Oral mucosal lesions and their association with sociodemographic, behavioral, and health status factors

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Abstract: The aim of this study was to evaluate the frequency of oral mucosal lesions and their associations with sociodemographic, health, and behavioral factors in a southern Brazilian population. Information was collected from participants (n = 801) using a structured questionnaire during an oral cancer screening campaign held at an agribusiness show in southern Brazil in 2009. Data were described using frequency distributions or means and standard deviations. Associations between independent variables and outcomes were assessed using the Chi-squared test. A total of 465 lesions were detected (actinic cheilitis: n = 204, 25.5%; candidiasis: n = 50, 6.2%; fibrous inflammatory hyperplasia: n = 42, 5.2%; ulceration, n = 33, 4.1%; hemangioma: n = 14, 1.7%; leukoplakia: n = 11, 1.4%). Candidiasis, actinic cheilitis, and fibrous inflammatory hyperplasia were associated significantly with literacy. Actinic cheilitis was also associated significantly with sun exposure and hat use, and leukoplakia was associated with smoking. The high frequency of oral mucosal lesions observed highlights the importance of education about risk factors. Additionally, training of health professionals, mainly those from public health services, in the use of preventive and community education strategies is needed.

Keywords: Mouth Neoplasms; Ulcer; Candidiasis; Health Status.

Introduction

The etiologies of oral mucosal lesions include infection, local trauma, and metabolic, immunologic, and neoplastic diseases.[1] Surveys have demonstrated that the prevalence of these lesions varies across the world in association with factors such as skin color, sex, exposure to risk factors for oral cancer, general health status of sample populations, and diagnostic criteria.[2] Epidemiologic studies of oral mucosal lesions are scarce compared with investigations of caries and periodontal disease.[3] Several such studies have been carried out in samples of people with specific diseases, such as oral cancer[1,2,3,4] and diabetes,[5] as well as those with particular chronic conditions and specific age groups.[6,7] Apart from population characteristics, geographic differences in the prevalence of these lesions may also be explained by the use of various experimental designs for their examination. However, as a rule, these studies have shown that the occurrence of oral lesions tends to increase with age, and is higher in male subjects, smokers, and alcoholics.[8]

Investigation of the epidemiology and occurrence of oral lesions has become an important tool in understanding the prevalence, extent, and degree of oral diseases in the general population.[1,2,3,4,5,8,7,8,9,10] Although the World Health Organization recommends oral cancer screening, few studies have been published on this subject, in contrast to other oral diseases. Accurate estimates of the occurrence of these lesions and more in-depth comprehension of their relationship to social determinants are essential for prevention and health promotion.[10] The aim of the present study was to determine the frequency of oral mucosal lesions and evaluate associations with sociodemographic, health, and behavioral factors in a southern Brazilian population.

Methodology

Experimental design and sample

The Committee for Ethics in Research, *Universidade Federal do Rio Grande do Sul* - UFRGS, Brazil, approved this cross-sectional study (protocol no. 18.980). The sample population comprised participants in an oral cancer awareness screening campaign held in 2009 during an agribusiness show in the city of Esteio, RS, Brazil.

A structured questionnaire was used to collect data pertaining to participants' sociodemographic characteristics (sex, age, self-reported skin color, monthly income, place of residence, and literacy). Self-reported skin color was dichotomized as white or non-white. Monthly income, in reais (R$, the currency of Brazil), was categorized as ≤R$500, R$501–1000, R$1001–1500, >R$1500, or not indicated. Literacy was classified according to educational level (elementary, high school [including dropouts], or university [including dropouts]).

Data on alcohol consumption (no, yes, former drinker), tobacco smoking (no, yes, former smoker; number of cigarettes/day), mate tea consumption (no, yes; liters/day), coffee consumption (no, yes; cups/day), sun exposure (no, yes; hours/day), hat use (no, yes), and sunscreen use (no, yes) were also recorded. Self-reported health status was investigated using dichotomized response options (no, yes). The most prevalent systemic diseases were regarded as hypertension, diabetes, hepatitis, and high cholesterol. Daily use of medication (no, yes) was determined

during the interview, and the most common drugs were antihypertensives, diuretics, hypoglycemics, antibiotics, analgesics, non-steroidal anti-inflammatory drugs (NSAIDs), and contraceptives.

Examinations of the oral cavity were supervised by an experienced stomatologist. The location, size, color, base characteristics, fundamental lesion, and consistency of lesions were recorded, along with respective diagnostic hypotheses. In cases of suspected oral lesion diagnosis, participants were referred for treatment at the School of Dentistry, UFRGS, or to a National Health Service unit (*Sistema Único de Saúde* – SUS).

Statistical analysis

The data collected from each participant were used to construct a data set. Categorical variables were described in terms of absolute and relative frequencies, and continuous variables were described as means and standard deviations. Associations of independent variables with outcomes were assessed using the Chi-squared or Fisher's exact test, as applicable (SPSS 13; SPSS Inc., Chicago, USA). A significance level of 5% was used for all tests.

Results

Sociodemographic and behavioral characteristics

The mean age of the 801 participants was 51.33 (range, 11–88) years. All other sociodemographic data are shown in Table 1.

Table 2 shows the behavioral characteristics of the participants. Drinkers were more likely to be smokers (p = 0.01).

Health status

Concerning the occurrence and distribution of systemic diseases, 197 (24.6%) participants were hypertensive, 120 (15%) had hypercholesterolemia, 45 (5.6%) had diabetes, and 36 (4.5%) had hepatitis. A total of 178 (22.2%) participants reported antihypertensive drug use. Fifty-four (6.7%) participants used diuretics, 31 (3.9%) used hypoglycemic drugs, 26 (3.2%) used contraceptives, 24 (3%) used analgesics, 13 (1.6%) used NSAIDs, and 3 (0.4%) used antibiotics. Conversely, 566 (70.7%) participants stated that they used no medication.

Table 1. Distribution of individuals assessed according to sociodemographic variables.

	n	(%)
Gender		
Male	439	54.8
Female	362	45.2
Skin color		
White	718	89.6
Non-white	36	4.5
Not informed	47	5.9
Literacy		
Elementary	321	40.1
High school (including drop-outs)	262	32.7
College (including drop-outs)	203	25.4
Not informed	15	1.8
Income (R$)		
≤500	135	16.9
501 - 1,000	233	29.1
1,001 - 1,500	120	15
>1,500	295	36.8
Not informed	18	2.2
Total	801	100

Table 2. Distribution of individuals assessed according to behavioral variables.

	n	%
Smoking		
Smoker	70	8.7
Non-smoker	549	68.6
Former smoker	182	22.7
Alcohol		
Yes	407	50.8
No	394	49.2
Smoking and alcohol consumption		
Non-smoker, non-drinker	371	46.31
Only drinker	360	44.94
Smoker and drinker	47	5.86
Only smoker	23	2.89
Sun exposure		
Yes	528	65.9
No	273	34.1
Hours a day – mean	4.77	
Hat use		
Yes	349	43.6
No	452	56.4
Sunblock use		
Yes	244	30.5
No	557	69.5
Coffee consumption		
Yes	523	65.3
No	278	34.7
Cups a day – mean	2.32	
Mate tea consumption		
Yes	512	63.9
No	289	36.1
Liters a day – mean	1.12	
Total	801	100

Oral mucosal lesions

A total of 465 lesions were diagnosed in 376 (46.9%) participants. Of these, 301 (80.05%) presented one lesion, 63 (16.75%) had two, 10 (2.65%) had three, and 2 (0.55%) had four lesions. The most common lesions were actinic cheilitis (n = 204, 43.9%), candidiasis (n = 50, 10.7%), fibrous inflammatory hyperplasia
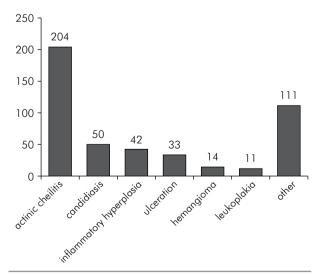

Figure. Prevalence of oral mucosa lesions in individuals examined.

(n = 42, 9%), ulcerations (n = 33, 7%), hemangioma (n = 14, 3%), and leukoplakia (n = 11, 2.4%). Less frequently occurring lesions were observed in 111 (24%) cases (Figure).

The presence of actinic cheilitis was associated significantly with fibrous inflammatory hyperplasia and low literacy. The prevalence of actinic cheilitis was associated with candidiasis (Table 3). Skin color and sex were also associated significantly with the prevalence of actinic cheilitis, with white people (p = 0.01; odds ratio [OR] = 4.07, 95% confidence interval [CI] = 1.23–13.43) and male subjects (p < 0.05,

Table 3. Association between literacy and prevalence of actinic cheilitis, candidiasis and inflammatory hyperplasia.

Literacy	Actinic cheilitis		Candidiasis		Inflammatory Hyperplasia	
	No	Yes	No	Yes	No	Yes
Elementary	214 (66.7%)	107 (33.3%)	288 (89.7%)	33 (10.3%)	296 (92.2%)	25 (7.8%)
High school (including drop-outs)	204 (77.9%)	58 (22.1%)	252 (96.2%)	10 (3.8%)	257 (98.1%)	5 (1.9%)
College (including drop-outs)	170 (83.7%)	33 (16.3%)	198 (97.5%)	5 (2.5%)	192 (94.6%)	11 (5.4%)

OR = 3.73, 95% CI = 2.6–5.37) more likely to present these lesions. The frequency of actinic cheilitis was associated significantly with greater sun exposure (p = 0.05); accordingly, it was negatively associated with hat use. Hat use was correlated significantly with the extent of sun exposure (OR = 2.95, 95% CI = 2.12–4.1).

The prevalence of candidiasis was associated with low income (p = 0.02, OR = 2.82, 95% CI = 1.14–6.97). Individuals who reported oral hypoglycemic drug use (p = 0.03, OR = 3.098, 95% CI = 1.13–8.45) also had a higher risk of candidiasis development. No significant association was observed between oral mucosal lesions and the use of antihypertensives, diuretics, contraceptives, analgesics, NSAIDs, or antibiotics. The prevalence of leukoplakia was associated positively with smoking (p = 0.011, OR = 6.26, 95% CI = 1.78–21.96).

Discussion

This study evaluated the frequency of oral lesions and associated factors using data collected during an oral cancer screening campaign in southern Brazil. In contrast to the majority of studies on this issue, which have assessed urban populations, the present study sample was composed predominantly of individuals from a rural area. The results reinforced previous findings that some sociodemographic indicators influence oral health,[11] notably in relation to oral mucosal lesions.

A large proportion (46.9%) of the population presented oral mucosal lesions, similar to percentages reported by Espinoza *et al.*[3] and Garcia-Pola *et al.*[8] However, participants in the present study comprised a convenience sample that was not representative of the southern Brazilian population. Hence, further direct comparisons by lesion type are unwarranted.

In previous studies, factors such as age,[4] sex,[4,5,6,7,8,9,10] tobacco smoking,[1] alcohol consumption,[8,9,10] socioeconomic status,[10] oral prosthesis use,[10] and health status[8] have been associated with the occurrence of oral mucosal lesions. Our data demonstrated similar associations for actinic cheilitis, candidiasis, inflammatory fibrous hyperplasia, and leukoplakia.

The present sample comprised mainly farm workers and others who worked outdoors. As expected and in agreement with previous studies, actinic cheilitis was associated with male sex, white skin color, greater sun exposure, and non-use of photoprotection. In agreement with Sousa Lucena *et al.*,[12] we also found that oral lesions were more likely in individuals with lower literacy. This result may be explained by the characteristics of people in this group, who give low priority to self-care and have harmful health habits, in addition to lacking awareness about oral diseases.[13]

Candidiasis was correlated positively with the use of oral hypoglycemic drugs to control diabetes mellitus. Vasconcelos *et al.*[14] reported a significantly greater frequency of candidiasis in diabetic than in non-diabetic patients. The mechanism by which diabetes acts as a risk factor for oral candidiasis has not been fully clarified. However, high glucose levels,[15] low salivary flow,[16] and low saliva pH, characteristic of diabetic patients, are known to favor fungal growth. Thus, specific training for health professionals in oral care and the risk of fungal diseases could play an important role in health promotion in this group of patients.

The majority of patients with candidiasis used removable prostheses, associated with an 8.5-times increase in the likelihood of developing this condition.[17] Long-term prosthesis use affects the occurrence of several lesion types, including denture stomatitis, a clinical subtype of candidiasis.[18] Most edentulous people have lower income and literacy levels, less access to services, and poor self-rated oral health[19] and hygiene.[20] These factors may influence candida colonization.[21]

The frequency of fibrous inflammatory hyperplasia was also related to removable prosthesis use, as shown in other studies,[10,19] particularly those examining long-

term use.[19] Modification of the alveolar ridge occurs over time in these patients,[22] requiring replacement of the prosthesis as it becomes ill-fitting. However, patients from socioeconomically disadvantaged groups have been found to frequently choose less-expensive treatments[23,24] and probably do not have the resources required for prosthesis replacement.[25] Thus, individuals with lower incomes are assumed to use the same removable prostheses for longer periods of time, favoring candidiasis occurrence.

Even with recent advances, access to health services remains limited in Brazil,[26] particularly in rural areas.[27] Clearly, municipalities with better infrastructure, including transportation, community integration, and health services, provide more access to health services.[28] These aspects apparently generate inequalities that modify the oral health profiles of rural populations. In addition, general medical and dental practitioners need better training in the diagnosis of oral conditions.[29] The lack of skills in oral mucosal lesion detection and oral diagnostic processes probably contributes to the underestimation of lesion prevalence. The data from this study highlight the importance of education in oral health promotion for health professionals and the general population.[30] These activities should be included in oral cancer screening campaigns to improve their effectiveness.

Conclusion

The high frequency of oral mucosal lesions observed in this study highlights the importance of orientation about risk factors. Additionally, training of health professionals, mainly those in public health services, in the use of preventive and community education strategies is needed. Different types of health professional can potentially contribute to routine inspections of the oral mucosa, improving the early diagnosis of lesions, especially those that may evolve into cancer. Furthermore, measures to reduce social and economic inequalities may improve oral health indicators.

Acknowledgments

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