research article

Epidemiology of oral mucosal lesions in Slovenia

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Background. Among the diseases of oral mucosa, malignant tumors are the most dangerous, but not the most common lesions that might appear in the oral cavity. Since most of the studies are focused on the detection of cancer in the oral cavity, we were interested in detecting the frequency of benign changes of the oral mucosa in Slovene population. Oral mucosal lesions are important pointer of oral health and quality of life, especially in elderly. The prevalence of oral mucosal lesions, together with information on the risk habits associated with oral health, such as tobacco and alcohol use, can help in planning future oral health studies and screening programs.

Patients and methods. Survey upon oral mucosal lesions was conducted during the national project for oral cancer screening in spring 2017 in the Slovenia in which more than 50% of dentists participated and 2395 patients (904 men and 1491 women) were included.

Results. Clinical examination, which was conducted according to the WHO standards revealed that 645 patients (27%) had oral mucosal lesions. The ten most common oral lesions detected were fibroma, gingivitis, Fordyce spots, white coated tongue, cheek biting, linea alba, denture stomatitis, geographic tongue, recurrent aphthous ulcerations and lichen planus.

Conclusions. Overall, these epidemiological data suggest need for specific health policies for prevention, diagnosis and treatment of oral mucosal lesions.

Key words: oral mucosa lesions; epidemiological data

Introduction

Oral health is an important factor of individual's quality of life. Disrupted oral health negatively affects speech, chewing and swallowing and deteriorates social contacts.[1] Prevalence of oral mucosal diseases varies from 10.8%–81.3% in the general population as reported in the literature[2-5], with malignant tumors, as the most widely studied entity, representing only a minority among these lesions. These reports point out that there is a need for additional epidemiological data as percentages of various oral mucosal conditions within studies differ greatly. Also, some studies report prevalence of only few diagnoses, which does not accurately show the variability and prevalence of all lesions in the oral cavity. Prevalence of oral mucosal diseases is even greater (95–100%) in the residents within nursing homes and patients referred to the oral medicine specialists.[6,7] These differences in prevalence might be due to the geographic peculiarities, age, gender, habits, intake of medication, denture presence *etc*. It is quite obvious that oral mucosal lesions change and increase with age, however not only due to the age itself but due to the long lasting effect of bad habits (such as alcohol intake and

smoking. It is well known that oral precancerous lesions (*i.e.* lesions with higher malignant potential) are oral lichen planus, leukoplakia and erythroplakia, the latter two being dependent on alcohol and tobacco intake.[2,3] It is very important that dentists recognize these lesions, as their regular monitoring reveals their potential to become malignant lesions. The prevalence of oral mucosal lesions, together with information on the risk habits associated with oral health, such as tobacco and alcohol use, can help in planning future oral health studies and improving regional screening program. The aim of our study was to obtain additional data upon prevalence of oral mucosal lesions in Slovenia.

TABLE 1. Frequency of lesion occurrence, diagnosis and percentage of the lesion within the whole sample and within the sample with oral lesions

Frequency of occurrence	Oral lesion	Number and % within the whole sample and within the patients with oral lesions
1.	fibroma	56 (2.33%–8.7 %)
2.	gingivitis	51 (2.12%–7.90%)
3.	Fordyce spots	46 (1.92%–7.13%)
4.	white coated tongue	40 (1.67%–6.20%)
5.	cheek biting	39 (1.62%–6.04%)
6.	linea alba	38 (1.58%–5.89%)
7.	denture stomatitis	36 (1.50%–5.58%)
8.	geographic tongue	32 (1.33%–4.96%)
9.	recurrent aphthous ulceration	31 (1.29%–4.80%)
10.	fissured tongue	27 (1.12%–4.18%)
11.	traumatic ulcer	27 (1.12%–4.18%)
12.	lichen	26 (1.08%–4.03%)
13.	mucosal pigmentation	25 (1.04%–3.87%)
14.	amalgam tattoo	21 (0.87%–3.25%)
15.	vascular lesions	21 (0.87%–3.25%)
16.	hyperkeratosis	21 (0.87%–3.25%)
17.	mucocele	20 (0.83%–3.10%)
18.	haemangioma	19 (0.79%–2.94%)
19.	papilloma	18 (0.75%–2.79%)
20.	reccurrent herpes	15 (0.62%–2.32%)
21.	decubital ulcer	15 (0.62%–2.32%)
22.	leukoplakia	12 (0.50%–1.86%)
23.	papillitis lingue	10 (0.41%–1.55%)
24.	oral squamous cell carcinoma	9 (0.37%–1.39%)
25.	mucosal petechiae	7 (0.29%–1.08%)
26.	candidal infection	7 (0.29%–1.08%)
27.	leukoedema	5 (0.20%–0.77%)
28.	frictional hyperkeratosis	5 (0.20%–0.77%)
29.	teeth impressions on the mucosa	4 (0.16%–0.62%)
30.	haematoma after bite	3 (0.12%–0.46%)
31.	black hairy tongue	3 (0.12%–0.46%)
32.	angular cheilitis	2 (0.08%–0.31%)
33.	median rhomboid glossitis	2 (0.08%–0.31%)
34.	lingua accreta	2 (0.08%–0,31%)
35.	hyperplastic candidiasis	1 (0.04%–0.15%)
36.	nicotine stomatitis	1 (0.04%–0.15%)

Patients and methods

Every participant signed informed consent according to the Helsinki II. Oral mucosal alterations were recorded according to the WHO protocol-Guide to the Epidemiology and Diagnosis of Oral Mucosal Diseases and Conditions.[8] The statistical analysis was done using the SPSS software, where $p < 0.05$ was considered to be significant. Chi-square test was used to analyze the data.

Results

This study included 2395 patients (904 men and 1491 women) who attended general dental practice in Ljubljana, Slovenia.

Mean age for men was 57.94 years, median 61 years, age range 25–92 years. Mean age for women was 57.62 years, median 60 years, age range 22–92 years. Out of 2395 patients, 1755 patients were without oral mucosal changes, while 645 patients (27%) had oral mucosal lesions (Table 1). Oral lesions were equally present in both gender (males 241/904, 26.66%; females 404/1 491, 27.09%). Majority of patients in all groups (smokers, non-smokers, ex-smokers) had only one oral lesion present, as seen in Table 2. In all patients with more than one lesion in the mouth, the median number of lesions was two. Statistically significant association was found only between oral cancer and tobacco smoking ($p < 0.05$, chi-square = 40.23), while statistical analysis of our results did not reveal significant differences in the prevalence of other oral lesions between smokers and non-smokers (chi square test). The most frequent oral lesions in smokers were cheek biting and linea alba, while the most frequent oral lesion in non-smokers were Fordyce spots and fibroma. Oral squamous cell carcinoma was found in only 0.37% of the patients, representing as low as 1.39% of all the examined patients with oral lesions (Table 3).

TABLE 2. Frequency of oral lesions in non-smokers, smokers and ex-smokers

		Without oral lesions	Oral lesions present	One oral lesion	Two or more oral lesions	The most frequent oral lesion
Male (N = 904)	Non-smokers (N = 719)	531 (73.85%)	188 (26.14%)	154/188 (81.91%)	34/188 (18.08%)	Fordyce spots
	Smokers (N = 166)	117 (70.48%)	49 (29.51%)	35/49 (71.5%)	14/49 (28.5%)	cheek biting
	Ex-smokers (N = 19)	15 (78.94 %)	4 (21.05%)	4/4	-	-
Female (N = 1491)	Non-smokers (N = 1249)	914 (73.17%)	335 (26.82%)	288/335 (85.97%)	47/335 (14.02%)	fibroma
	Smokers (N = 226)	163 (72.12%)	63 (27.87%)	53/63 (84.12%)	10/63 (15.85%)	linea alba
	Ex-smokers (N = 16)	10 (62.5%)	6 (37.5%)	6/6	-	traumatic ulcer

TABLE 3. Prevalence of tobacco smoking and most frequent oral lesions, precancerous lesions (oral lichen planus and leukoplakia) and oral cancer. Ex-smokers who have stopped smoking more than 10 years ago are considered as non-smokers. Statistically significant association was found only between oral cancer and tobacco smoking ($p < 0.05$, chi-square = 40.23)

	Study group (N = 2395; %)	Cheek biting (N = 39)	Linea alba (N = 38)	Fibroma (N = 56)	Fordyce spots (N = 46)	Oral cancer (N = 9)	Oral lichen planus (N = 26)	Oral leukoplakia (N = 12)
Smokers	392; 16.37%	20; 51.28%	15; 39.47%	10; 17.86%	11; 23.91%	9**; 100%	6; 23.1%	4; 3.33%
Non-smokers	2003; 83.63%	19; 48.72%	23; 60.53%	46; 82.14%	35; 76.08%	0; 0%	20; 76.9%	8; 6.66%

Discussion

Literature data about the prevalence of oral mucosal lesions are very variable and depend on the observed diagnoses and studied population. Most of published literature observes only the prevalence of precancerous and cancerous lesions. The results of our study show that malignant (OSCC) and potentially malignant lesions of leukoplakia were more frequently diagnosed in males (OSCC - all male patients; leukoplakia - 33.3% females, 66.6% males), which is consistent with the findings from the published literature.[3] It is interesting to note that potentially malignant lesion, *i.e.* oral *lichen planus* was also more frequently diagnosed in males (58% in males compared to 42% in females, respectively). This differs from data published by Kovac-Kavcic and Skaleric[3] and Mathew *et al.*[9] who found greater oral lichen prevalence in females.

Regarding the prevalence of different oral mucosal lesions in population, several authors have reported higher prevalence than in our study.[3,5,10] According to Kovač-Kavčič *et al.*[3], 61.6% of examined patients (N = 555) had oral mucosal lesions, and the most prevalent were Fordyce spots, fissured tongue, lingual varices and recurrent herpes simplex. Campisi *et al.*[5] studied randomly selected 118 male subjects and revealed oral mucosal lesions in 81.3% of the participants. Oral mucosal lesions were coated tongue (51.4%), leukoplakia (13.8%), traumatic oral lesions in 9.2%, actinic cheilitis (4.6%) and oral squamous cell carcinoma (OSCC) in one case. Shet *et al.*[10] found that 48% of the examined patients (N = 570) had oral mucosal lesions which is higher percentage than obtained within our study. This is probably due to the fact that their sample included only geriatric patients older than 60 years, which was not the case in our study. Furthermore, the same authors[10] stated that the most common oral mucosal lesions were lingual varices (13.68%), denture induced inflammatory fibrous hyperplasia (4.21%) and squamous cell cancer (4.21%), all of them which can be seen more often in geriatric population. Our study has shown the prevalence of oral mucosal lesions of 27%. These data are comparable with our previous study[12] which included 1908 patients and where the prevalence of oral mucosal lesions was 16.8%. As seen, literature data show great variability in reported prevalence of oral lesions, depending on the sample size and observed population. When greater number of patients is included in the study, the frequency of oral lesions usually lowers.

Feng *et al.*[2] reported that the prevalence of oral diseases was 10.8% in their study (N = 11 054) which is lower than the prevalence seen in our study (27%). The same authors[2] further reported that the most common type of oral lesions were fissured tongue (3.15%), recurrent aphthous ulcers (1.48%), traumatic ulcer (1.13%) and angular cheilitis (0.86%). This is contrary to the results of our study, as our findings suggest that the five most

common oral diagnoses were fibroma, gingivitis, Fordyce spots, white coated tongue and cheek biting with higher percentages. Previously, various authors such as Chosack *et al.*[13] and Miloglu *et al.*[14] found significant coexistance of geographic and fissured tongue which was not found in our sample.

It is interesting to note that the results from this study are different from the study we performed three years ago on the Slovenian population when cheek biting was the most common lesions followed by fibroma, geographic tongue, amalgam tattoo and Fordyce spots.[12] On the other hand, among five most common oral lesions in our previous[13] and current study, three are consistent (Fordyce spots, cheek biting and fibroma). Furthermore, when our data are compared to an earlier study on Slovene population[3], it can be observed that the prevalence of smokers among the examined patients is much lower than 20 years ago (35% compared to 13.7%), while the prevalence of the oral mucosal lesions is higher (27% compared to 16.8%).

Our results have shown that oral lesions were equally present in both gender (males 241/904, 26.66%; females 404/1 491, 27.09%), unlike Pentenero *et al.*[15] who found greater prevalence of oral mucosal lesions in males. Statistical analysis of our results did not reveal significant differences in the prevalence of oral lesions between smokers and non-smokers (chi square test), except for oral cancer. The most frequent oral lesions in smokers were cheek biting and linea alba, while the most frequent oral lesion in non-smokers were Fordyce spots and fibroma.

Additionally, higher percentage of patients with oral malignancies was found within this sample (9 patients with OSCC; 0.37%) when compared to our previous[12] and also when compared to the other authors such as Triantos *et al.*[1], Feng *et al.*[2], Kovac-Kavcic and Skaleric[3], Mozafari *et al.*[6], Brailo *et al.*[7] and Cebeci *et al.*[16] This requires additional attention and highlights the need for regular oral examinations/screening, especially of the elderly population and individuals with smoking and drinking habits or in which other possible risk factor can be identified (mechanical trauma, HPV infection).

Conclusions

Our study provided information that one fourth (1/4) of the population attending general dental practice had oral mucosal alterations. Irritational, inflammatory and anatomic changes were the most common types of oral mucosal lesions. The frequency of newly diagnosed oral malignancies increased when compared with the previous results. These data provide valuable information for planning future oral health studies and strategy.

It is important to encourage people, to attend preventive medical examination by doctors and dentists. In the same time it is important to educate medical doctors and dentists, to be able to recognize suspicious oral mucosal lesions, because early treatment of oral cancer significantly improves prognosis, treatment outcomes and diminishes post treatment morbidity.

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