Epidemiological study on the lip and oral cavity cancer in Brazil: connecting science and clinical applicability

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SUMMARY

OBJECTIVE: The aim of this study was to describe and discuss the epidemiological indicators of lip and oral cavity cancer in Brazil, in 2017, according to data from the Global Burden of Disease data.
METHODS: This is a descriptive study reported according to STROBE guidelines. We identified epidemiological indicators using the Global Burden of Disease results tool. Mortality/incidence rates were described per 100,000 population. Global Burden of Disease 2017 reviews were completed using Python version 2.7, Stata version 13.1, and R version 3.3.
RESULTS: In 2017, there were 5,237 deaths from the lip or oral cavity cancer in Brazil, most of them were males aged between 50 and 69 years (2,730 cases, which was equivalent to 52% of the universe of deaths resulting from this cause). Regarding the burden of lip and oral cavity cancer, per 100,000 Brazilians, we observed an incidence of 3.99, prevalence of 15.46, and mortality of 2.29 (with higher indicators in the South and Southeast regions of the country).
CONCLUSIONS: Epidemiological indicators of lip and oral cavity cancer were higher in men, with higher mortality indicators in individuals aged 50–69 years, and higher rates (incidence, prevalence, and mortality) in the South and Southeast regions of Brazil. From 2002–2015, there was a reduction in mortality; however, in the period from 2015–2017, there was a resumption in the growth of this indicator.
KEYWORDS: Epidemiology. Mortality. Mouth neoplasms.

INTRODUCTION

In Europe, mortality rates from the lip and oral cavity cancer have been decreasing since 1970. In contrast, Latin American countries, such as Chile, have shown increased rates since 1980[1]. Brazil followed this trend until 2002, and then, until 2015, it showed stability or reduction in its rates[2]. This coincides with the implementation of public policies on oral health in our country: inclusion of oral health in the Family Health Strategy at the end of 2000; regulation of the actions of oral health teams in the Family Health Strategy (2001); completion of the national epidemiological survey of oral health (2003); and launch of the guidelines of the National Oral Health Policy (*Brasil Sorridente, 2004*)[3].

In Brazil, 15,290 new cases of that disease were recorded in 2014 and 15,490 in 2015[4]. Therefore, Brazil was the country with the highest number of contributing cases in

Latin America (33,925 deaths attributed to oral and pharyngeal cancer in 2015)[5]; thus, future longevity gains will depend on the adoption of health policies focused on the management of chronic conditions, which requires studies and analyses of these conditions[6]; however, no study investigated the epidemiological profile of oral cancer in the Brazilian region in 2017.

Despite the known action of smoking and alcohol in the etiology of this disease, epidemiological studies have shown that, even after adjusting for these risk factors, there is still a residual effect of social conditions on the risk of oral cancer. Thus, the findings of this study investigate whether socioeconomic conditions interfere with the prognosis of the disease. This study aimed to describe and discuss the epidemiological indicators of lip and oral cavity cancer in Brazil, in 2017, according to the Global Burden of Disease (GBD) data.

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METHODS

This is a descriptive study with data on the estimated burden of lip and oral cavity cancer in Brazil in GBD 2017. GBD Brazil is a partnership, started in 2014, and involves the Institute for Health Metrics and Evaluation, Ministry of Health, local universities, and researchers from around the world[7].

GBD study conducted in 2017 aimed to determine the incidence, prevalence, mortality, and disability-adjusted life years (DALYs) of 359 diseases and injuries, and 84 risk factors by age and sex in 195 countries and territories[8]. It provides a comprehensive assessment of cause-specific mortality for 282 causes from 1980–2017[9]. In addition, more indicators from the United Nations Sustainable Development Goals were examined, and forecasting methods were used to generate projections through 2030 and assess the pace of change needed to achieve them.

The GBD 2017 study investigated:
a. all causes, risks, etiologies, disabilities, injuries by nature, and aggregates of GBD sequelae;
b. measures: deaths, years of life lost (YLLs), years lived with disability (YLDs), DALYs, prevalence, incidence, life expectancy, probability of death, health-adjusted life expectancy, the maternal mortality rate, and summary exposure value;
c. metrics (units): number, rate, percentage, years, probability of death;
d. years: 1990–2017;
e. annual results for all measures;
f. all GBD age groups;
g. sexes: males, females, both sexes;
h. locations: super-regions, regions, GBD countries, sub-national units, and custom regions.

We started with the identification of the epidemiological indicators of lip and oral cavity cancer in Brazil in 2017, according to sex, age group, and region of the country, through the GBD results tool (http://ghdx.healthdata.org/gbd-results-tool). For the composition of its database, the GBD uses multiple sources from all countries such as vital statistics, censuses, administrative databases, publications, surveys, cancer records, police records (external causes), and environmental data[7].

The following data sources were used in Brazil – a) epidemiological surveys: Vigitel (*Vigilância de fatores de risco e proteção para doenças crônicas por Inquérito Telefônico*), PNAD (*Pesquisa Nacional por Amostra de Domicílios*), and PeNSE (*Pesquisa Nacional de Saúde do Escolar*); b) vital records: SIM (*Sistema de Informação sobre Mortalidade*) and DATASUS (*Departamento de Informática do Sistema Único de Saúde*); and c) sources of epidemiological surveillance: SIA-SUS (*Sistema de Informação Ambulatorial do Sistema Único de Saúde*), SISVAN (*Sistema de Vigilância Alimentar e Nutricional*), and SINAN (*Sistema de Informação de Agravos de Notificação*) – the main source of mortality data. The database of the Mortality Information System of the Ministry of Health (SIM) was used.

Analysis of these data generated indicators of mortality and YLLs due to premature death, which, in addition to the information on morbidity and the number of YLDs, provided the measure of the GBD: the YLLs due to premature death, or disability (DALYs).

Mortality/incidence rates (MIR) were described per 100,000 people. GBD 2017 analyses were completed using Python version 2.7, Stata version 13.1, and R version 3.3[9]. Data are presented as absolute frequency and relative frequency.

RESULTS

The study variables related to lip and oral cavity cancer were mortality, incidence, prevalence, DALYs, YLD, and YLL. The ratio between the mortality rate and the incidence rate generated an indicator called the MIR, which was used to estimate the 5-year survival of cancer of the lip or oral cavity. These data were considered according to gender, age group (15–49, 50–69, and ≥70 years), and Brazilian region (North, Northeast, Southeast, South, and Midwest) of cases that occurred in 2017, and all data were expressed as a number per 100,000 inhabitants.

In 2017, there were 5,237 deaths from cancer of the lip or oral cavity in Brazil. Most of them were male (3,864 deaths, corresponding to approximately 74% of the total) and aged between 50 and 69 years (2,730 cases, which was equivalent to 52% of the universe of deaths resulting from this cause) (Table 1).

Regarding the burden of lip and oral cavity cancer per 100,000 Brazilian inhabitants in 2017, we observed an incidence of 3.99, a prevalence of 15.46, mortality of 2.29, 57.78 DALYs, 1.64 YLD, and 56.14 YLL (Table 2). Regarding the

Table 1. Deaths from cancer of the lip or oral cavity in Brazil in 2017

Deaths	n	%
Total	5,237	100
Sex		
Female	1,373	26.22
Male	3,864	73.78
Age group (years)		
15–49	683	13.04
50–69	2,730	52.13
70>	1,824	34.83

geographic region, the numbers indicated higher mortality, incidence, and prevalence in the South and Southeast regions of the country (Table 3). Regarding lip and oral cavity cancer in Brazil (with reference to the period from 2002 to 2017), there was a balanced reduction in mortality until 2015, when there was a resumption in its growth.

DISCUSSION

Other studies confirm the fact that all epidemiological indicators of oral cancer are higher in men than in women. The National Cancer Institute estimated, for the year 2016, 11,140 new cases of oral cavity cancer in men and 4,350 in women. The values correspond to an estimated risk of 11.27 new cases per 100,000 men and 4.21 per 100,000 women[4].

Thus, the epidemiological profile of the individuals most affected by the disease would be characterized by men, aged between 50 and 70 years, workers exposed to the sun, and chronic users of cigarettes and/or alcohol, habits more common among men[10,11]. Consequently, the mortality rate from these neoplasms in men is significantly higher than in women, reaching a ratio of 4/1[2].

Previous research identified the age group from 60–69 years as the most prone to this type of cancer[12]. however, the GBD

data showed a change in relation to the age group, bringing higher rates for individuals aged more than 70 years. As for the rate of YLLs (potential YLLs due to cancer of the mouth and pharynx) in the country, there was an upward trend between 1979 and 2013 in both sexes[5].

When analyzing its distribution throughout the entire territorial extension of Brazil, it is observed that for mouth cancer, the Northeast region presented one of the lowest average coefficients for the period from 2002–2013 (1.6/100,000 inhabitants), but with an average annual increase in mortality of 6.9%. The Southeast region, in turn, had the second-highest average coefficient (2.04); however, it was the only region in which there was a reduction in mortality rates. It is known that tobacco is the main risk factor for cancer of the mouth and pharynx and that the South and Southeast regions have the highest consumption of tobacco in Brazil[13]. Between 1989 and 2010, the drop in the percentage of smokers in Brazil was 46%[14], reflecting the reduction in mortality observed in recent years.

From 1979–2002, the average mortality rate from oral cancer in Brazil was 2.7/100,000 inhabitants[5]. Between 2002 and 2013, the rate dropped to 1.87/100,000 inhabitants[2], remaining stable in this period. The GBD data confirm a reduction in mortality between 2002 and 2015 and a resumption in the growth of this indicator from then on. It is estimated that, in

Table 2. Epidemiology of lip and oral cavity cancer in Brazil in 2017.

Indicators	General	Sex		Age group (years)		
		Male	Female	15–49	50–69	≥70
Incidence	3.99	6.03	2.25	1.55	12.7	21.94
Prevalence	15.46	22.36	9.55	7.22	49.99	72.97
Mortality	2.29	3.69	1.1	0.6	7.14	15.2
MIR	0.57	0.61	0.49	0.39	0.56	0.69
DALYs	57.78	96.4	23.88	27.59	213.12	199.02
YLD	1.64	2.45	0.93	0.7	5.25	8.34
YLL	56.14	93.94	22.95	26.89	207.87	190.68

MIR: mortality/incidence rates; DALYs: disability-adjusted life years; YLD: years lived with disability; YLL: years of life lost.

Table 3. Epidemiology of lip and oral cavity cancer in Brazilian region in 2017.

Indicators	North	Northeast	Southeast	South	Midwest
Incidence	3.03	3.78	4.23	4.26	3.59
Prevalence	11.73	14.69	16.44	16.41	13.89
Mortality	1.8	2.25	2.39	2.41	2.04
MIR	0.59	0.6	0.56	0.57	0.57
DALYs	43.59	56.3	61.23	60.97	49.66
YLD	1.25	1.55	1.73	1.74	1.48
YLL	42.34	54.74	59.5	59.23	48.18

MIR: mortality/incidence rates; DALYs: disability-adjusted life years; YLD: years lived with disability; YLL: years of life lost.

2020, more than 21,000 new cases presented with oral and pharyngeal cancer and more than 10,000 of them died in Brazil[15].

This discrepancy in rates between the sexes is observed not only in Brazil but also worldwide. The increase in the longevity of the Brazilian population has caused a demographic and epidemiological transition[13]. This process encompasses the following three basic changes: replacement of communicable diseases by non-communicable diseases and external causes; transformation from a situation in which mortality predominates to one in which morbidity is dominant; and shifting the burden of morbidity and mortality from younger groups to older groups[16] (which justifies the significant increase in the incidence of oral cancer cases in elderly individuals).

The differences in the behavior of the main types of cancer, with a decrease mainly in the more developed regions and an increase in the less developed regions of the country, seem to reflect both socioeconomic inequalities and access to health services by the Brazilian population[17]. In addition, it may suggest an improvement in the information systems in the period studied (which would justify the registration of a greater number of deaths for the calculation).

A possible reduction in oral cancer mortality in recent years may be related to the efforts undertaken to provide access to early diagnosis and treatment for the main types of cancer, in line with the National Oral Health Policy and the National Oncology Care Policy.

In terms of clinical applicability, knowledge about the pathology brings more chances of an early diagnosis, thus avoiding mutilating treatments that impact the quality of life of patients (and unnecessary expenses in public health). As such, discussing the pathology to highlight the high rates of morbidity and mortality will make health professionals, especially doctors and dentists, reflect on their responsibilities in carrying out health education and screening for lip and oral cavity cancer.

In terms of scientific applicability, our results highlight the difficulties in establishing public policies aimed at the main risk factors related to the occurrence of oral malignancy. In this way, researchers in the area of epidemiology and clinical applicability will be encouraged to deepen the studies on the relationship between the factors associated with this disease, the future perspectives for the studied indices, the importance of policies already implemented, and the social and economic impact caused by high rates of oral cancer morbidity.

The high rates of mortality and morbidity due to oral cancer indicate that this disease constitutes a public health problem both in developed and developing countries. The possibility of reducing the incidence of oral cancer is related to the knowledge and control of risk factors that lead to the development of the disease. Therefore, the more the topic is discussed, the more information based on scientific evidence is disseminated.

There is still no evidence that a visual examination, as part of a population-based screening program, reduces the mortality rate from lip and oral cavity cancer. Thus, there is a need for longitudinal studies that can analyze this relationship. There is also a need to produce scientific evidence that supports actions that demonstrate a real impact on the epidemiological indicators of oral cancer to the detriment of isolated, voluntary, and disconnected actions of public action, especially at the local level. Hence, extensive research should be carried out in order to show the burden that social conditions exert on the complex causal chain of lip and oral cavity cancer.

This study has limitations that must be addressed. The first one is that we use secondary data, which may be outdated from state and/or national databases. The second refers to the study design (cross-sectional), which has no explanatory power in terms of cause and effect. Therefore, we suggest conducting a longitudinal study to provide additional information about this disease over time.

CONCLUSIONS

Epidemiological indicators of lip and oral cavity cancer were higher in men, with higher mortality indicators in individuals aged 50–69 years and higher rates (incidence, prevalence, and mortality) in the South and Southeast regions of Brazil. From 2002–2015, there was a reduction in mortality; however, in the period from 2015–2017, there was a resumption in the growth of this indicator.

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AUTHORS' CONTRIBUTIONS

IABL: Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing. **RJLA:** Validation, Visualization, Writing – original draft, Writing – review & editing. **APS:** Validation, Visualization, Writing – original draft, Writing – review & editing. **BFR:** Validation, Visualization, Writing – original draft, Writing – review & editing. **FWSF:** Validation, Visualization, Writing – original

draft, Writing – review & editing. **FRPQ:** Validation, Visualization, Writing – original draft, Writing – review & editing. **ESM:** Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Validation, Visualization, Writing – original draft, Writing – review & editing.

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