ORIGINAL ARTICLE

Detection of oral mucosal lesions by screening examinations

Sandra R Torres [1]*
Natalia Tavares Souza [1]
Mário José Romañach [1]
Marilia Heffer Cantisano [2]
Ronir Raggio Luiz [3]
Abel Silveira Cardoso [1]

Abstract:

Introduction: Studies on the prevalence of oral lesions are important to characterize their occurrence in a population. The understanding of epidemiologic aspects, etiology, natural history and risk factors related to oral pathological conditions are essential to primary prevention, early diagnosis and treatment. **Objective:** The aim of this study was to evaluate the prevalence of oral mucosal lesions (OML) detected during a prevention campaign in stomatology, considering clinical, demographic and social data. **Materials and methods:** The study was conducted with data collected from a prevention campaign in stomatology, in the state of Rio de Janeiro, Brazil. The individuals who agreed to participate in the campaign were clinically examined and answered a questionnaire with sociodemographic questions. The clinically detected OML were recorded for analysis. **Results:** In the three days of the campaign, 10144 individuals were evaluated. The age ranged from 0 to 96 years old, with a mean of 45.0 ± 18.4 years. Twenty two percent of the participants presented OML which required control or treatment. The most prevalent oral lesion was candidiasis (5.2 %), followed by reactive lesions (3.8%), developmental alterations (2.8%), aphthous ulceration (2.1%), conditions related to prosthesis (1.6%), leukoplakia (1.5%) and traumatic ulcers (1.4%). The prevalence of OML was higher among elderly individuals, and there were no differences between genders. **Conclusion:** Oral mucosa screenings are important to detect OML and to refer individuals for treatment. When oral exams are performed as part of a prevention campaign, they provide important epidemiological data.

Keywords: Prevalence; Epidemiology; Oral Lesions; Prevention

[1] Universidade Federal do Rio de Janeiro -UFRJ, Departamento de Patologia e Diagnóstico Oral, Faculdade de Odontologia - Rio de Janeiro - RJ - Brasil.
[2] Universidade do Estado do Rio de Janeiro, Faculdade de Odontologia - Rio de Janeiro - RJ - Brasil.
[3] Universidade Federal do Rio de Janeiro -UFRJ, Instituto de Estudos de Saúde Coletiva - Rio de Janeiro - RJ - Brasil.

Correspondence to:
Sandra R Torres.
E-mail: sandratorres@odonto.ufrj.br

INTRODUCTION

Epidemiological studies indicate variations in the occurrence of oral mucosal lesions (OML) in different populations[1-11]. The primary prevention, early diagnosis and treatment of OML rely on the understanding of the epidemiology, etiology, natural history, geographic variations and related risks[12]. Data from different geographic areas must be evaluated, in order to compare particular variations of each area, and to show specific needs, which should be considered for implementation of health care programs[2,3]. Only few studies on the prevalence of OML in the Brazilian population are available in the English-language literature, most of them presenting small sample size[11-13].

Health care programs and prevention campaigns in stomatology must be held so that the population and health care professionals become aware of the most prevalent and relevant oral lesions. Understanding the prevalence of any disease is important, particularly those which can impact mortality and morbidity. The goals of the performed stomatology campaign were to promote health through oral exams in order to alert the population about oral lesions and the importance of their prevention. The obtained data may help governments to plan how resources may be allotted and invested in best trained professionals to diagnose and manage these diseases.

In studies with large samples (more than 700 subjects), the prevalence of OML varies from 14.7% to 28.0%, in different countries[4,5,7,8,11]. This wide variation can be explained by several factors, such as cultural, economic and social differences, geographical variations, genetic factors, oral habits, and the different methods used in the studies[3,10,11,14,15]. The prevalence of OML may also vary according to gender, age, ethnicity and socioeconomic status[3,14,15]. The knowledge of the prevalence of OML may contribute to professional guidance in the differential diagnosis of lesions, particularly distinguishing pathological conditions from normal variation of oral structures[3,4].

Oral mucosal lesions may affect chewing, swallowing, and speech, and thus, interfere with daily social activities, and also lead to psychological problems[5]. A number of socio-demographic and behavioral factors have been associated with the presence of OML. The most reported factors are exposure to tobacco, alcohol intake, and the use of dental prostheses[1,2,3,4,13,16,17].

The present study was performed with data collected through clinical oral exams, during a prevention campaign in stomatology, in a population of the state of Rio de Janeiro-Brazil. The aim of this study is to present the prevalence of the detected OML, considering the association with clinical, demographic and social data.

MATERIALS AND METHODS

The subjects of the study were participants of a campaign designed to promote the specialty of Stomatology (Oral Medicine) in Rio de Janeiro, as part of the efforts of the Brazilian Society of Stomatology and Oral Pathology (SOBEP). The campaign took place in seven cities of Rio de Janeiro state, during three consecutive days, in October 2003.

All the professional effort in the campaign was voluntary, and most of the academic dental institutions and government health institutions of the participating cities were supporting the event. Meetings were held with representatives of all the participating institutions to organize, discuss and establish the campaign procedures and criteria. Standardized training was offered by a stomatologist in every participating institution, with the same set of slides presentation containing procedures for the campaign, biosafety guidelines, principles of oral semiology, oral mucosa variations, diagnostic definitions, and disclosing the criteria for referrals. There were approximately 800 examiners, including undergraduate and post-graduate students, dentists, and professors of stomatology and oral pathology from different academic institutions and services from Rio de Janeiro state, and all of them received training, but reliability was not assessed. Temporary stands were installed as working stations, inside densely populated urban areas, like public markets or subway stations. Every working station had the supervision of at least one stomatology specialist, per working period.

Information about the role of the specialty of stomatology and individual based preventive information about OML were verbally provided to the individuals who were walking by the campaign areas, with the aid of educational folders and banners. Only those individuals who agreed to be submitted to oral examination and who answered the questionnaire were included in this study.

The study protocol was approved under protocol number 238-16, by the Research Ethics Committee of the Clementino Fraga Filho University Hospital,

Universidade Federal do Rio de Janeiro, Brazil. This study was performed with retrospective data and was waived of consent.

Individuals were submitted to a short questionnaire on socioeconomic, demographic and clinical data, filled-out by dental students. Questionnaire included information on identification, contact, last dental appointment, habits, oral symptoms and medications. The oral symptoms and associations will be analyzed in a different study. Participants were referred to the stands for oral examinations. Portable canopies were used as stands, and the oral examinations were taken place on common chairs inside the canopy, with the aid of a headlamp, respecting the biosafety guidelines, and the principles of oral semiology and stomatology. Oral exams were performed by dentists or by dental students and were supervised by stomatology professors. Whenever an oral lesion was observed during the exam, an experienced stomatologist was requested to confirm the diagnosis.

Morphologic changes of the oral mucosa were considered oral alterations. The oral alterations that needed care or treatment were defined as OML. Bone alterations were detected only when bone expansion was present. Lesions were clinically detected and diagnosed according to established concepts in the literature. The OML detected through oral exams were registered in a special form designed for the study. Individuals who presented OML were referred to a stomatology center, if the condition needed to be investigated, treated or controlled.

If individuals presented variations of oral mucosa and developmental alterations which were not symptomatic and did not need treatment, they received information about the condition and were not referred to any center. Leukoedema, linea alba, physiologic melanin pigmentation, and lingual varicosities, were considered variations of oral mucosa. The following conditions were considered as developmental alterations: Fordyce granules, fissured tongue, geographic tongue, hairy tongue, tori and exostosis, ankyloglossia, macroglossia, bifid uvula, double lip and cleft palate. Periodontal and dental related conditions were not a reason for referral.

The associations of the most frequent or important OML with demographic, social and clinical data were verified. Individuals were separated into groups according to age, which were divided into young (≤18 years), adults (from 18 to 59 years) and elderly (≥ 60 years).

Individuals were categorized in non-smokers, ex-smokers, and smokers. Regarding alcohol consumption, subjects were categorized in non-drinkers, social drinkers, and heavy drinkers (8 and 15 more drinks per week, for women and men, respectively).

The obtained data were compiled and stored in Epi-Info 6.0 database (CDC, Atlanta, EUA). Data were analyzed on SPSS 13.0 (IBM, Armonk, EUA). A description analysis was performed, and the chi-square and T tests were used to check the association between dichotomous and measurable data, respectively. The significant level was set at $p < 0.05$.

RESULTS

During the three days of the campaign, 10,144 individuals were clinically evaluated, with mean age of 45.0 ± 18.4 years (ranging from 0 to 96 years). Sixty-one percent of the population were women, and most of the individuals were adults (67.3%). Table 1 shows the demographic and clinical findings of the studied individuals. The metropolitan region of Rio de Janeiro state held most of the stands for the campaign, and was also the place with the highest number of examined individuals (87.9%).

There were 48.7% of the individuals reporting a dental visit in the previous year. The use of medications was reported by 44.4% of the individuals, and more women (28.0%) were using medications than men (16.2%, $p = 0.004$). The most frequently reported medications were antihypertensive drugs (18.7%) and tranquilizers (7.4%). Thirty seven percent of the individuals were current or ex-smokers, and 44.3% were alcohol consumers (Table 1).

There were 66.3% of the population showing normal oral exam, and 11.7% who presented oral alterations which required no treatment. There were 2,233 (22.0%) individuals presenting OML which required care and were referred for treatment (Figure 1). The most prevalent OML was candidiasis (5.2%), reactive lesions (3.8%), developmental alterations (2.9%), aphthous ulceration (2.1%), injuries caused by prosthesis (1.6%), leukoplakia (1.5%) and traumatic ulcers (excluding ulcerations caused by dental prosthesis) (1.4%) (Figure 1). The OML observed in frequencies lower than 1% were classified as 'others' and were not analysed.

The prevalence of OML was higher among elderly individuals (Table 2). The most prevalent OML observed in adults and elderly individuals were candidiasis (5.6%) and reactive lesions (4.1%) (Figure 2). In young individuals, the most prevalent OML were aphthous ulcers (2.6%) and developmental alterations

Table 1. Sociodemographic characteristics of the 10144 evaluated individuals from Rio de Janeiro, Brazil.

Demographic characteristics	Total n=10144	%
Gender		
Male	3204	38.5
Female	5128	61.5
Non-notified	1812	-
Age Group		
Young (≤18)	881	8.7
Adult	6815	67.3
Elderly (≥ 60)	2431	24.0
Non-notified	17	-
City of evaluation		
Metropolitan area*	7331	87.9
Other cities	1001	12.1
Smoking status		
Never smoked	6305	63.0
Ex-smoker	2349	23.4
Smoker	1365	13.6
Non-notified	125	-
Alcohol consumption		
Not alcohol consumer	5591	55.7
Social drinker	4271	42.6
Heavy drinker	173	1.7
Non-notified	109	-
Last visit to the dentist		
Less than one year	3979	48.7
One to five years	2487	30.3
Over five years	1721	21.0
Non-notified	1957	-

*City of Rio de Janeiro and surrounding areas

(2.1%). No differences were observed in the prevalence of OML between genders. More OML were detected in individuals using medications (26.9%), when compared to those not using medications (18.1%; p<0.001).

None of the most prevalent or important OML showed statistical significant differences between genders. Candidiasis, reactive lesions, developmental alterations, injuries caused by prosthesis, traumatic ulcers, and leukoplakia were statistically more prevalent among the elderly. Erythroplakia and oral cancer were not observed in young individuals (Figure 2).

The association of smoking and alcohol consumption with OML, among the 9246 adults and elderly of the study are shown on Table 3. Smoking was significantly associated to larger number of cases of candidiasis, leukoplakia and erythroplakia and smaller number of subjects with aphthous ulcers. Alcohol consumption was associated to larger number of leukoplakia cases. No association of oral cancer and these habits was observed.

DISCUSSION

Twenty two percent of the 10,144 individuals screened during a prevention campaign in stomatology presented OML which required care by a stomatology professional. This represents a high prevalence of individuals in need for proper management by a stomatologist. Most of these individuals were not aware of any alterations in their mouth, because most of the OML are asymptomatic. These data emphasize the importance of routine oral mucosal exams, in order to early detect and properly treat OML. Moreover, these data also highlight the population needs of specialized care in stomatology.
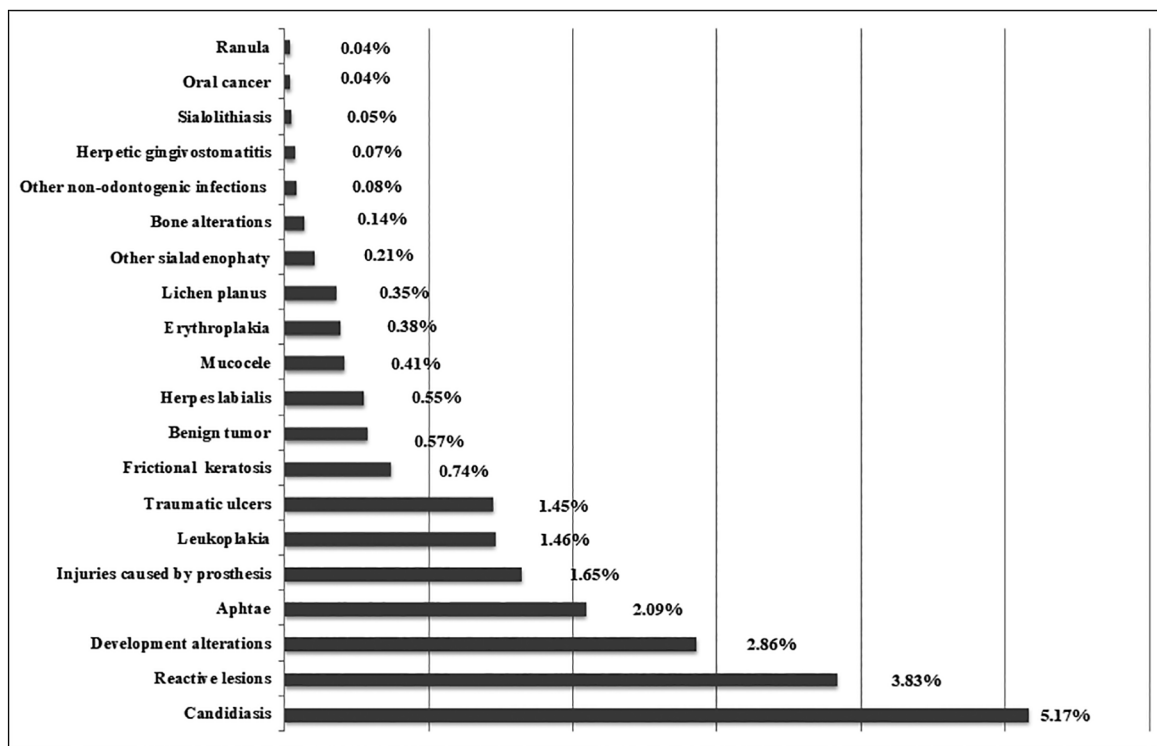
Figure 1. Frequency of oral mucosal lesions observed in the 10144 evaluated individuals.

Table 2. Oral mucosa status of the 10144 evaluated individuals, according to age and gender.

| Characteristics	Total		Normal oral mucosa		OML* with no treatment required		OML* which required care		p value
	n	%	n	%	n	%	n	%	
	10144		6724	66.3	1187	11.7	2233	22.0	-
Age group									<.001
Young	881	8.7	715	81.2	88	9.9	78	8.9	
Adults	6815	67.3	4669	68.5	811	11.9	1335	19.6	
Elderly	2431	24.0	1325	54.5	286	11.8	820	33.7	
Non notified	17	-	-	-	-	-	-	-	
Gender									.363
Male	3204	38.5	2161	67.4	354	11.1	689	21.5	
Female	5128	61.5	3487	68.0	581	11.3	1060	20.7	
Non notified	1812	-	-	-	-	-	-	-	

*OML - oral mucosal lesions.

The finding of overall oral alterations in the studied population was 33.7%, when those alterations that did not need treatment were included. The prevalence of oral alterations in a similar study was 16%[7]. Studies showing separated data on oral alterations which do not need care, from OML are scarce in the literature.

This study evaluated the presence of OML in the largest Brazilian population sample. The prevalence of OML based on small samples must be interpreted with caution. Only few authors have studied the prevalence of OML in large population samples[4-8,11]. The mean overall prevalence of OML reported from these studies was 21.4%.

More female individuals (61.5%) have been observed in this study, but there were no significant gender differences in the distribution of the oral conditions. The increased number of female individuals may be explained by the fact that women generally care
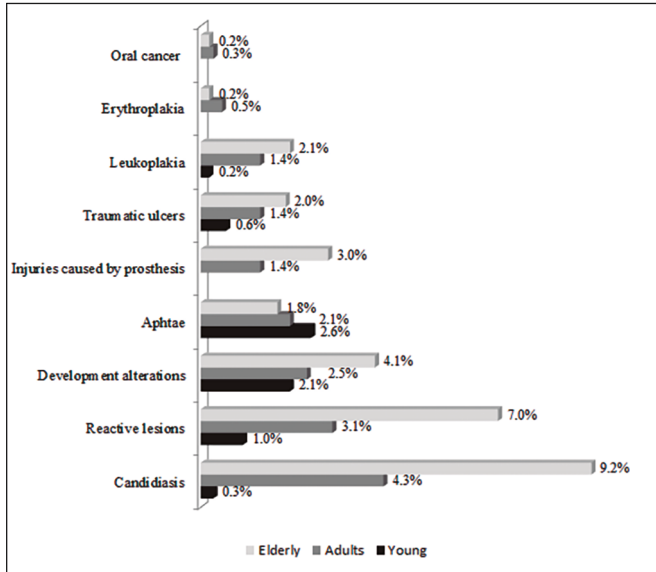
Figure 2. Most prevalent or relevant oral lesions, according to the age groups, observed in the 10144 evaluated individuals.

more about health, and this way, they were more likely to attend the examinations during the campaign[3].

The age of individuals may have an important influence on the prevalence of OML[9,11,14]. In this study, elderly individuals were more affected by OML that required further professional care (Table 2). Previous studies have also reported an increased risk to develop OML in adults and elderlies[9,14,17]. This may be explained by adaptive oral mucosal changes due to mechanical or chemical irritation, and by oral manifestations of systemic diseases, which are quite common in older adults[1,4,6,9,13,14,16,17]. The most common conditions observed in adults and elderlies were candidiasis and reactive lesions, which may be related to these factors.

Candidiasis is an opportunistic fungal infection, caused by *Candida* spp., which can colonize one third of the population, with prevalence ranging from 1.35% to 17.2% in several studies[3,5,7,10,11]. In this study, candidiasis was the most prevalent OML (5.17%), affecting mainly adults and elderly individuals. Information on the different types of candidiasis was not registered during the campaign.

Developmental alterations are the most prevalent oral conditions reported in some studies[3,5,11], as in the present study (2.86%). These changes are usually

Table 3. Presence of most prevalent and relevant oral lesions according to tobacco and alcohol consumption, among the 9246 adults and elderly individuals.

OML according to smoking status[†]	Total		Not smoker		Ex-smoker		Smoker		*p* value
	n	%	n	%	n	%	n	%	
Candidiasis	520	5.6	275	5.0	151	6.5	91	6.8	0.005
Reactive lesions	380	4.1	212	3.9	109	4.7	56	4.2	0.245
Development alterations	271	2.9	166	3.0	71	3.1	33	2.5	0.531
Aphtae	189	2.0	132	2.4	46	2.0	11	0.8	0.001
Injuries by prosthesis	167	1.8	90	1.6	50	2.2	27	2.0	0.259
Traumatic ulcers	142	1.5	83	1.5	34	1.5	23	1.7	0.815
Leukoplakia	146	1.6	54	1.0	44	1.9	47	3.5	<0.001
Erythroplakia	39	0.4	15	0.3	9	0.4	13	1.0	0.001
Oral cancer	4	0.04	1	0.02	1	0.02	2	0.1	0.119

OML according to alcohol consumption[††]	Total		Not alcohol consumer		Social drinker		Heavy drinker		
	n	%	n	%	n	%	n	%	
Candidiasis	520	5.6	282	5.8	221	5.3	13	7.6	0.334
Reactive lesions	380	4.1	200	4.1	168	4.1	10	5.8	0.525
Developmental alterations	271	2.9	152	3.1	114	2.8	4	2.3	0.501
Aphtae	189	2.0	114	2.4	72	1.7	3	1.7	0.120
Injuries by prosthesis	167	1.8	89	1.8	72	1.7	6	3.5	0.242
Traumatic ulcers	142	1.5	88	1.8	50	1.2	2	1.2	0.060
Leukoplakia	146	1.6	74	1.5	62	1.5	9	5.2	0.001
Erythroplakia	39	0.4	17	0.4	18	0.4	1	0.6	0.755
Oral cancer	4	0.04	1	0.02	3	0.1	0	0	0.484

OML = oral mucosa lesion
[†] The smoking status was non-notified for 102 individuals
[††] The alcohol consumption status was non-notified for 86 individuals

found in young individuals,[11] but some of them appear throughout life, and may have associated factors[18].

Recurrent aphthous ulceration has been documented as affecting 28.2% to 76.2% of different populations, and the most common age group is from 20 to 39 years, in both genders[19,20]. In this study, the prevalence of aphthous ulceration was of 2.09%. This difference may be explained by the study design, as cross-sectional studies are not designed to detect recurrent clinical changes. Adults were mainly affected by aphthous ulceration, which is in agreement with previous studies[19,20].

Associations between OML and tobacco or alcohol consumption have been reported in many studies[5,7]. In this study, an increased frequency of leukoplakia and erythroplakia was observed among smokers, although alcohol consumption was not significantly associated to erythroplakia. Interestingly, these results suggest that smoking shows a protective effect for recurrent aphtous ulcers, but a multivariate analysis would have to be performed to explore these associations. It has been suggested that tobacco may increase keratinization and reduce inflammatory response of the oral mucosa, becoming less susceptible to recurrent aphtous ulcers[21,22].

Oral cancer is one of the ten most common malignant diseases[5]. The majority of oral squamous cell carcinomas occur in patients over 40 years of age, with risk factors as tobacco and alcohol consumption[5]. In the present study, clinically detected malignant lesions were observed in only 0.04% of the subjects and no clinical correlation could be drawn due to the small number of cases. Besides the fact that only clinical data were available, no information on the type of oral cancer was registered. Therefore, the benefit of this prevention campaign in stomatology is important for detecting OML. When the focus is of prevention is oral cancer, screenings are more likely to be effective when performed in specific populations at risk[23,24].

Potentially malignant OML as leukoplakia (1.46%) and erythroplakia (0.38%) were observed in this population, and individuals were referred for management of conditions. Clinical examination is the gold standard for the early detection of OML. Some OML may have similar clinical features, which represent a challenge for the diagnosis[14]. The biopsy, followed by histopathological examination are important tools for establishing the final diagnosis[14]. The diagnoses presented in this study are not definitive. Individuals with suspected premalignant and malignant lesions were referred to centres of stomatology to confirm the diagnosis and appropriate treatment.

Nearly half of the subjects reported that their last visit to the dentist occurred within less than one year. Most of these individuals were females (60.9%), reflecting a greater concern for oral health among women when compared to men[3]. Despite of that, the prevalence of OML remained high. If lesions appeared after the last dental appointment or dentists are not early detecting OML during oral exams, is a matter that needs to be investigated in future studies.

Many medications have adverse effect manifested in the oral mucosa. Medical history is essential for the diagnosis of oral changes and appropriate treatment[3]. Some antihypertensive drugs and diuretics may cause lichenoid reactions that can be misdiagnosed as lichen planus[1]. In this study, antihypertensive drugs were being used by 18.7% of the population and could have been responsible for part of the 0.35% of individuals who presented oral lichenoid lesions. This way, some anti-inflammatory and antihypertensive drugs can cause ulcers in oral mucosa, and 8.4% and 28.9% of the individuals who presented aphthous ulcerations were using anti-inflammatory and antihypertensive drugs, respectively. (Data not shown)

This study has some limitations. A limitation of this study was the clinically based diagnoses of oral lesions, with no complementary exams. Patients had follow-up visits in different institutions and periods of time, and only limited data were registered for the final diagnoses and outcomes. Moreover, a convenience sample of individuals was used in each area, so the sample may not be representative of the population of the state of Rio de Janeiro. It is necessary that health care professionals and the population increase their knowledge and understanding of the most prevalent and relevant OML, through public health programs. In this campaign, the population was instructed about common oral diseases, as well as the role of the specialist in stomatology in the diagnosis and prevention of OML. It was also possible to verify the prevalence of OML, where approximately one-third of subjects had oral alterations, and a fifth of the examined individuals needed further care in stomatology.

CONCLUSIONS

Oral exams are important to detect OML and to refer individuals for treatment. Twenty-two percent of the screened population presented OML and needed proper management and specialized care in stomatology. The most common OML were candidiasis, followed by reactive lesions, developmental alterations, aphthous ulcerations, injuries caused by prosthesis, leukoplakia and traumatic ulcer. Elderly individual presented more

oral alterations than other age groups. When oral exams are performed as part of a prevention campaign, they provide important epidemiological data.

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