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EPIDEMIOLOGICAL AND CLINICOPATHOLOGICAL STUDY WITH ANALYSIS OF RISK FACTORS OF ORAL LESIONS IN TWO DISTINCT REGIONS OF BRAZILIAN NORTHEAST

Estudo epidemiológico e clínico-patológico com análise de fatores de risco de lesões orais em duas regiões distintas do Nordeste brasileiro

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RESUMO

Introdução: Variações geográficas também contribuem para o aparecimento de algumas lesões bucais, como câncer de lábio e queilite actínica. Porém, essa associação pode estar relacionada com hábitos, condições ambientais e ocupação profissional encontrados em diferentes regiões. **Métodos**: Foi realizado um estudo observacional, transversal e quantitativo. Os dados foram coletados de prontuários clínicos e laudos histopatológicos de pacientes com lesões bucais atendidos nas 14ª (região semiárida) e 16ª (região litorânea) Coordenadorias Regionais de Saúde (CRES) do estado do Ceará, entre agosto de 2010 e janeiro de 2012. **Resultados**: 110 pacientes foram incluídos, a maioria do sexo feminino (64,5%) e na sexta década de vida (25,0%). O diagnóstico histopatológico mais prevalente foi de hiperplasia fibroepitelial (40,9%), seguido de carcinoma espinocelular, mucocele e fibroma traumático (8,2%). Não foram

encontradas diferenças na forma de apresentação das lesões entre as regiões geográficas. A exposição aos fatores tabagismo (p=0,001), álcool (p=0,047) e exposição solar (p=0,016) foram associados positivamente com lesões malignas e potencialmente malignas. Além disso, o uso de chapéu e protetor labial (p<0,05, OR= 5,6 e 19,9, respectivamente) foram associadas à prevenção de lesões malignas e potencialmente malignas em ambas as regiões. **Conclusões**: Não foram encontradas diferenças significativas no perfil de lesões encontrado quando comparadas as duas regiões, costeira e semiárida. Ressalta-se a importância do papel preventivo do uso de chapéus e protetores labiais na redução da prevalência de neoplasias malignas.

Palavras-chave: Epidemiologia, Diagnóstico Oral, Fatores de Risco.

ABSTRACT

Introduction: Geographic variations also contribute to the appearance of some oral lesions, such as lip cancer and actinic cheilosis. However, this association may be related to habits, environmental conditions and professional occupation found in different regions. **Methods**: An observational, cross-sectional and quantitative study was carried out. Data was collected from clinical records and histopathological reports of patients with oral lesions served in the 14th (semiarid region) and 16th (coastal region) Regional Health Coordinations (CRES) in the state of Ceará, between August 2010 and January 2012. **Results**: 110 patients were collected, the majority of whom were female (64.5%) and in their sixth decade of life (25.0%). The most prevalent histopathological diagnosis was fibroepithelial hyperplasia (40.9%), followed by squamous cell carcinoma, mucocele and traumatic fibroma (8.2%). No differences in the presentation of injuries among regions were found. Exposure to factors smoking (p=0.001), alcohol (p=0.047) and sun exposure (p=0.016), besides the use of hat and lip balm (p<0.05, OR= 5.6 and 19.9, respectively) were associated with prevention of malignant and potencial malignant lesions in both regions. **Conclusions**: No significant differences were found in the injury profile found when comparing the two regions, coastal and semi-arid. The importance of the preventive role of wearing hats and lip balms in reducing the prevalence of malignant neoplasms is highlighted.

Keywords: Epidemiology, Oral Diagnosis, Risk Factors

INTRODUCTION

Oral lesions manifest in various forms, often necessitating complementary exams to reach a precise diagnosis. Moreover, epidemiological factors, including gender, age group, anatomical site, geographic conditions and exposure to risk factors must be considered. Combining epidemiological and histopathological data significantly enhances diagnostic conclusion (1). Investigating oral lesions, their epidemiological profiles, and potential risk factors in a population provide support for directing more effective prevention and treatment strategies, also facilitating early detection and diagnosis of malignancies (2,3).

Given Brazil's vast dimensions, it is essential to conduct studies among its different regions, since socioeconomic, cultural and climatic disparities suggest potential variations in the prevalence of oral injuries (4).

Various lesions arise from the epithelial tissue of oral mucosa and may range from reactve to neoplastic behavior (5). Despite this, several studies indicate that non-neoplastic proliferative processes, such as fibrous and fibroepithelial hyperplasias, often associated with inflammatory stimuli, constitute the most prevalent lesions in the oral cavity (6,7)

Malignant neoplasms of the oral cavity represent a significant public health concern in Brazil and globally. According to estimates from the National Cancer Institute (INCA) of the Ministry of Health, oral cancer ranks seventh among malignancies in Brazil, being the fifth most common neoplasm in men (8).

In the Northeast region, oral cavity cancer ranks fifth among men (2.350 cases) and tenth among women (1.150 cases), with aproximately 3,500 new cases expected. In 2023, the Northeast region emerged as the second most affected by malignant neoplasms of the mouth, with Ceará state being the second most prevalent for this type of neoplasm. An estimated 760 new cases of oral cavity neoplasms were reported, with 230 in the capital, Fortaleza, and the remainder dispersed across state (8).

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Numerous factors contribute to the rising incidence of oral cancer, including population aging due to socioeconomic development. Urbanization and technological advancement, also expose individuals to diseases associated with food additives, pesticides, environmental pollution, smoking and alcohol consumption (8,9). Geographic disparities also influence the occurrence of certain oral lesions, such as lip cancer and actinic cheilosis, often linked to regional habits, environmental conditions and professional occupation (10,11).

Despite limited number of publications showing associations between the different geographic regions of Brazil and oral lesion, BARRETO et al. (2006), noted a high prevalence of malignant mouth lesions in the hinterlands of the state of Paraíba, suggesting that there could be differences in the distribution of oral lesions according to the most prevalent risk factors in each climatic region.

AIMS

This study aimed to conduct an epidemiological and clinicopathological investigation of oral mucosal lesions diagnosed in two distinct regions of Ceará state. This work seeks to elucidate potential correlations between oral lesion incidence in two contrasting climatic zones - coastal and semi-arid – and outline the epidemiological profile of oral diseases in these regions. Additionally, the study aims to analyze exposure to risk factors and the use of protective measures among these populations.

MATERIALS AND METHODS

Ethical aspects

The study received prior approval from the Research Ethics Committee (COMEPE) of the Faculty of Medicine, Federal University of Ceará. All participating patients provided informed consent before inclusion in this stidy.

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Study design

This study follows an observational, cross-sectional and quantitative design, representing a segment of a larger multicenter initiative involving collaboration between State Department of Health, Municipal Health Departments across rural Ceará, Hospital Networks and the Federal University of Ceará. The study focuses on two different Regional Health Coordinators (CRES): 14th CRES (central hinterland region), which is made up of the municipalities of Aiuaba, Arneiroz, Parambú and Tauá; and 16th CRES (coastal region) composed of the municipalities of Barroquinha, Camocim, Chaval, Granja and Martinópole Both regions have the implementation of the Family Health Program (PSF) and Dental Specialty Centers (CEO's) with Stomatology services,

The sample for this study was derived from clinical records and biopsy data of patients presenting with oral mucosal lesions, treated at the 14th and 16th CRES in Ceará, between August 2010 and January 2012. Data comprising socioeconomic parameters (gender, age, education level, occupation and monthly income), behavioral aspects related risk factors (such as smoking, alcohol consumption, sexually transmitted diseases and sun exposure) and knowledge about oral cancer were extracted from patients' clinical records. These records were compiled by the Oral Health coordinators of each respective region and forwarded to the Oral Pathology Laboratory for analysis.

Sex distribution was categorized into male and female, and age groups were classified according to World Health Organization standards, comprising 0 to 90 years (13).

Additionally, clinical data regarding the presence, size, location, implantation, duration and clinical diagnosis of oral mucosal lesions were documented. Lesions were classified as benign, potentially malignant, or malignant.

Biopsy procedures were conducted at the CEOs of each region, followed by Oral Pathology Laboratory of the Dentistry Course, Faculty of Pharmacy, Dentistry, and Nursing, Federal University of Ceará. Anatomopathological reports were

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subsequently relayed to the respective Dental Specialty Centers in the two regions.

Patients diagnosed with benign and potentially malignant lesions underwent treatment at the corresponding CEOs and referred to the Stomatology service at the Federal University of Ceará when necessary. Patients diagnosed with malignant lesions received treatment at the Head and Neck Surgery service at either Walter Cantídio University Hospital or Haroldo Juaçaba Hospital.

Statistical analysis

Data were expressed as absolute frequency, percentage and percentage confidence interval. Uni, bi and multivariate analyses were conducted using Fisher or Chi-square tests for all assessments, with prevalence ratios (odds ratios) were calculated for statistically significant findings.

Data were tabulated and analyzed using the Statistical Statistical Package for the Social Sciences (SPSS) version 15.0 for Windows (SPSS Inc. ®, Chicago, Illinois, USA) with a confidence level of 95% considered for all analyses..

RESULTS

Sample characterization

This study analyzed clinical data from 110 patients enrolled between August 2010 and January 2012, with 58 (52.7%) from the Semi-arid (14th CRES) and 52 (47.3%) from the Coastal (16th CRES), each one comprising one municipality. The female population (n=71, 64.5%) was significantly higher (p=0.029) than male population (n=39 or 35.5%), with no significant difference observed between the two regions (p=0.862). The average age found was 47.3±19.6 years, with a concentration of cases, noted in the sixth decade of life (25.0%) (p<0.022).

Regarding the education level, a significant portion of sample reported either illiteracy or incomplete primary education (67.1%; p<0.001). The majority also reported a monthly income of up to 2 minimum wages (93.6%) and were predominantely married (50.0%) (p<0.001). Farmers constituted the largest

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occupational group (36.1%), particularly in the semi-arid (56%), while housewifes (36.2%) and other occupations (27. 7%) constituted the majority occupation in coastal region (p<0.001). However, no significant differences were observed between the two regions in terms of income (p=0.394) and marital status (p=0.711). Only 28.4% of the sample reported prior knowledge about oral cancer (p<0.001). Among those who had received information, it was mainly through other means (30.8%), followed by dentists (26.9%), but there was no statistical difference between the means investigated (p =0.526). Comparatively, no differences were observed between the two CRES regarding previous information about cancer (p=0.731), or the source of information (p=0.508).

Table 1: Sample characteristics of patients seen in both regions, semi-arid and coastal from Ceará- Brazil.

	n	%	CI	p-value	Semi-arid	Coastal	p-value*
Region of origin (n=110)							
Semi-arid	58	52.7%	43.0 - 62.3	0.685	-	-	-
Coastal	52	47.3%	37.7 - 57.0		-	-	-
Gender (n=110)							
Female	71*	64.5%	54.8 - 73.4	0.029	37 (63.8%)	34 (65.4%)	0.862
Male	39	35.5%	26.7 - 45.1		21 (36.2%)	18 (46.2%)	
Age (n=108)							
0-10	5	4.6%	1.5 - 10.5	0.022	1 (1.8%)	4 (7.8%)	0.084
11-20	8	7.4%	3.2 - 14.1		6 (10.5%)	2(3.9%)	
21-30	7	6.5%	2.6 - 12.9		5 (8.8%)	2(3.9%)	
31-40	16	14.8%	8.7 - 22.9		7 (12.3%)	9(17.6%)	
41-50	19	17.6%	10.9 - 26.1		7 (12.3%)	12(23.5%)	
51-60	27*	25.0%	17.2 - 34.2		16 (28.1%)	11(21.6%)	
61-70	14	13.0%	7.2 - 20.8		5 (8.8%)	9(17.6%)	
71-80	8	7.4%	3.2 - 14.1		7 (12.3%)	1(2.0%)	
81-90	4	3.7%	1.0 - 9.2		3 (5.3%)	1(2.0%)	
Level of education (n=85)							
Illiterate/Incomplete elementary education	57*	67.1%	56.0 - 78.9	<0.001	36 (73.5%)	21 (58.3%)	0.422
Complete primary education	9	10.6%	5.0 - 19.1		3(6.1%)	6(16.7%)	
Incomplete high school	8	9.4%	4.1 - 17.7		5 (10.2%)	3(8.3%)	
Complete high school	8	9.4%	4.1 - 17.7		4(8.2%)	4(11.1%)	
University education	3	2.7%	0.7 - 10.0		1(2.0%)	2(5.6%)	

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Monthly income/rental (n=78)							
Up to 2 national minimum wages	73*	93.6%	85.7 - 97.9	<0.001	43(93.5%)	30(93.8%)	0.394
Between 2 and 4 national minimum wages	4	5.1%	1.4 - 12.6		3(2.5%)	1(3.1%)	
More than 4 national minimum wages	1	1.3	0.0 - 6.9		0(0%)	1(3.1%)	
Marital status (n=104)							
Married	52*	50.0%	40.0 - 60.0	<0.001	26(48.1%)	26(52%)	0.711
Single	35	33.7%	24.7 - 43.6		6(11.1%)	3(6.0%)	
Divorced	9	8.7%	4.0 - 15.6		17(31.5%)	18(36.0%)	
Widower	8	7.7%	3.4 - 14.6		5(9.3%)	3(6.0%)	
Professional activity (n=97)							
Farmer	35	36.1%	26.6 - 46.5	0.059	28 (56.0%)*	7(14.9%)	<0.001
Housewife	19	19.6%	12.2 - 28.9		2(4.0%)	17 (36.2%)*	
Student	11	11.3%	5.8 - 19.4		6 (12.0%)	5(10.6%)	
Retired	11	11.3%	5.8 - 19.4		6 (12.0%)	5(10.6%)	
Others	21	21.6%	13.9 - 31.2		8 (16.0%)	13 (27.7%)*	
Prior information about cancer (n=102)							
Yes	29	28.4%	19.9 - 38.2	0.001	14(26.9%)	15(30.0%)	0.731
No	73*	71.6%	61.8 - 80.1		38(73.1%)	35(70.0%)	
Source of information (n=26)							
Dentist	7	26.9%	11.5 - 47.8	0.526	3(27.3%)	4(26.7%)	0.508
Health Center	4	15.4%	4.7 - 34.9		1(9.1%)	3(20.0%)	
Health agent	3	11.5%	2.4 - 30.1		2(18.2%)	1(6.7%)	
Radio	3	11.5%	2.4 - 30.1		2(18.2%)	1(6.7%)	
Doctor	1	3.8%	0.1 - 19.6		1(9.1%)	0(0.0%)	
Others	8	30.8%	14.3 - 51.8		2(18.2%)	6(40.0%)	

p < 0.05, Chi-square or Fisher's exact. CI = Confidence Interval.

Clinicopathological characteristics of oral mucosal lesions

Clinically, most lesions exhibited color changes (n=70, 72.2%; p<0.002), with red being the predominant color (n= 35, 50%) (p<0.001). Smooth surfaces were commonly observed (63.8%) (p<0.001), but there was no significant difference in implantation type. Most of the lesions were soft in consistency (p=0.018), representing 36.5% (n=23) of the sample. Lower lip lesions were the most prevalent (n=20, 24.8%) followed by the hard palate (n=18, 16.5%), alveolar ridge

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(n=17, 15.6%), buccal mucosa (n= 15, 13.8%), tongue (n=11, 10.1%) and labial mucosa (n=8, 6.4%) (p=0.003). (Table 3).

Fibroepithelial hyperplasia (19.1%) and traumatic fibroma (13.6%) were the most frequent clinical diagnosis. Histopathological diagnosis of fibroepithelial hyperplasia was the most prevalent (40.9%, n=45). Squamous cell carcinoma, mucocele and traumatic fibroma were each responsible for 8.2% (n=9) of the total of injuries.

Benign lesions accounted for the majority in both regions (79.5% in semi-arid and 86.0% in coastal) with no significant difference observed in lesion subtypes (benign, potentially malignant and malignant) (p=0.280).

Among the malignant lesions, 6 (50.0%) lesions were found in the lower lip and 6 (50.0%) were intraoral carcinomas, with no significant differences between the two regions (p=1.000).

Table 2: Profile of clinical presentation of oral lesions sample of patients seen in the regions, semi-arid and coastal from Ceará- Brazil.

	N	%	CI	p-value
Color change (n=97)				
No	27	27.8%	19.2 - 37.9	0.002
Yes	70*	72.2%	62.1 - 80.8	
Color (n=70)				
Reddish	35*	50.0%	37.8 - 62.2	<0.001
Whitish	16	22.9%	13.7 - 34.4	
Bluish	9	12.9%	6.0 - 23.0	
Purplish	5	7.1%	2.4 - 15.9	
Reddish-white	2	2.9%	0.3 - 9.9	
Black	2	2.9%	0.3 - 9.9	
Yellowish	1	1.3%	0.0 - 7.7	
Surface (n=94)				
Smooth	60*	63.8%	53.3 - 73.5	<0.001
Irregular	15	16.0%	9.2 - 24.9	
Rough	8	8.5%	3.7 - 16.1	
Ulcerated	6	6.4%	2.4 - 13.4	
Intraosseus	4	4.3%	1.2 - 10.5	
Papular	1	1.1%	0.0 - 5.6	
Implantation (n=78)				
Sessile	41	52.6%	40.9 - 64.0	0.749

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Pedicled	37	47.4%	36.0 - 59.1	
Consistency (n=63)				
Soft	23*	36.5%	24.7 - 49.6	0.018
Firm	18	28.6%	17.9 - 41.3	
Hardened	13	20.6%	11.5 - 32.7	
Elastic/Rubbery	5	7.9%	2.6 - 17.6	
Flabby	4	6.3%	1.8 - 15.5	
Localization (n=109)				
Bottom lip	20*	18.3%	11.6 - 26.9	0.003
Hard palate	18*	16.5%	10.1 - 24.8	
Alveolar ridge	17*	15.6%	9.4 - 23.8	
Buccal mucosa	15*	13.8%	7.9 - 21.7	
Tongue	11*	10.1%	5.1 - 17.3	
Lip muccosa	8*	6.4%	3.4 – 13.9	
Intraosseous	6	5.5%	2.0 - 11.6	
Vestibular fundus	5	4.6%	1.5 - 10.4	
Retromolar triangle	5	4.6%	1.5 - 10.4	
Gum	2	1.8%	0.2 - 6.5	
Soft palate	1	0.9%	0.0 - 5.0	
Lip commissure	1	0.9%	0.0 - 5.0	
Floor of the mouth	1	0.9%	0.0 - 5.0	

$p < 0.05$, Chi-square or Fisher's exact.

Assessment of Risk Factors between the two regions

The sample population exhibited a significant prevalence of smoking (n=45, 40.9%). The average time of smoke exposure was 29.3±17.4 years and among the types used, industrialized ones were the most common (n= 20, 44.4%) ($p<0.023$). Regarding the average time of use between the types of tobacco, the pipe was the one with the longest average time (47.7±25.2 years), followed by the artisanal type (24.9±8.9 years), chewed (24 .0±13.2 years) and industrialized (23.2±16.7 years). When comparing regions, significant differences were found ($p=0.041$), with greater representation by the semi-arid sample (50.0%, odds ratio = 2.2 (1.0-4.9)).

Sun exposure was reported by nearly half the sample (48.6%), with hat usage and lip balm application documented less frequently. While no significant disparities were noted between the two regions in terms of alcohol consumption or sexual transmitted disease (STD) history, Tauá region exhibited a higher

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prevalence of smoking and sun exposure. The use of prostheses was more prevalent in Camocim region. Smoking, alcohol consumption, and sun exposure were significantly associated with the development of malignant lesions.

Alcohol consumption was the second most common risk factor (n=24, 21.8%), primarily involving beer (50.0%) and cachaça (45.4%), with no significant differences between the types of beverages or between the two regions. The average time of exposure to this risk factor was 10.3±1.5 years.

The association between smoking and alcohol was observed in only 18 (16.4%) of the individuals in the total sample. Of these, 12 (20.7%) were from the semi-arid and 6 (11.5%) from the coastal(p=0.195)

A vast majority of participants from both regions (96.0%; p<0.001) reported no previous positive infections for any sexually transmitted disease (STD). However, a history of cancer in the family was reported by 32 (36.4%) patients (p=0.058). Notably, these variables did not exhibit statistical differences when comparing regions (p=0.617 and p=0.329; respectively).

Sun exposure was acknowledged by 48.6% (n=51) of the overall sample, with only 37.1% using hats and 15.4% using lip balm (p=0.061 and p<0.001, respectively). Comparison between regions revealed a significant disparity in sun exposure, particularly in the semi-arid [p=0.005; odds ratio 3.1(1.4-6.9)]. However, hat usage (p= 0.350) and lip balm application (p=0.587) did not differ significantly between the samples.

Prosthesis use was identified in 38.2% of patients, with bimaxillary complete dentures (40.5%) being the most reported, though not significantly different from other types (p=0.090). Notably, a significant majority of prosthesis users were found in the coastal sample [(p<0.001; odds ratio =5.2 (2.2-12.1)].

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Table 3: Characterization of exposure to risk factors and occurrence of oral lesions sample of patients seen in the regions, semi-arid and coastal form Ceará-Brazil.

	n	%	CI	p-value	Semi-arid	Coastal	p-value
Smoke (n=110)							
Yes	45	40.9%	31.6 - 50.7		29(50.0%)†	16(30.8%)	0.041
No	65	59.1%	49.3 - 68.4	0.486			
Type of smoke (n=45)							
Industrialized	20*	44.4	29.6 - 60.0	0.023	12(41.4%)	8(50.0%)	0.086
Artisanal smoke	16	35.6	21.9 - 51.2		8(27.6%)	8(50.0%)	
Chewed tobacco	6	13.3	5.0 - 26.8		6(20.7%)	0(0.0%)	
Pipe	3	6.7	1.4 - 18.3		3(10.3%)	0(0.0%)	
Alcohol (n=110)							
Yes	24	21.8%	14.5 - 30.7	<0.001	16 (27.6%)	8 (15.4%)	0.122
No	86*	78.2%	69.3 - 85.5				
Type of alcohol (n=22)							
Cachaça (sugar cane rum)	10	45.5%	24.4 - 67.8	0.052	7(46.7%)	3(42.9%)	0.323
Beer	11	50.0%	28.2 - 71.8		8(53.3%)	3(42.9%)	
Others	1	4.5%	0.1 - 22.8		0(0.0%)	1(14.3%)	
Smoke and alcohol	18	16.4%	10.0-24.6	<0.001	12(20.7%)	6(11.5%)	0.195
Use of prosthesis (n=110)							
Yes	42	38.2%	29.1 - 47.9	0.077	12 (20.7%)	30(57.7%)‡	<0.001
No	68	61.8%	52.1 - 70.9				
Family history of cancer (n=88)							
Yes	32	36.4%	26.4 - 47.3	0.058	16 (42.1%)	16 (32.0%)	0.329
No	56	63.6%	52.7 - 73.6				
Type of prosthesis (n=42)							
Bimaxillary	17	40.5%	25.6 - 56.7	0.090	5(41.7%)	12(40.0%)	0.474
Upper total prosthesis	10	23.8%	12.0 - 39.4		3(25.0%)	7(23.3%)	
Lower partial denture	9	21.4%	10.3 - 36.8		2(1.7%)	7(23.3%)	
Lower total prosthesis	3	7.1%	1.5 - 19.5		2(16.7%)	1(3.3%)	
Upper partial denture	3	7.1%	1.5 - 19.5		0(0.0%)	3(10.0%)	
Sexually transmitted disease (n=101)							
Yes	4	4.0%	1.1 - 9.8	<0.001	1 (2.0%)	3 (5.9%)	0.617

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No	97*	96.0%	90.2 - 98.9				
Sun exposure (n=105)							
Yes	51	48.6%	38.7 - 58.5	0.836	33(62.3%)§	18 (34.6%)	0.005
No	54	51.4%	41.5 - 61.3				
Use of hat (n=105)							
Yes	39	37.1%	27.9 - 47.1	0.061	22 (41.5%)	17 (32.7%)	0.350
No	66	62.9%	52.9 - 72.1				
Use of lip balm (n=104)							
Yes	16	15.4%	9.0 - 23.8	<0.001	9 (17.3%)	7 (13.5%)	0.587
No	88*	84.6%	76.2 - 90.9				

p < 0.05, Chi-square or Fisher's exact. CI = Confidence Interval.

Exposure to risk factors and development of oral lesions

Concerning exposure to risk factors and oral lesion development, no significant association was found between smoking and benign / potentially malignant lesions, but a significant association was observed with the development of malignant lesions (p=0.001 and odds ratio= 18.9[2.3-153.4]). Similarly, alcohol exposure was not associated with potentially malignant lesions compared to benign lesions but was strongly linked to malignant lesions (p=0.047 and odds ratio 4.4 [1.3-15.6]). Simultaneous exposure to smoke and alcohol increased the prevalence of malignant lesions by 6.2 times (CI = 1.7-2.6) (p=0.003).

Sun exposure did not increase the frequency of benign/potentially malignant lesions but was associated with increased malignant lesions on the lip (p=0.016 and odds ratio= 17.8 [1.0 - 325.9]). Prosthesis use (p=0.927), STDs (p= 0.693), hat use (p=0.580) and lip balm application (p=0.099) did not exhibit significant associations with any category of lesions. (Table 4)

In evaluating the frequency of benign, potentially malignant and malignant lesions concerning sun exposure and their association with protective factors, this study found a notably lower occurrence of potentially malignant (p = 0.003) and malignant (p=0.024) in individuals who wore hat. Conversely, a substantial increase in the prevalence of potentially malignant and malignant lesions was observed in individuals who did not use this protective factor (p=0.037 and odds

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ratio= 5.6[1.0-33.0]). Similarly, a significant relation was found between the absence of lip balm usage and the development of potentially malignant and malignant lesions (p=0.006 and odds ratio= 19.9[1.1-367.8])

Table 4: Evaluation of risk factors and their association with the development of benign, premalignant and malignant sample of patients seen in the regions, semi-arid and coastal form Ceará- Brazil.

	Benign	PML	Malign	p-Value†
Smoke	32 (36.8%)	2 (22.2%)	11 (91.7%)*	0.001
p-Value	-	0.384	<0.001	
OR (CI)			18.9 (2.3 - 153.4)	
Alcohol	16 (18.4%)	2 (22.2%)	6 (50.0%)*	0.047
p-Value	-	0.674	0.013	
OR (CI)			4.4 (1.3 - 15.6)	
Smoke and Alcohol	12 (13.8%)	0 (0.0%)	6 (50.0%)*	0.003
p-Value	-	0.596	0.002	
OR (CI)			6.2 (1.7 - 22.6)	
Dental prosthesis	33 (37.9%)	3 (33.3%)	5 (41.7%)	0.927
p-Value	-	1.000	1.000	
OR (CI)				
Sexually transmitted disease	3 (3.8%)	0 (0.0%)	0 (0.0%)	0.693
p-Value	-	1.000	1.000	
OR (CI)				
Sun exposure	35 (42.2%)	5 (62.5%)	6 (100.0%)‡	0.016
p-Value	-	0.293	0.008	
OR (CI)			17.8 (1.0 - 325.9)	
Use of hat	30 (36.1%)	2 (25.0%)	3 (50.0%)	0.580
p-Value	-	0.708	0.100	
OR (CI)				
Use of lip balm	16 (19.5%)	0 (0.0%)	0 (0.0%)	0.099
p-Value		0.342	0.093	
OR (CI)				

Data expressed as absolute frequency (n) and percentage (%); PML = Potentially malignant lesions. OR (CI) = Odds Ratio (Confidence Interval);*p < 0.05, Chi-square or Fisher's Exact (versus Benign); †p < 0.05, Chi-square (df=2). ‡p < 0.05, with sun exposure as a risk factor associated only with malignant lesions on the lip (*versus* Benign).

Table 5: Evaluation of the frequency of development of benign, malignant and potentially malignant lesions compared to sun exposure and its association with protective factors in the sample of patients seen regions, semi-arid and coastal form Ceará- Brazil.

	Type of injury developed associated with exposure to sunlight			
	Benign	**PML**	**Malign**	**p-Value†**

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Hat	**Yes**	28\2 (93.0%)	2\4 (33.3%)*	3\3 (50.0%)*	<0.001
	p-Value	-	0.003	0.024	
	OR (CI)		0.03 (0.0 - 0.3)	0.07 (0.0 - 0.6)	
	No	8 (15.1%)	3 (50.0%)*	3 (50.0%)*	0.015
	p-Value	-	0.037	0.037	
	OR (CI)		5.6(1.0-33.0)	5.6(1.0-33.0)	
Lip balm	**Yes**	8 (50.0%)	-	-	-
	p-Value	-	-	-	
	OR (CI)				
	No	26 (39.4%)	6 (100.0%)*	6 (100.0%)*	0.001
	p-Value	-	0.006	0.006	
	OR (CI)		19.9(1.1-367.8)	19.9(1.1-367.8)	

Data expressed as absolute frequency (n) and percentage (%); PML = Potentially malignant lesions; OR (CI) = Odds Ratio (Confidence Interval);*p < 0.05, Chi-square or Fisher's Exact (versus Benign); where malignant lesions were crossed with location on the lip.†p < 0.05, Chi-square (df=2).

DISCUSSION

Oral lesions affect a considerable portion of the population, with frequencies ranging from approximately 15.5% (14) to 81.3% (11). Notably, a significant concern arises due to the malignant nature of some lesions.

In our study, 110 lesions were identified through direct surveillance in two different regions in Ceará: 14th CRES (Camocim, coastal) and 16th CRES (Tauá, semi-arid). These regions are of particular interest due to their low-income status (15) and professions associated with intense sun exposure, a known risk factor for various malignant and potentially malignant lesions (11, 16, 17).

Understanding the profile and lesion frequencies in different regions is crucial for establishing care policies and guiding future research. The distribution of risk factors for the disease's development aids in planning health promotion and prevention programs (2).

In the present study, a predominantly female sample (64.5%) was observed, which is consistent with other similar studies (1,3,18). This result may be attributed to women's greater demand for dental services and routine examinations (5, 19), although the prevalence of these characteristics varies depending on the study population (20).

The most significant age group in this study was the 6th decade, with the sample distribution mainly between the 4th and 7th decades, and a mean age of 47.3 ± 19.6 years. Similar results were noted in the studies by PRADO et al., 2010, where the 5th and 6th decades were the most prevalent, and in the study by OSTERNE et.al., 2009 where a wide distribution of injuries was noted between the 3rd and 6th decades of life.

The predilection for a high age range in the present population can be justified by the fact that, among the lesions diagnosed, the group of reactive lesions appears to be the most frequent, which are normally observed in older populations in view of that edentulism is proportional to age (21) and regions of low socio-economic development, such as those evaluated in this study, are associated with intense use of poorly adapted prostheses (22). Among the lesions diagnosed, fibroepithelial hyperplasia was the main one (40.9%). These findings corroborate several previous studies carried out in different regions (1, 3, 13,20).

Lesion topographic distribution varied widely in this study, with the lower lip being the most affected site, followed by hard palate, alveolar ridge, buccal mucosa, tongue and labial mucosa, similar to what is observed in previous studies (13, 22). This distribution may be attributed to the fact that most lesions had a reactive behavior, and these regions are primarily associated with trauma (3, 23) . While some studies report higher prevalence in other locations such as the hard palate (24), alveolar ridge (25), and buccal mucosa (26), PEREIRA et al. (2013) reported that this variety can be found in epidemiological studies when reactional lesions are the most prevalent, and sites such as the palate, tongue and buccal mucosa generally stand out.

No significant differences were observed in lesion profiles (benign, potentially malignant and malignant) when comparing coastal and semi-arid regions . This aligns with findings from other studies, which suggest that exposure to risk factors and occupational aspects may play a more critical role in lesion development than geoclimatic differences within a region in the same country (11).

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Among potentially malignant lesions, actinic cheilosis was predominant, consistent with other Brazilian studies (17). Squamous cell carcinoma was the most prevalent malignant lesion, echoing findings from numerous studies (16, 17, 23, 26). Notably, half of these cases occurred on the lower lip, highlighting the significant role of sun exposure in lesion development, considering the two studied regions.

Smoking, alcohol consumption, and sun exposure were strongly associated with malignant lesions, corroborating findings from previous studies, and the combined exposure to smoking and alcohol consumption amplifies the risk, which is also described in the literature (11,16,17). The decrease in odds ratio values for the combination of the factors smoking and alcohol, when compared with the values presented in the analysis of the two factors separately, is also observed in the literature and justified by the decrease in the sample exposed to the two factors in combination (30).

Prosthesis use did not demonstrate a significant association with malignant lesions, consistent with prior research conducted by TALAMINI et al. (2003) and ALBUQUERQUE et al., (2011). In a case control study, prothesis use proved to be possibly associated as an adjuvant for the development of malignant lesions in cases of maladaptation and development of wounds (33).

The non-use of protective factors, such as hats and lip balm, was directly associated with malignant lip lesions. HALBOUB et al., (2012), in a study on the prevalence of mouth cancer in Yemen, noticed a lower number of women affected by cancer in the lip region, justified by the authors due to the protection provided by the burqa and veil used only by women in that country. Additionally, using lip balm more than once a day reduced the risk of lip cancer, as reported previously (35). Paradoxically, SOUSA LUCENA et al., 2012 demonstrated that the use of hats in workers exposed to the sun daily on the Northeast coast was related to an increased frequency of actinic cheilosis (potentially malignant lesion and strongly associated with the development of lip cancer), such a result was justified by the type of hat used, which did not offer effective protection for the lip region,

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and by the lack of concomitant use of other protective factors in individuals who wore hats.

These findings underscore the importance of correctly using protective measures and avoiding exposure to smoke and alcohol to mitigate the prevalence of malignant neoplasms in the oral cavity.

This is the first study carried out in two distinct regions with a low socio-economic profile in the state of Ceará and reveals the impact that affordable protective items can have on preventing malignant lesions in the mouth.

CONCLUSIONS

The demographic profile of the studied population reveals a notable predominance of female patients in their 6th decade of life, exhibiting low levels of education, low income and lack of information regarding oral cancer.

The diagnosed lesions were primarily manifested as reactive/hyperplastic, with fibroepithelial hyperplasia emerging as the most prevalent diagnosis. Predominant locations include the lip, hard palate, alveolar ridge, buccal mucosa, tongue and labial mucosa.

Analysis of injury patterns across the coastal and semi-arid regions of Ceará yielded no significant differences. Noteworthy associations were observed between the development of malignant lesions in the oral cavity and the consumption of tobacco and alcohol, as well as sun exposure. Emphasis is placed on the preventive efficacy of practices such as wearing hats and using lip balms in mitigating the prevalence of malignant neoplasms.

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