [26]	2010	1-tongue
Zheng-Yu Shen [17]	2012	2- buccal mucosa 1- tongue 1-Gingiva 1- Lip
Kaplan Ilana et al. [16]	2012	4-Tongue 2-gingiva
Wang et al. [28]	2014	2- Tongue
Irani et al. [8]	2016	1- tongue

group of data. This could aid in giving better systematic reviews in future in this field of study.

Conclusion

The total number of oral lichen planus cases in the 19 studies included were 8891. 126 of the cases turned malignant. The malignant transformation rate in individual study ranged from 0-4.45. The average malignant transformation rate was found to be 1.4%. Erosive lichen planus (66.1%) had the maximum potential for malignant transformation. The common site of occurrence of malignant transformation was the tongue (58.4%). Oral squamous cell carcinoma (84.4%) is the common malignancy associated with oral lichen planus.

The absence of strict diagnostic criteria is the culprit behind the controversy regarding the premalignant nature of OLP. Researchers should be encouraged to take up similar long term studies to estimate the Potential of oral lichen planus to turn into malignancy. Molecular and genetic analysis will provide a more explicit characterization of the potential risk. However, the outcome of this study reinforces the need for a long-term follow-up regimen for all cases of Oral Lichen Planus.

References

1 McCartan BE, Healy CM (2008) The reported prevalence of oral lichen planus: A review and critique. J Oral Pathol Med 37: 447-453.

2 Decker L, Joost TV, Kuizinga MC, Tank B, Neumann HAM (2005) Premalignant Nature of Oral Lichen Planus Ronald. Acta Derm Venereol 85: 516-520.

3 Ebrahimi M, Nylander K, van der Waal I (2011) Oral lichen planus and the p53 family: What do we know? J Oral Pathol Med 40: 281-285.

4 Georgakopoulou EA, Achtari MD, Achtaris M, Foukas PG, Kotsinas A (2012) Oral lichen planus as a preneoplastic inflammatory model. J Biomed Biotechnol.

5 Roopashree MR, Gondhalekar RV, Shashikanth MC, George J, Thippeswamy SH, et al. (2010) Pathogenesis of oral lichen planus - a review. J Oral Pathol Med 39: 729-734.

6 Oliveira Alves MG, Almeida JD, Balducci I, Guimarães Cabral LA (2010) Oral lichen planus: A retrospective study of 110 Brazilian patients. BMC Res Notes 3: 157.

7 Budimir V, Richter I, Andabak-Rogulj A, Vučićević-Boras V, Budimir J, et al. (2014) Oral lichen planus - retrospective study of 563 Croatian patients. Med Oral Patol Oral Cir Bucal 19: e255-e260.

8 Irani S, Esfahani AM, Ghorbani A (2016) Dysplastic change rate in cases of oral lichen planus: A retrospective study of 112 cases in an Iranian population. J Oral Maxillofac Pathol 20: 395-399.

9 Holmstrup P, Thorn J, Rindum J, Pindborg J (1988) Malignant development of lichen planus-affected oral mucosa. JOPM 17: 219-225.

10 Katz RW, Brahim JS, Travis WD (1990) Oral squamous cell carcinoma arising in a patient with long-standing lichen planus. A case report. Oral Surg Oral Med Oral Pathol 70: 282-285.

11 Pogrel MA, Weldon LL (1983) Carcinoma arising in erosive lichen planus in the midline of the dorsum of the tongue. Oral Surg Oral Med Oral Pathol 55: 62-66.

12 Lind PO, Koppang SH, Aas E (1985) Malignant transformation in oral lichen planus. Int J Oral Surg 14: 509-516.

13 Lovas JG, Harsanyi BB, ElGeneidy AK (1989) Oral lichenoid dysplasia: a clinicopathologic analysis. Oral Surg Oral Med Oral Pathol 68: 57-63.

14 Van der Meij E, Van der Waal I (2003) Lack of clinicopathologic correlation in the diagnosis of oral lichen planus based on the presently available diagnostic criteria and suggestions for modifications. JOPM 32: 507-512.

15 Gupta PC, Bhonsle RB, Murti PR, Daftary DK, Mehta FS, et al. (1989) An epidemiologic assessment of cancer risk in oral precancerous lesions in India with special reference to nodular leukoplakia. Cancer 63: 2247-2252.

16 Kaplan I, Sharabi YV, Gal G, Calderon S, Anavi Y (2012) The Dynamics of Oral Lichen Planus: A Retrospective Clinicopathological Study. Head Neck Pathol 6: 178-183.

17 Shen ZY, Liu W, Zhu LK, Feng JQ, Tang GY, et al. (2012) A retrospective clinicopathological study on oral lichen planus and malignant transformation: Analysis of 518 cases. Med Oral Patol Oral Cir Bucal 17: e943-e947.

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

19 Lanfranchi-Tizeira HE, Aguas SC, Sano SM (2003) Malignant transformation of atypical oral lichen planus: a review of 32 cases. Med Oral 8: 2-9.

20 Bornstein MM, Kalas L, Lemp S, Altermatt HJ, Rees TD, et al. (2016) Oral lichen planus and malignant transformation: a retrospective follow-up study of clinical and histopathologic data. Quintessence Int 37: 261-271.

21 Hsue SS, Wang WC, Chen CH, Lin CC, Chen YK, et al. (2007) Malignant transformation in 1458 patients with potentially malignant oral mucosal disorders: a follow-up study based in a Taiwanese hospital. J Oral Pathol Med 36: 25-29.

22 Fang M, Zhang W, Chen Y, He Z (2009) Malignant transformation of oral lichen planus: a retrospective study of 23 cases. Quintessence Int 40: 235-242.

23 Ingafou M, Leao JC, Porter SR, Scully C (2006) Oral lichen planus: a retrospective study of 690 British patients. Oral Dis 12: 463-468.

24 Pakfetrat A, Bolouri AJ, Basir-Shabestari S, Falaki F (2009). Oral Lichen Planus: a retrospective study of 420 Iranian patients. Med Oral Patol Oral Cir Bucal 14: E315-E318.

25 Fenoll AB, Sánchez-Siles M, Jornet LP, Alonso CF, Sánchez NS (2010) A retrospective clinicopathological study of 550 patients with oral lichen planus in south-eastern Spain. J Oral Pathol Med 39: 491-496.

26 Castells TE, Rui F, Aytés LB, Escoda CG (2010) Clinical features of oral lichen planus. A retrospective study of 65 cases. Med Oral Patol Oral Cir Bucal 15: e685-e690.

27 Bombeccari GP, Guzzi G, Tettamanti M, Giannì AB, Baj A, et al. (2011) Oral lichen planus and malignant transformation: a longitudinal cohort study. Oral Surg Oral Med Oral Pathol Oral RadiolEndod 112: 328-334.

28 Wang YY, Tail YH, Wang WC, Chen CY, Kao YH, et al. (2014) Malignant transformation in 5071 southern Taiwanese patients with potentially malignant oral mucosal disorders. BMC Oral Health 14: 99.

29 Casparis S, Borm JM, Tektas S, Kamarachev J, Locher MC, et al. (2015) Oral lichen planus (OLP), oral lichenoid lesions (OLL), oral dysplasia, and oral cancer: retrospective analysis of clinicopathological data from 2002-2011. Oral Maxillofac Surg 19: 149-156.