



Prevalence Study of Oral White Lesions with Special Reference to a New Definition of Oral Leucoplakia

K.P. Schepman, E.H. van der Meij, L.E. Smeele and I. van der Waal

Department of Oral and Maxillofacial Surgery and Pathology, Free University Hospital/Academic Centre for Dentistry, Amsterdam, The Netherlands

In this survey, the experiences with and implications of a revised definition of oral leucoplakia are described. One of the new aspects of the revised definition is the distinction between a provisional, clinical diagnosis and a definitive one for which histopathological examination is required. A prevalence study of white lesions of the oral mucosa among a selected population of 1000 consecutive patients from the Netherlands showed a prevalence of a provisional and definitive diagnosis of oral leucoplakia of 0.6 and 0.2%, respectively. For uniform reporting, a recently proposed classification and staging system has been used to stage leucoplakias with a definitive diagnosis. The use of the revised definition of oral leucoplakia, as well as the classification and staging system, seem very suitable for epidemiological studies. Copyright © 1996 Elsevier Science Ltd

Key words: classification, definition, epidemiology, leucoplakia, oral, staging

Oral Oncol, Eur J Cancer, Vol. 32B, No. 6, pp. 416–419, 1996

INTRODUCTION

In a publication by the WHO in 1978, oral leucoplakia was defined as “A white patch or plaque that cannot be characterized, clinically or pathologically, as any other disease” [1]. It was emphasized that the term leucoplakia should only be used in a clinically descriptive way and that it should carry no histological connotation, which means that the use of the term is unrelated to the absence or presence of epithelial dysplasia. At an international seminar on oral leucoplakia in 1983, it was suggested that the term leucoplakia should be avoided in the case of known aetiology other than the use of tobacco [2].

In 1994, an international working group on oral leucoplakia rephrased the definition as “A predominantly white lesion of the oral mucosa that cannot be characterized as any other definable lesion; some oral leucoplakias will transform into cancer” [3]. Furthermore, a distinction is made between a provisional (clinical) and a definitive diagnosis of oral leucoplakia. The definitive diagnosis of oral leucoplakia is a result of the identification and, if possible, elimination of suspected aetiological factors and, in the case of persistent lesions—more than 2–4 weeks—histopathological examination to rule out any other definable lesion and to determine the degree of epithelial dysplasia, if present.

The purpose of this study is to define the prevalence of oral white lesions among a selected population of 1000 consecutive patients from the Department of Oral and Maxillofacial Surgery in The Netherlands, with special reference to the use of a new definition of oral leucoplakia.

MATERIALS AND METHODS

For this study, 1000 consecutive patients who visited the Department of Oral and Maxillofacial Surgery at the Free University Hospital in Amsterdam, The Netherlands, were examined as part of a routine oral examination procedure in the period April 1993–July 1994. Patients who were referred specifically for a white oral mucosal lesion were not included in this study.

The group of 1000 patients consisted of 472 men (47.2%) and 528 women (52.8%), with a mean age of 35 years, both for men and women (range 13–93 years). The sex and age distribution are shown in Fig. 1. Possible smoking and alcohol habits were recorded (see Table 1). A tobacco and/or alcohol user was defined, respectively, as any person who smoked at least five cigarettes a day and/or drank at least two units of alcohol a day.

Apart from leucoplakia, candidiasis, cheek and lip biting, frictional white lesions, geographic tongue, lesion associated with a dental restoration, leucoedema, leukokeratosis nicotina palati, and lichen planus were considered as target lesions.

The diagnosis of oral leucoplakia was based on the criteria as provided by Axéll *et al.* [2], retrospectively adjusted according to the new definition as mentioned in the

Correspondence to Prof. dr. I. van der Waal, Free University Hospital/ACTA, Department of Oral and Maxillofacial Surgery and Pathology, De Boelelaan 1117, 1081 HV Amsterdam, The Netherlands.

Received 17 May 1996; accepted 20 May 1996.

Distribution of patients by sex and age

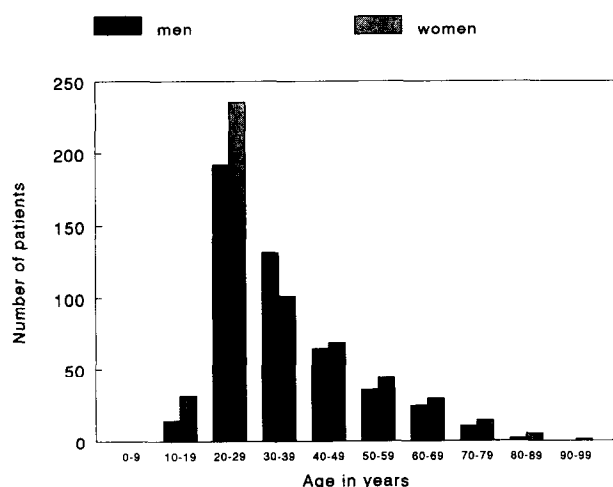


Fig. 1. Age and sex distribution of 1000 patients.

Introduction, including the distinction between a provisional and a definitive diagnosis of oral leucoplakia [3]. Clinically, a distinction was made between a homogeneous and a non-homogeneous leucoplakia [2]. Leucoplakias with a definitive diagnosis have been staged according to a recently proposed classification and staging system [4].

The diagnosis of candidiasis, cheek and lip biting, leucoedema, leucokeratosis nicotina palati, and lichen planus were based on criteria as provided by the WHO [1]. The diagnostic criteria for geographic tongue were based on the definition used by Axéll [5]. A lesion associated with a dental restoration was defined as "A lesion with whitish, reddish or whitish-reddish changes of the oral mucosa, occasionally with a lichenoid appearance, with a clear anatomical relation to an amalgam filling" [6]. White lesions for which a mechanical factor could be disclosed were diagnosed as frictional lesions.

The localisation of the lesions was specified according to the anatomical distribution recommended by the ICD-DA [7]. Colour photographs were taken of all lesions that were diagnosed provisionally as leucoplakia. The management was directed towards the elimination of possible aetiological factors. Biopsies were taken only in selected cases.

RESULTS

The prevalence rates of the target lesions are summarised in Table 2. In 6 cases out of 1000 patients, a provisional diagnosis of oral leucoplakia was made, resulting in a prevalence rate of 0.6%. This group of 6 patients contained 3 men and 3 women, with a mean age of 39 years (range 22–55 years). All of these patients were regular smokers. In 2

Table 2. Prevalence rates of the target lesions in the group of 1000 patients according to gender

Lesion	n		Prevalence (%)
	♂	♀	
Candidiasis	9		0.9
Cheek biting	6	3	2.3
Frictional lesion	8	15	2.5
Geographic tongue	19	6	2.3
Lesion associated with dental restoration	23	11	0.2
Leucoedema	12	1	3.0
Leucokeratosis nicotina palati	21	9	1.0
Leucoplakia	10	2	0.6
Lichen planus	8	3	0.6
Total	4	2	13.4
	82	52	

out of the 6 cases, both women, a definitive diagnosis of oral leucoplakia was made based on exclusion of possible aetiological factors and histopathological examination, resulting in a prevalence rate of a definitive diagnosis of oral leucoplakia of 0.2%. The distribution of the 6 patients with a provisional and/or definitive diagnosis of oral leucoplakia according to the site of the lesion, the classification and stage is shown in Table 3.

DISCUSSION

The results of this prevalence study are derived from a selected and relatively small population, which means that comparison with other epidemiological studies should be looked upon with some reservation.

The low prevalence rate in the present study may be due to the fact that the majority of the examined patients were in the age group of 20–29 years (Fig. 1), while the onset of oral leucoplakia generally takes place after the age of 40 years [8]. Another explanation for the low percentage in the present study may be attributed to the exclusion of patients from this study who were referred for diagnosis of a white mucosal lesion.

In Table 4, epidemiological data on the prevalence of oral leucoplakia as retrieved from the literature are given [5, 9–24]. In several studies, the taking of biopsies has not been reported. Therefore, it is not known whether the diagnosis was based on clinical grounds alone or included a histological examination. This may make the comparison of these

Table 1. Distribution of tobacco and alcohol habits among 1000 patients

Gender	Number of patients	Habits		Tobacco and alcohol
		Tobacco	Alcohol	
Men	472 (47.2%)	216 (45.8%)	115 (24.4%)	77 (14.2%)
Women	528 (52.8%)	195 (36.9%)	39 (7.4%)	22 (4.2%)
Total	1000 (100%)	411 (41.1%)	154 (15.4%)	99 (9.9%)

Table 3. Distribution of 6 patients with a provisional and/or definitive diagnosis of oral leucoplakia according to site, classification and stage

Patient; age (years)*	Diagnosis of leucoplakia		Site of leucoplakia	Classification†	Stage
	Provisional	Definitive			
1. F; 22	+	—	Floor of mouth	L ₁ S ₂ C ₁	—
2. M; 28	+	—	Floor of mouth	L ₁ S ₂ C ₁	—
3. M; 38	+	—	Lateral border of tongue	L ₁ S ₂ C ₁	—
4. M; 45	+	—	Commissure	L ₁ S ₁ C ₂	—
5. F; 48	+	+	Floor of mouth	L ₁ S ₂ C ₁ P ₁	2
6. F; 55	+	+	Lateral border of tongue	L ₁ S ₂ C ₁ P ₂	2

* F, female; M, male.

† LSCP, symbols used in the classification system for oral leucoplakia, in which L, S, C and P, respectively, stand for size of leucoplakia (L), site (S), clinical aspect (C) and pathology (P).

prevalence figures with the present study problematical. In the study of Bouquot and Gorlin [19], histopathological examination revealed, in 22 cases out of 682 clinically diagnosed leucoplakias, a squamous cell carcinoma. Based on histopathological grounds and according to the definition of oral leucoplakia in that study, these lesions should have been excluded from the diagnosis leucoplakia and be ranked as "other definable lesions".

The target lesions other than oral leucoplakia in the present study are considered to be distinct clinical entities. Under the new definition, these lesions are ranked as "other

definable lesions". A number of such cases cannot always be classified as such at the first oral examination and may then be diagnosed provisionally as leucoplakia. Since the diagnosis of white oral mucosal lesions in epidemiological studies are usually based on a single oral examination, an erroneous diagnosis of leucoplakia may result.

From the literature, it is known that some white lesions in persons using tobacco may be reversible after cessation of the smoking habit [28, 29]. Such lesions can provisionally be diagnosed as leucoplakia, and, if they regress, could be named "tobacco-associated lesion". If the lesion persists

Table 4. Studies on the prevalence of oral leucoplakia

Author	Year	Country	No. examined persons	Age	Character	No. leukoplakias	No. biopsies	Definition	Prevalence (%)
Pindborg <i>et al.</i> [9–11]	1965–1966	India	30,000	NR*	Rural/urban	150–328	NR	Pindborg <i>et al.</i> (1963) [25]	1.5–3.3
Zachariah <i>et al.</i> [12]	1966	India	5000	NR	Rural	118	NR	Pindborg <i>et al.</i> (1963) [25]	2.4
Pindborg <i>et al.</i> [13]	1968	New Guinea	1266	>20	Rural	56	16	Pindborg <i>et al.</i> (1963) [25]	4.6
Mehta <i>et al.</i> [14]	1969	India	50,915	>15	Rural	881	723	Pindborg <i>et al.</i> (1963) [25]	1.7
Gangadharan and Paymaster [15]	1971	India	203,249	All ages	Urban	1422	NR	Pindborg <i>et al.</i> (1963) [25]	0.7
Mehta <i>et al.</i> [16]	1972	India	101,761	>15	Rural	685	NR	Pindborg <i>et al.</i> (1963) [25]	0.7
Axéll [5]	1976	Sweden	20,333	>15	Urban/suburban/rural	717	NR	Silverman <i>et al.</i> (1963) [26]	3.6
Lay <i>et al.</i> [17]	1982	Burma	6000	>15	Rural	101	NR	WHO (1980)† [27]	1.7
Rodriquez <i>et al.</i> [18]	1983	Cuba	749	20–75	Urban workers	16	NR	WHO (1978) [1]	2.1
Bouquot and Gorlin [19]	1986	U.S.A.	23,616	>35	Rural/urban	682	176	WHO (1978) [1]	2.9
Reichart <i>et al.</i> [20]	1987	Thailand	1866	All ages	Rural	21	NR	WHO (1978) [1]	1.1
Hogewind and van der Waal [21]	1988	The Netherlands	1000	All ages	Urban	14	3	Axéll <i>et al.</i> (1983) [2]	1.4
Ikeda <i>et al.</i> [22]	1991	Japan	3131	All ages	Urban	77	NR	Axéll <i>et al.</i> (1983) [2]	2.5
Banoczy and Rigo [23]	1991	Hungary	7820	All ages	Rural	104	NR	Axéll <i>et al.</i> (1983) [2]	1.3
Ikeda <i>et al.</i> [24]	1995	Cambodia	1319	>15	Urban	14	NR	WHO (1980)† [27]	1.1

* NR, not reported.

† Same definition as WHO (1978).

after cessation of the smoking habit or when the patient has continued to smoke, the provisional diagnosis of oral leucoplakia remains unchanged and preferably should be transformed into a definitive diagnosis by the taking of a biopsy.

In the present study, no causative factors could be detected in the provisionally diagnosed leucoplakias. Only two of these lesions had been biopsied. According to the revised definition of leucoplakia, a biopsy preferably should be taken in all lesions that persist after a waiting period of 2–4 weeks.

For uniform documentation and reporting, a recently proposed classification and staging system based on the revised definition of oral leucoplakia has been used (see Table 3). The symbols used in this system represent clinical and histopathological features of oral leucoplakia that are supposed to have a predictive value with regard to the malignant transformation. Only the 2 cases with a definitive diagnosis of oral leucoplakia were eligible for staging. We recommend clearly stating in papers on oral leucoplakia whether the diagnosis is a clinical, provisional or a definitive one.

1. World Health Organization Collaborating Centre for Oral Precancerous Lesions. Definition of leucoplakia and related lesions: an aid to studies on oral precancer. *Oral Surg* 1978, **46**, 518–539.
2. Axéll T, Holmström P, Kramer IRH, Pindborg JJ, Shear M. International seminar on oral leucoplakia and associated lesions related to tobacco habits. *Comm Dent Oral Epidemiol* 1984, **12**, 145–154.
3. Axéll T, Pindborg JJ, Smith CJ, Waal I van der and an International Collaborative Group on Oral White Lesions. Oral white lesions with special reference to precancerous and tobacco-related lesions: conclusions of an international symposium held in Uppsala, Sweden, 18–21 May 1994. *J Oral Pathol Med* 1996, **25**, 49–54.
4. Schepman KP, Waal I van der. A proposal for a classification and staging system for oral leucoplakia: a preliminary study. *Oral Oncol, Eur J Cancer* 1995, **31B**, 396–398.
5. Axéll T. A prevalence study of oral mucosal lesions in an adult Swedish population. *Odontol Rev* 1976, **27** Suppl. 36.
6. Pindborg JJ. *Atlas of Diseases of the Oral Mucosa*. Copenhagen, Munksgaard, 1992.
7. World Health Organisation. *International Classification of Diseases, 10th Revision*. Application to Dentistry and Stomatology. Geneva, ICD-DA, 1992.
8. Waldron CA, Shafer WG. Leukoplakia revisited. A clinico-pathologic study of 3256 oral leucoplakias. *Cancer* 1975, **36**, 1386–1392.
9. Pindborg JJ, Kalapessi HK, Kale SA, Singh B, Talyrekhan B. Frequency of oral leucoplakias and related conditions among 10,000 Bombayites. *J All India Dent Assoc* 1965, **37**, 1–2.
10. Pindborg JJ, Chawla TN, Misra RK, Nagpaul RK, Gupta P. Frequency of oral carcinoma, leucoplakia, leucoedema, leukokeratosis, submucous fibrosis and lichen planus in 10,000 Indians in Lucknow, Uttar Pradesh, India. *J Dent Res* 1965, **44**, 615.
11. Pindborg JJ, Bhatt M, Devanath KR, Narayana HR, Ramachandra S. Frequency of oral white lesions among 10,000 individuals in Bangalore, South India. *India J Med Sci* 1966, **20**, 349–352.
12. Zachariah J, Mathew B, Varma NAR, Iqbal AM, Pindborg JJ. Frequency of oral mucosal lesions among 5000 individuals in Trivandrum, South India. *J Ind Dent Assoc* 1966, **38**, 290–291.
13. Pindborg JJ, Barmes OD, Poed-Petersen B. Epidemiology and leucoedema among Papuans and New Guineans. *Cancer* 1968, **22**, 379–384.
14. Mehta F, Pindborg JJ, Gupta PC, Daftary DK. Epidemiologic and histologic study of oral cancer and leucoplakia among 50,915 villagers in India. *Cancer* 1969, **24**, 832–849.
15. Gangadharan P, Paymaster JC. Leukoplakia, an epidemiologic study of 1504 cases observed at the Tata Memorial Hospital, Bombay, India. *Br J Cancer* 1971, **25**, 657–668.
16. Mehta FS, Gupta PC, Daftary DK. An epidemiologic study of oral cancer and precancerous conditions among 101,761 villagers in Maharashtra, India. *Int J Cancer* 1972, **10**, 134–141.
17. Lay KM, Sein K, Myint A, Ko SK, Pindborg JJ. Epidemiologic study of 6000 villagers of oral precancerous lesions in Bilugyun: preliminary report. *Comm Dent Oral Epidemiol* 1982, **10**, 152–155.
18. Rodriguez I, Santana JC, Sanabria J, Banoczy J. Prevalence of oral leucoplakia in Havana City, Cuba. *Comm Dent Oral Epidemiol* 1983, **11**, 379–383.
19. Bouquot JE, Gorlin RJ. Leukoplakia, lichen planus, and other oral keratoses in 23,616 white Americans over the age of 35 years. *Oral Surg Oral Med Oral Pathol* 1986, **61**, 373–381.
20. Reichart PA, Mohr U, Srisuwan S, Geerlings H, Theetranont C, Kangwangpong T. Precancerous and oral mucosal lesions related to chewing, smoking and drinking habits in Thailand. *Comm Dent Oral Epidemiol* 1987, **15**, 152–160.
21. Hogewind WFC, Waal I van der. Prevalence study of oral leucoplakia in a selected population of 1000 patients from The Netherlands. *Comm Dent Oral Epidemiol* 1988, **16**, 302–305.
22. Ikeda N, Ishii T, Lida S, Kawai T. Epidemiological study of oral leucoplakia based on mass screening for oral mucosal diseases in a selected Japanese population. *Comm Dent Oral Epidemiol* 1991, **19**, 160–163.
23. Banoczy J, Rigo O. Prevalence study of oral precancerous lesions within a complex screening system in Hungary. *Comm Dent Oral Epidemiol* 1991, **19**, 265–267.
24. Ikeda N, Handa Y, Khim SP, et al. Prevalence study of oral mucosa lesions in a selected Cambodian population. *Comm Dent Oral Epidemiol* 1995, **23**, 49–54.
25. Pindborg JJ, Renstrup G, Poulsen HE, Silverman S. Studies in oral leucoplakias. V. Clinical and histologic signs of malignancy. *Acta Odont Scand* 1963, **21**, 407–414.
26. Silverman S Jr, Renstrup G, Pindborg JJ. Studies in oral leucoplakias. III. Effects of vitamin A comparing clinical, histopathologic, cytologic, and hematologic responses. *Acta Odontol Scand* 1963, **21**, 271–292.
27. World Health Organisation. Guide to epidemiology and diagnosis of oral mucosal diseases and conditions. *Comm Dent Oral Epidemiol* 1980, **8**, 1–26.
28. Gupta PC. A study of dose-response relationship between tobacco habits and oral leucoplakia. *Br J Cancer* 1984, **50**, 527–531.
29. Gupta PC, Murti PR, Bhonsle RB, Mehta FS, Pindborg JJ. Effect of cessation of tobacco use on the incidence of oral mucosal lesions in a 10-yr follow-up study of 12212 users. *Oral Dis* 1995, **1**, 54–58.