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Predictors for oral cancer in Brazil

Preditores para o câncer oral no Brasil

Isabella Lima Arrais RIBEIRO[a*], Johnys Berton Medeiros da NÓBREGA[a], Ana Maria Gondim VALENÇA[a], Ricardo Dias de CASTRO[a]

[a]UFPB – Universidade Federal da Paraíba, João Pessoa, PB, Brasil

Resumo

Introdução: A incidência de câncer de lábio, cavidade bucal e orofaringe no Brasil é uma das maiores do mundo. **Objetivo:** Este estudo teve como objetivo identificar preditores para o câncer bucal no Brasil entre 2010 e 2013. **Método:** Mediante um estudo de série temporal em que foram avaliados 14.959 diagnósticos primários de câncer de cabeça e pescoço. As variáveis de interesse foram: gênero, idade, raça, nível de escolaridade, histórico familiar de câncer, consumo de álcool, tabagismo e diagnóstico anterior de câncer. A variável desfecho foi dividida em "câncer de boca" e "câncer de outras regiões de cabeça e pescoço". Os dados foram analisados por regressão logística binária múltipla; α = 5%. **Resultado:** O fator de proteção foi: ter aproximadamente 12 anos de escolaridade (OR = 0,85). Os fatores de risco foram: ser um ex-consumidor (OR = 1,19) ou consumidor (OR = 1,11) de álcool, tabagismo (OR = 1,35) e o diagnóstico prévio de câncer sem tratamento (OR = 1,21). **Conclusão:** Concluiu-se que o câncer bucal possui os seguintes preditores em comparação com outros tipos de câncer de cabeça e pescoço durante o mesmo período: ter aproximadamente 12 anos de estudo (fator de proteção) e ser ex-consumidor ou consumidor de álcool, tabagismo e ter tido um diagnóstico prévio de câncer sem tratamento (fatores de risco).

Descritores: Câncer; saúde pública; determinantes sociais; epidemiologia.

Abstract

Introduction: The incidence of lip, oral cavity and oropharynx cancer in Brazil is one of the highest worldwide. **Objective:** This study aimed to identify predictors for oral cancer in Brazil between 2010 and 2013. **Method:** Through a time series study in which 14,959 primary head and neck cancer diagnoses were evaluated. The variables of interest were gender, age, race, education level, family history of cancer, alcohol consumption, smoking, and previous cancer diagnosis. The outcome variable was divided into "oral cancer" and "cancer of other head and neck regions." The data were analysed by multiple binary logistic regression; α=5%. **Result:** The protective factor was: approximately 12 years of education (OR = 0.85). The risk factors were: being an ex-consumer (OR=1.19) or consumer (OR=1.11) of alcohol, tobacco use (OR=1.35) and a prior diagnosis of cancer that went untreated (OR=1.21). **Conclusion:** Was concluded that the oral cancer had the following predictors compared to other types of head and neck cancer during the same period: approximately 12 years of education (protective factor) and ex-consumer or consumer of alcohol, smoking and previous diagnosis of cancer that went untreated (risk factors).

Descriptors: Cancer; public health; social determinants; epidemiology.

INTRODUCTION

Cancer is a growing worldwide public health problem[1,2]. Recently, there have been approximately 300,000 new cases of cancer in the lip, oral cavity and oropharynx and approximately 140,000 deaths[3]. The incidence of these types of cancer in Brazil is one of the highest worldwide[4,5].

Cancers located in the lip, oral cavity and oropharynx regions are generally grouped together in epidemiological studies because they have similar histopathological characteristics and risk factors[6]. The increase in cancers located in the head and neck regions[7-10] has attracted academic interest, especially in the search for preventable risk factors related to habits and life styles[11,12].

Population-based cancer registries (PBCR's) provide permanent information on the number of new cases of cancer and allow the collection of information on the incidence and conditions that may affect disease occurrence, thereby strengthening epidemiological evaluations[13].

The aim of this study was to identify predictors of cancer located primarily in the lip, oral cavity and oropharynx regions in

Brazilian patients during the period between 2010 and 2013 using population-based cancer registries.

METHOD

Study Population

This study was a time series study in which all primary head and neck cancer diagnoses (codes C00-C13, C30.0, C31.0 and C31.1 according to the international classification of diseases (ICD 10-2011)[6] between 2010 and 2013 were selected. These data were obtained from the PBCRs of the National Cancer Institute (Instituto Nacional do Cancer - INCA) and comprised the hospital cancer records (HCRs) provided by the HCR integrator, which brings together information from 260 Brazilian hospitals on approximately 25 platforms. These data are provided free of charge on INCA's website[14].

Data Collection

A total of 30,342 cancer records related to the study period (2010-2013) were collected from around the country. Of these, only those that contained complete information on the independent variables of gender, age, race, education level, family history of cancer, alcohol consumption, smoking, and previous diagnosis of cancer were considered for the purposes of the sample. In total, 14,959 records with complete information were collected.

The dependent variable was the location of the cancer. This variable was divided into "oral cancer" (located in lip, oral cavity and oropharynx) and "cancer of other head and neck regions" to create a dichotomous outcome. The reference categories for each of the independent variables were gender (male), age, skin colour (white), literacy (no education), family history (absence of family history), alcoholism (non-consumers), smoking (non-consumers) and previous diagnosis of cancer (none).

In total, 10,464, 10,284, 5,746 and 3,848 cases of cancer of the head and neck were recorded in the Brazilian HCRs in 2010, 2011, 2012 and 2013, respectively, corresponding to 30,342 cases. However, some of the records were excluded from the analysis due to a lack of information regarding any of the variables of interest, resulting in the inclusion of 14,959 records in the general database.

Statistical Analysis

The data were analysed using R software (3.1.3) (Bell Laboratories; Auckland-New Zealand). A normality test (Kolmogorov-Smirnov) was performed for the "age" variable, which revealed a non-normal distribution type ($p = 0.000$). The Mann-Whitney test was performed to establish the difference in the ages of patients with primary cancer of the lip and oral cavity and those with cancer in other regions of the head and neck.

A univariate binary logistic regression was conducted in which each variable was evaluated as an outcome predictor with a 5% significance level. Then, all variables with a significance below 5% were included together in a multivariate model. This model was adjusted using the backward method. A 5% significance level was adopted for the permanence of the variables in the final model.

RESULT

A total of 8,147 (54.4%) of the total evaluated records (14,959) described oral cancers. The mean age of the subjects was 59.11 years (±12.75), and the median age was 58.00 years. The mean age of patients with cancer of the lip, oral cavity and oropharynx was 59.39 years (±12.65 years) and of patients with cancer of other head and neck region cases was 58.90 years (±12.82), with no significant difference between the groups ($p=0.647$).

Table 1 shows that both the oral cancer and cancers of other head and neck regions were primarily concentrated in males with white skin with an incomplete primary education. There was a lower incidence in individuals with higher education levels. The cancer in the two regions considered for the outcome was primarily found in individuals with no family history of cancer, alcohol and tobacco consumers and those who had a previous diagnosis of cancer and had not undergone treatment.

Of all the cancers found in the head and neck, the most common histological type was squamous cell carcinoma (ICD 8070/3), both of the oral region (89.0%) and of other head and neck regions (89.0%). This cancer type affected 83.6% of all individuals.

The univariate analysis for each of the variables of interest to the outcome is shown in Table 2.

The data in Table 3 was obtained for the "literacy" variable, where having reached the secondary education level reduced the chance by 1.16-fold.

Alcoholism was a risk factor for both ex-consumers (OR = 1.19) and consumers (OR=1.11), as was smoking (OR=1.35) and a previous diagnosis of another cancer that was not treated (OR=1.21).

DISCUSSION

The oral cancers are generally grouped together in epidemiological studies because they share similar risk factors[11,15-19].

The ages of individuals affected by oral cancer and other head and neck regions corresponded to the ages reported by Casati et al.[19], who found that head and neck cancers usually developed between 50 and 70 years of age. However, Chor et al.[17] did not establish the age variable as a risk factor for cancer in lip, oral cavity and oropharynx; this result differed from the study by Ribeiro et al.[11], where increasing age was associated with cancers of the lip and oral cavity.

There was a predominance of squamous cell carcinoma in both the lip, oral cavity and oropharynx regions and in the other head and neck regions, which also occurred in other parts of the world[2,17,20-25].

The male gender is more commonly associated with cancers of the head and neck, especially those that involve the lip, oral cavity and oropharynx[11,17]. Radoï et al.[23] identified an association between the consumption of alcohol and tobacco and the occurrence of oral cancer in men in France.

Ribeiro et al.[11] and Weatherspoon et al.[2] found that higher education levels behaved as protective factors for the occurrence of cancer of the lip and oral cavity.

Table 1. Absolute and relative frequency values for the independent variables included in the study according to the cancer location, in Brazil (2010-2013) (n=14,959)

Variable	Variable category	Oral		Other head and neck regions	
		n	%	n	%
Gender	Male	6.525	80.1	5.488	80.5
	Female	1.622	19.9	1.324	19.5
Skin_colour	White	3.987	48.9	3.420	50.2
	Black	640	7.9	480	7.1
	Yellow	73	0.9	57	0.9
	Pardo	3.442	42.2	2.842	41.7
Literacy	None	1.174	14.4	923	13.6
	Incomplete primary education	4.492	55.1	3.613	53.0
	Complete primary education	1.351	16.6	1.196	17.5
	Secondary education	861	10.6	832	12.2
	Incomplete higher education	60	0.7	53	0.8
	Complete higher education	209	2.6	195	2.9
Family_history	Yes	3.461	42.5	2.920	42.9
	No	4.686	57.5	3.892	57.1
Alcoholism	Never	2.334	28.6	2.311	33.9
	Ex-Consumer	2.109	25.9	1.711	25.1
	Yes	3.704	45.5	2.790	41.0
Smoking	Never	1.482	18.2	1.600	23.5
	Ex-consumer	1.751	21.5	1.646	24.2
	Yes	4.914	60.3	3.566	52.3
Previous diagnosis	No diagnosis or treatment	2.768	34.0	2.559	37.6
	With diagnosis with no treatment	4.302	52.8	3.260	47.9
	With diagnosis with treatment	1.077	13.2	993	14.6

The identification of factors associated with the development of the oral cancer contribute to the prevention of cancer in these areas. The finding that the main risk factors are preventable is important information for health managers and should encourage campaigns for the prevention of a cancer that has a considerable number of comorbidities and an average survival of only 5 years over the last 40 years (30-40%)[22-24].

In addition to the issues of comorbidities and survival, it is also important to note that the highest number of oral cavity cancer deaths was found in individuals between the fifth and sixth decades of life and in patients who had a low level of education[23].

The attention of oral health managers and professionals should be drawn to preventive measures, including patient education in which potential risk factors are explained, and to establishing the patient profile associated with cancer of the lip, oral cavity and oropharynx[2].

The study of HCR data may have limitations because the data are not always complete[11,18]; this limitation is inherent in studies using secondary data. In light of this, it was necessary to exclude 50.69% of the collected records to perform a multiple analysis. Although incomplete data were excluded, the number of cases evaluated allowed a robust multivariate analysis with the generation of predictors for the occurrence of oral cancer during the evaluated period.

The characteristics of this study did not allow us to examine the association of cases with human papilloma virus (HPV) infection, which has been associated with the development of squamous cell carcinoma of the head and neck[17,21,25], especially in the oropharyngeal region[17]. However, the characteristics did permit the association of factors frequently reported to be risk factors in studies with different designs, such as alcoholism[17,22] and smoking[22]. The latter factor has also been associated with squamous cell carcinoma due to its promotion of mutations in the TP53 gene[17].

Table 2. Univariate analysis for oral cancer in Brazil (2000-2013) (n=14,959)

Variable	B	SE	Sig.	OR	CI 95% Exp (B)	
					Upper	Lower
Gender (Female)	0.028	0.041	0.497	-	-	-
Age	0.000	0.001	0.965	-	-	-
Literacy						
Complete primary[I]	-0.092	0.044	0.036	0.912	0.994	0.836
Secondary education[II]	-0.180	0.052	<0.001	0.835	0.924	0.755
Family history	0.016	0.033	0.625	-	-	-
Alcoholism						
Ex-consumer	0.197	0.043	<0.001	1.217	1.324	1.119
Consumer	0.272	0.038	<0.001	1.312	1.413	1.218
Smoking (Ex-consumer)	0.137	0.049	0.005	1.146	1.262	1.041
Smoking (Consumer)	0.398	0.042	<0.001	1.488	1.616	1.371
Untreated previous diagnosis	0.197	0.032	<0.001	1.217	1.295	1.144

B = Estimate; Sig = Significance; SE = Standard Error; OR = Odds Ratio; CI = Confidence Interval; Exp (B) = Exponential (Estimate); [I] = approximately 9 years of education; [II] = approximately 12 years of education.

Table 3. Multivariate binary logistic regression analysis (adjusted model) for oral cancer in Brazil (2000-2013) (n=14,959)

Variable	B	SE	Sig.	OR	CI 95% Exp (B)	
					Upper	Lower
Literacy (Secondary level[I])	-0.152	0.052	0.003	0.858	0.951	0.776
Alcoholism (Ex-consumer)	0.179	0.044	<0.001	1.196	1.303	1.097
Alcoholism (Consumer)	0.106	0.043	0.015	1.111	1.209	1.021
Smoking (Consumer)	0.306	0.038	<0.001	1.356	1.460	1.258
Untreated previous diagnosis	0.194	0.033	<0.001	1.214	1.294	1.138

B= Estimate; SE=Standard Error; Sig= Significance; OR= Odds Ratio; CI=Confidence Interval; Exp (B) = Exponential (Estimate); [I] = approximately 9 years of education.

The present study demonstrates that in Brazil, the model adjusted with the variables from the national databases offers evidence of a greater risk of cancer of the lip, oral cavity and oropharynx than that of other head and neck regions over a four-year period when associated with the risk factors alcoholism (ex-consumer and consumer) and smoking as a previous diagnosis of cancer that went untreated.

The predicted protective factor of oral cancer were the completion of approximately 12 years of education during the evaluated period compared to other types of cancer in the head and neck. Being an ex-consumer or consumer of alcohol, smoking and having a previous diagnosis of cancer that went untreated were risk factors.

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CONFLICTS OF INTERESTS

The authors declare no conflicts of interest.

*CORRESPONDING AUTHOR

Isabella Lima Arrais Ribeiro, Programa de Pós-graduação em Odontologia, UFPB – Universidade Federal da Paraíba, Campus I, Cidade Universitária, Castelo Branco, 58051-900 João Pessoa - PB, Brasil, e-mail: isabella_arrais@yahoo.com

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