
Lesions of the oral mucosa: an epidemiological study of 23785 Mexican patients

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This study is a cross-sectional report of oral mucosal lesions in 23785 patients more than 15 years of age who requested elective dental care in a dental school. Among the patients examined, the general lesion rate was 356.60 lesions per 1000 patients. Sixty-eight entities were identified, the lesions being more common among males. White, red, and ulcerated lesions were seen to predominate, associated mostly with chronic irritative causative factors. The prevalence rates of individual oral mucosal lesions ranged from 0.55 to 105.36 per 1000 patients examined. Age and sex assessment showed some differences in the type and presentation rates of the lesions. These and other epidemiological aspects are discussed. (*Oral Surg Oral Med Oral Pathol Oral Radiol Endod* 2008;105:79-85)

The present study reports the results of a cross-sectional evaluation of the permanent prospective registry of oral mucosal lesions of the Department of Oral Diagnosis and Medicine, Dental School, De La Salle Bajío University, León, Guanajuato, Mexico, with the purpose of establishing the prevalence of oral mucosal lesions in a population of patients more than 15 years of age, of either sex, seeking elective dental care in a dental school.

While a dental school setting may differ from the situation found in the general population (because it is not open or randomized),^{1,2} this may be a model indicative of general and daily dental practice, particularly compared with other settings that deal with rather selected populations such as those seen in specialty centers,³⁻⁶ nursing homes and veterans facilities,⁷ or oral mucosa disease prevalence established in biopsy services.⁸ Such selected populations may also be considered to include either very young^{9,10} or very old patients.¹¹⁻¹⁴ Although such settings afford highly specific information, they necessarily introduce bias to the mucosal lesion prevalences and incidences found in the general population. Similar inconveniences are posed by small population samples.¹⁵⁻¹⁷

The present report includes 22 years of data on 23785 patients. A prior evaluation involved 7297 patients, corresponding to a period of 7.5 years,¹⁸ to which 16488 observational subjects were added. The

increase in patients is expected to reinforce the reliability and validity of the study, to better define epidemiological aspects relating to pathological changes of the oral mucosa.

MATERIAL AND METHODS

We consecutively examined data of 23785 patients more than 15 years of age who requested elective dental care from January 1982 to December 2003. The guide to clinical procedures of the Department of Oral Diagnosis and Medicine was used to this effect.¹⁹ Each suspect lesion was assessed clinically by qualified staff members who were assisting dental students, accompanied by a direct patient interview; where necessary, complementary studies were made (e.g., laboratory tests and histopathologic evaluation). Following confirmation of the diagnosis, management and control measures were defined. For the present study, the following patient data were collected from the corresponding clinical histories: identification of the lesion or condition, the underlying etiology, and patient age and sex.

For presentation and analysis, lesion prevalence was reported as the number of lesions per 1000 patients, with distribution into the following categories: (1) clinical characteristics, (2) etiology, (3) general prevalence, with identification of the 30 most frequent lesions, (4) sex distribution and mean age, with identification of the 15 most frequent lesions per sex, and (5) major lesion groups and specific lesion prevalence, based on the etiology and prevalence of the total mucosal lesions recorded in the study (this aspect will be the subject of future reports).

RESULTS

Fig. 1 reports the general statistics of the study. Among the 23785 patients examined, the general lesion rate was 356.60 lesions per 1000 patients. The age

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1 Global results			
	N	Lesions /1000	Risk level (%)
Male	7435	439.18	5.90
Female	16350	319.05	1.95
Total	23785	356.60	1.50
2 Different lesions			68
3 Major etiological groups. Categories			8
4 Classification by clinical appearance Categories			8
5 Proportion by gender			
	Participants	1:2.2	M:F
	Lesions	1.4:1	M:F
	Risk	3:1	M:F
6 Age. Years			
	Range		15 to 97
	Average of the study series		33.06
	Average of the population with lesions		38.55

Fig. 1. General statistics of the lesions of the oral mucosa in 23785 patients.

Table I. Clinical appearance of lesions of the oral mucosa in 23785 patients

	<i>No. of lesions per 1,000 patients</i>			<i>Average Age (y)</i>
	<i>Male</i>	<i>Female</i>	<i>Total</i>	
Superficial changes				
White nonkeratotic (4)	148.76	88.50	107.34	32.90
Red (12)	93.88	75.47	81.23	39.88
Ulcers/vesicles (9)	64.56	54.25	57.47	37.83
White keratotic (9)	67.11	29.11	40.99	42.59
Color (8): endogenous and exogenous pigments	27.21	27.79	27.61	41.11
Fissure lesions and pits (6)	6.46	7.77	7.36	36.93
Soft tissue masses				
Nonneoplastic (13)	34.70	40.73	34.64	36.98
Reactive, hyperplastic, hamartomatous, and cystic				
Neoplastic (6)	3.50	4.65	4.29	38.82
Miscellaneous (1)	0.00	0.06	0.04	36.00
Total	442.68	323.69	352.39	38.20

No. of lesions in the group are shown in parentheses.

ranged from 15 to 97 years, with a global average of 33.06 years (38.55 years for the patient subgroup with lesions). Lesions were more common among males (male:female ratio = 1.4:1). As to morbidity (percent-

age of lesions in relation to the number of subjects in the corresponding subgroup), a three-fold greater risk of developing mucosal lesions was recorded among the males compared with the female population (6% in males vs. approximately 2% in females). Sixty-eight different lesions were identified.

Table I reports the general clinical characteristics. The lesions identified were classified as (1) superficial changes, (2) soft tissue masses, and (3) miscellaneous. The superficial changes included white lesions (keratotic and nonkeratotic), red lesions, and pigmented lesions defined by the presence of endogenous pigments such as melanin, or exogenous pigments such as amalgam, dyes, or graphite. This large group also comprised ulcers, vesicles, and pits and fissures. The latter included deep linear infolding lesions such as fissured tongue. A pit was in turn defined as a hollow fovea or indentation, such as commissural lip pits. The masses were subclassified into nonneoplastic volume increase (reactive, hyperplastic, hamartomatous, or cystic), and neoplastic (either benign or malignant). White, red, and ulcerated lesions were seen to predominate. Table II shows the etiopathogenic distribution of these lesions—of the 8 major groups identified, 76.99% corresponded to the first 3 groups: morphogenetic

Table II. Etiopathogenesis of lesions of the oral mucosa in 23785 patients

Category	Etiopathogenesis	No. lesions per 1000 patients	Relative %	Accumulative %
I	Morphogenetic disorders	115.32	32.73	
II	Reactive	85.80	24.35	57.07
III	Traumatic	70.17	19.91	76.99
IV	Infectious	37.50	10.64	87.63
V	Factitious	22.70	6.44	94.07
VI	Growths and neoplasms	10.64	3.02	97.09
VII	Immune	10.09	2.86	99.95
VIII	Systemic diseases	0.17	0.05	100.00
		352.39	100.00	

TABLE III. Lesions of greatest prevalence in the oral mucosa of 23785 patients

Lesion	Male n = 7435	No. of lesions per 1000 patients	Female n = 16350	No. of lesions per 1000 patients	Total n = 23785	No. of lesions per 1000 patients	Age (y)
Leukoedema	1086	146.07	1420	86.85	2506	105.36	32.50
Traumatic ulceration	333	44.79	624	38.17	957	40.24	31.64
Frictional keratosis	377	50.71	388	23.73	765	32.16	37.03
Traumatic erythema	245	32.95	435	26.61	680	28.59	32.90
Morsicatio buccarum	236	31.74	280	17.13	516	21.69	27.36
Chronic atrophic candidiasis	118	15.87	361	22.08	479	20.14	52.48
Melanotic maculae of the lip*	25	13.27	67	17.71	92	16.23	31.14
Inflammatory fibrous hyperplasia	92	12.37	285	17.43	377	15.85	42.51
Smoker melanosis*	25	13.27	34	8.99	59	10.41	49.46
Aphthous ulcer	68	9.15	136	8.32	204	8.58	30.45
Lip herpes	72	9.68	116	7.09	188	7.90	32.26
Benign migratory glossitis	70	9.41	111	6.79	181	7.61	31.97
Nicotinic stomatitis	72	9.68	28	1.71	100	4.20	47.88
Angular cheilitis	26	3.50	60	3.67	86	3.62	47.94
Nevi	23	3.09	52	3.18	75	3.15	36.63
Epulis fissuratum	15	2.02	59	3.61	74	3.11	59.61
Papilloma	14	1.88	55	3.36	69	2.90	38.67
Inflammatory papillary hyperplasia	21	2.82	38	2.32	59	2.48	50.58
Hemangioma	20	2.69	34	2.08	54	2.27	48.65
Erythema of unidentified cause	20	2.69	30	1.83	50	2.10	38.10
Gingival hyperplasia	15	2.02	30	1.83	45	1.89	39.64
Hairy tongue	20	2.69	20	1.22	40	1.68	38.13
Phenytoln gingival hyperplasia	11	1.48	23	1.41	34	1.43	28.82
Mucocele	12	1.61	22	1.35	34	1.43	28.68
Reticular lichen planus	8	1.08	21	1.28	29	1.22	44.31
Fibrosis and scar tissue	11	1.48	12	0.73	23	0.97	28.00
Leukoplakia	13	1.75	10	0.61	23	0.97	51.00
Chemical burns	7	0.94	14	0.86	21	0.88	32.10
Pyogenic granuloma	6	0.81	14	0.86	20	0.84	42.15
Verruca vulgaris	2	0.27	17	1.04	19	0.80	36.68
	3063	431.78	4796	313.85	7859	350.71	38.98

M = 1884.

F = 3784.

*Rates based on 5668 patients. Those entities were considered after 1999 (M = 1884, F = 3784).

disorders, reactive lesions, and traumatic lesions (this information will be discussed in more detail in a future publication).

Table III reports the 30 most frequent lesions found. All were identified during the examination upon admission—no alterations detected from anamnesis were included. These 30 lesions were 98.33% of all identified

lesions, with a rate of 0.80:105 per 1000. The remaining 38 lesion types had a rate per 1000 of less than 0.55.

Regarding patient age, the lesions most removed from the general mean of the study population, with presentation in subjects more than 50 years of age, were epulis fissuratum, chronic atrophic candidiasis, leukoplakia, inflammatory papillary hyperplasia, and smok-

TABLE IV. Characteristics by patient gender

<i>Male</i>			<i>Female</i>		
<i>Lesion</i>	<i>n = 7435</i>	<i>No. of lesions per 1000 patients</i>	<i>Lesion</i>	<i>n = 16350</i>	<i>No. of lesions per 1000 patients</i>
Leukoedema	1086	146.07	Leukoedema	1420	86.85
Frictional keratosis	377	50.71	Traumatic ulcer	624	38.17
Traumatic ulcer	333	44.79	Traumatic erythema	435	26.61
Traumatic erythema	245	32.95	Frictional keratosis	388	23.73
<i>Morsicatio buccarum</i>	236	31.74	Chronic atrophic candidiasis	361	22.08
Chronic atrophic candidiasis	118	15.87	Melanotic maculae of the lip*	67	17.71
Melanotic maculae of the lip*	25	13.27	Inflammatory fibrous hyperplasia	285	17.43
Smoking melanosis*	25	13.27	<i>Morsicatio buccarum</i>	280	17.13
Inflammatory fibrous hyperplasia	92	12.37	Smoking melanosis*	34	8.99
Lip herpes	72	9.68	Aphthous ulcers	136	8.32
Nicotinic stomatitis	72	9.68	Lip herpes	116	7.09
Benign migratory glossitis	70	9.41	Benign migratory glossitis	111	6.79
Aphthous ulcers	68	9.15	Angular cheilitis	60	3.67
Angular cheilitis	26	3.50	Nevi	52	3.18
Nevi	23	3.09	Nicotinic stomatitis	28	1.71
	2868	405.56		4397	289.44
Risk index		1.41			0.66
Risk index. M:F proportion		2.15			

M = 1884.

F = 3784.

*On the basis of 5668 patients after the year 1999.

ing-associated melanosis. In comparison, the lesions associated with the youngest age intervals were morsicatio buccarum, fibrosis and scars, and mucocele.

Table IV reflects morbidity and order of importance of the 15 most frequent lesions according to patient sex. This differentiation was made on the grounds that sex may condition risk differences due to biologic factors, psychological aspects, or differences in social role. These 15 lesions account for 91.24% of all lesions reported. The male:female proportion of the lesions found was 1.25:1 (1.4:1 for the total group). Morbidity risk (lesions vs. the number of patients within the group) was 2.15:1 (male:female ratio, 3.0:1 for the total group). Only one third of the lesions showed a higher incidence among females, with rates very similar to those found in males: chronic atrophic candidiasis, labial melanotic macule, traumatic fibroma, angular cheilitis, and melanocytic nevus. However, several sex contrasts were noted, as an example, nicotinic stomatitis was almost 6 times more frequent in men than in women (5.1:1). Other lesions were approximately twice as common in males, such as frictional keratoses (2.1:1), morsicatio buccarum (1.8:1), and leukoedema (1.7:1). Regarding the order of these pathologies, only 2 lesions showed variations in ranking of more than 3 levels: morsicatio buccarum and nicotinic stomatitis.

DISCUSSION

Prior to discussing the results of the present study, it should be stressed that the findings are influenced by

the conditions under which the data were collected. If the operative and circumstantial particularities associated with the geographic, social, and cultural setting are taken into consideration, the results obtained can be compared with those of similar studies. In the Department of Oral Diagnosis and Medicine, admission to clinical care is processed when patients request elective dental care by professionals assisting dental students. This department usually does not deal with oral or dental emergencies, which are seen in the corresponding emergency service. Patients spontaneously presenting for dental consultation exhibit an attitude that may differ from that found in an epidemiological survey of an open population. In numerical terms, most of our series is composed of females. We did not include lesions registered from the anamnesis or as result of interconsultation requested from other services in our dental school.

Considering the information presented in the aforementioned paragraph and in comparison with other studies carried out elsewhere in the world, it is seen that surveys such as that published by Bouquot²⁰ involve a sample size similar to our own, although the patients were older, because the services were offered in cancer detection clinics where the attended population is typically of older age. This must be taken into consideration because the prevalences of both reactive and degenerative lesions increase with age,²¹ frequently as a result of preexisting systemic diseases or risk factors that introduce some bias to the sampling procedure.²²⁻²⁴

TABLE V. Comparative analysis with other major epidemiological studies

Lesion	No. of lesions per 1000 patients				Coincidence among the 4 studies		
	I*	II†	III‡	IV§	Times	%	
Leukoedema	105.36	459.3 (1)			2	50	
Traumatic ulcer	40.24	17.8 (10)	5.2 (4)		3	75	
Irritative keratosis	32.16	43.7 (5)	4.7 (5)	26.7 (4)	4	100	
Traumatic erythema	28.59						
<i>Morsicatio buccarum</i>	21.69			30.5 (3)	2	50	
Chronic atrophic candidiasis	20.14			36.0 (1)	2	50	
Melanotic maculae of the lip	16.23	100.4 (2)			2	50	
Inflammatory fibrous hyperplasia	15.85	20.7 (9)	12.0 (2)		3	75	
Smoking associated melanosis	10.41						
Minor recurrent aphthous ulcers	8.58						
<i>Coincidence with present study</i>		<i>No. of rank in the study</i>					
Times (%)		5	3	3			
Percent		50	30	30			

*Present study.

†Axéll (1975).¹

‡Bouquot (1986).²⁰

§Shulman (2004).²

The study of Axéll¹ is included as a solid reference for comparison purposes, for although it involves a smaller sample of patients, it exceeds the international standards required of epidemiological studies.²⁵ While the report published by Shulman² involved an open population not requesting dental care (home visits), the large sample size of the study has led us to include it for comparison. In this sense, Table V attempts to establish comparisons with studies similar to our own in terms of the population size evaluated and oral lesion classification.^{1,2,20} A comparison is made of the frequency with which the first 10 disease entities of this study coincide with the first 10 entities of other surveys, although the order of lesions and their prevalences may differ. The purpose is to determine whether any lesion or lesions are repeatedly cited as the most prevalent or common disorders in different parts of the world.

In the present report, and compared with our 1991 subset comprising 7297 patients,¹⁸ 6 of the 10 most prevalent lesions in the initial survey were seen to remain the same: leukoedema, traumatic ulcer, frictional keratoses, chronic atrophic candidiasis, irritative hyperplasia, and minor recurrent aphthous ulcers. Factors such as time and improvement in diagnostic quality observed in recent years may influence the registered prevalence of oral mucosal lesions. In effect, regarding the factor time, it is important to point out that there have been technological advances; social and ecological changes; modifications in the coverage, type, and speed of massive communications; population displacements; and pharmacological and medical advances that influence population longevity and quality

of life. The increase in smoking among women during the 1980s, the influence of government antismoking campaigns over the last 10 years, increased sexual freedom, global emergence of the acquired immunodeficiency syndrome, the increase in cases of anorexia, and the growing practice of oral piercing and cosmetic lip tattooing among young people are examples of lifestyle changes that will have an impact on study outcomes.

In the study of Axéll¹ involving 8698 patients, 5 of these same lesions were among the most frequent. In the series published by Bouquot²⁰ comprising 23,616 patients, the same coincidence was established for 3 of the lesions—a situation that is seen to repeat in the report published by Shulman et al.² Thus, in these 4 surveys, each conducted in at least 7000 patients, the same lesions coincided in 50% to 100% of cases. Irritative keratosis ranked in the first 10 places in each of these studies. Traumatic ulcer and inflammatory fibrous hyperplasia were cited in 3 of 4 studies. Thus, it can be concluded that lesions of a traumatic origin are those most commonly reported in different parts of the world. Only traumatic erythema, smoking-associated melanosis, and minor recurrent aphthous ulcers were not cited among the 10 most common lesions in any of the 3-comparator reports. Labial melanotic macule, chronic atrophic candidiasis, and leukoedema likewise showed a high prevalence in 3 of the 4 studies compared. In relation to this latter entity, which is actually best regarded as a variant of normality, it is interesting to note that it is common in both northern European populations and in the mixed-race Latin American pop-

ulation,^{1,18} with higher prevalences than any pathological change.

Other reports (not included in Table V) presenting age distribution characteristics¹⁵ or sampling conditions¹⁶ similar to those found in the dental school environment nevertheless failed to involve equivalent study population sizes. Even the study published by Knapp,¹⁰ which included 181 388 Army recruits, is limited to young adults between 18 and 22 years old.

On analyzing specific aspects of the present study, leukoedema is seen to be the most commonly recorded disorder, with a frequency twice that of the next ranking lesion (traumatic ulcers). Regarding the origin of the alterations, reactive and traumatic lesions showed the highest prevalence. Table II shows that lesions of this kind account for almost half (44.26%) of the lesions reported (sum of relative percentages of categories II and III); on adding to this the factitious conditions (category V), those causative factors account for almost a half of the lesions found in this study. In addition, 7 of the first 10 lesions cited in Table III are associated with an irritative etiology: traumatic ulcer, irritative keratoses, traumatic erythema, morsicatio buccarum, labial melanotic macule, irritative hyperplasia, and smoking-associated melanosis. Assessment of irritative etiologies is of preventive importance, because adequate patient education and dental practice can help prevent many of these lesions. The control of local and external factors based on information, the elimination of local irritants, excellence in dental care for dental replacement, and adequate psychological and health orientation of compulsive habits and biologic and psychological dependencies such as tobacco smoking may contribute to the reduction of morbidity in these lesions. Although minor recurrent aphthous ulcers affect a significant proportion of the population (8.58:1000 patients) and are intensely painful lesions, it is interesting to observe that minor recurrent aphthous ulcers do not seem to be a cause for dental consultation, because with the exception of our own series, such lesions are not among the most important disorders reported by the aforementioned epidemiological surveys. Although not included among the 10 most common lesions described by Shulman,² the prevalence is similar, 8.9:1000 patients.

Considering patient age or the chronology of lesion appearance, it is difficult to explain why some lesions such as morsicatio buccarum, irritative hyperplasia, or mucocele are prevalent at earlier ages—because the associated risk factors for the development of such lesions are not age dependent. Morsicatio buccarum, which was found to be the lesion with the youngest age index, can be attributable to psychological reactions to anxiety or self-aggression that are not necessarily char-

acteristic of any particular age group. In contrast, the lesions characteristic of older age ranges, such as those predominantly manifesting in patients more than 50 years of age, are associated with the wearing of partial or complete dentures, the latter in turn being related to tooth loss resulting from caries and periodontitis accumulating over time. Defects in the manufacture of partial or complete prostheses and the adaptive and progressive atrophic changes of the bone and mucosa of the maxillary processes explain the presence of epulis fissuratum, inflammatory papillary hyperplasia, and chronic atrophic candidiasis. Smoking also shows cumulative effects, resulting in melanosis in a percentage of cases proportional to the duration of the habit. Leukoplakia, another lesion associated with smoking and other chronic irritants, also develops in proportion to the duration of exposure. Thus, it can be expected to be more common among older patients.

The results may be influenced by patient sex. In fact, some conditions are highly determined by sex.²⁶ In this report, the possibility of finding a lesion in males was 2 to 3 times greater than in females (Fig. 1 and Table IV). The analysis of this variable can be approached from different biologic, cultural, and social perspectives. One possibility is that males are more exposed to risk factors, or alternatively, females may be genetically less susceptible to the development of oral lesions. Another possible explanation is that males may be comparatively less sensitive to health matters, and their concept of well-being places little emphasis on oral or dental aspects. In contrast, women may be more health conscious and might extend such consciousness to younger family members, thus causing the lesions not to appear or advance as a result of earlier identification and treatment. An additional question is whether male adaptation to the environment leads to more manias, self-aggressive behavior, and neglect of oral health. It could also be that social, economic, and family roles prevent males from receiving care as often and timely as women, because the existing time availability may be different. Furthermore, although medical insurance and public health are available for covering the costs of health care, women may be more frequently benefited in that they combine opportunity with a positive attitude toward health and dental care. While the aforementioned observations are speculative, they may merit further study or clarification, with focused efforts on health attitudes generated by sex considerations and acknowledgment that there may be variations among different parts of the world or between countries.

Finally, it may be observed that from the public health care perspective, the majority of lesions identified and their causes, in this and in other similar studies, are largely avoidable and can be controlled through

education and measures targeted to both the general population and to dental professionals.

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