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Fraction of head and neck cancer attributable to tobacco and alcohol in cities of three Brazilian regions

Fração de câncer de cabeça e pescoço atribuível ao tabaco e ao álcool em cidades de três regiões brasileiras

Suely Aparecida Kfouri[I], José Eluf Neto[II], Sérgio Koifman[III†], Maria Paula Curado[IV], Ana Menezes[V], Alexander Welaussen Daudt[VI], Victor Wünsch Filho[I]

ABSTRACT: *Objectives:* To estimate the fraction of head and neck cancer (HNC) attributable to tobacco and alcohol in cities in the Midwest, Southeast and South regions of Brazil. *Methods:* Case-control study including 1,594 cases of HNC and 1,292 hospital controls. The association of HNC with tobacco and alcohol was estimated by the odds ratio and respective 95% confidence intervals through non-conditional logistic regression, adjusted for age, sex, schooling, consumption of fruits and vegetables, alcohol drinking (to examine the tobacco effect), and tobacco smoking (to examine the alcohol effect). The proportions of HNC attributable to tobacco and alcohol were estimated through the attributable fraction (AF) calculation. Separate estimates were made for Goiânia (Midwest), Rio de Janeiro and São Paulo (Southeast) and Pelotas and Porto Alegre (South). *Results:* The HNC fraction attributable to smoking was slightly higher in Goiânia (AF = 90%) than in cities in the Southeast (AF = 87%) and South (AF = 86%). The HNC fraction attributable to the consumption of alcoholic beverages presented similar and higher results in the cities of Southeast (AF = 78%) and South (AF = 77%) than in Goiânia (AF = 62%). *Conclusion:* The HNC fractions attributable to smoking were more expressive than for alcohol consumption. Although with discrete distinctions between them, the AFs to tobacco smoking and alcohol consumption in HNC observed in the cities of these three Brazilian regions were similar to those obtained in Latin America studies, but they were higher than in other parts in the world.

Keywords: Tobacco. Alcohol. Head and neck neoplasms. Brazil. Attributable risk.

[I]School of Public Health, Universidade de São Paulo – São Paulo (SP), Brazil.

[II]School of Medicine, Universidade de São Paulo – São Paulo (SP), Brazil.

[III]National School of Public Health, Fundação Oswaldo Cruz – Rio de Janeiro (RJ), Brazil.

[IV]International Research and Study Center, AC Camargo Cancer Center – São Paulo (SP), Brazil.

[V]School of Medicine, Universidade Federal de Pelotas – Pelotas (RS), Brazil.

[VI]Hospital de Clínicas de Porto Alegre – Porto Alegre (RS), Brazil.

†*In memorian.*

Corresponding author: Suely Aparecida Kfouri. Programa de Pós-Graduação em Saúde Pública, Faculdade de Saúde Pública. Avenida Dr. Arnaldo, 715, Cerqueira César, CEP: 01246-904, São Paulo, SP, Brasil. E-mail: suely.kfourisaka@usp.br

RESUMO: *Objetivo:* Estimar a fração de câncer de cabeça e pescoço (CCP) atribuível ao tabaco e ao álcool em cidades das regiões Centro-Oeste, Sudeste E Sul do Brasil. *Métodos:* Estudo caso-controle com 1.594 casos de CCP e 1.292 controles hospitalares. A associação de CCP com tabaco e álcool foi estimada pela *odds ratio* e intervalos de confiança de 95% via regressão logística não condicional, ajustada por idade, sexo, escolaridade, consumo de frutas e legumes, consumo de bebidas alcoólicas (para examinar o efeito do tabaco) e tabagismo (para examinar o efeito do álcool). As proporções de CCP atribuíveis ao tabaco e ao álcool foram estimadas pelo cálculo da fração atribuível (FA). Foram realizadas estimativas separadas para Goiânia (Centro-Oeste), Rio de Janeiro e São Paulo (Sudeste) e Pelotas e Porto Alegre (Sul). *Resultados:* A fração de CCP atribuível ao tabagismo foi discretamente mais elevada em Goiânia (FA = 90%) em comparação às cidades do Sudeste (FA = 87%) e do Sul (FA = 86%). A fração de CCP atribuível ao consumo de bebidas alcoólicas apresentou resultados similares e mais altos nas cidades do Sudeste (FA = 78%) e Sul (FA = 77%) em comparação a Goiânia (FA = 62%). *Conclusão:* As frações de CCP atribuíveis ao tabagismo foram mais expressivas do que para o consumo de álcool. Embora com discretas distinções entre si, as FA para tabaco e álcool observadas nas cidades das três regiões brasileiras foram semelhantes às obtidas em estudos em outras regiões da América Latina, porém, mais altas que em outras partes do mundo.

Palavras-chave: Tabaco. Álcool. Neoplasias de cabeça e pescoço. Brasil. Risco atribuível.

INTRODUCTION

Head and neck cancer (HNC) is the generic denomination for the set of tumors in the oral cavity, pharynx and larynx, whose incidence rises to about 680 thousand cases, and mortality rates reach 500 thousand a year around the world[1]. These numbers express the relevance of the disease for public health. In Brazil, the estimates from Instituto Nacional do Câncer (INCA) for the years 2016-2017 show about 15,490 new cases a year for oral cavity, being 11,140 in men and 4,350 in women[2].

Smoking and alcohol consumption are the main risk factors for these tumors, and the interaction of these two factors with other variables, such as diet[3] and occupational exposures[4], characterizes specific patterns of incidence in the populations. The magnitude of the risks of tobacco and alcohol in HNC are different depending on the region of the world, and on specific anatomic locations[5]. There are also variations according to the socioeconomic conditions of the populations[6], which influence the behavioral attitudes and lifestyle of the individuals[7]. Different prevalence rates in the intake of alcohol, in time and space, generate different risks of cancer[8-10]. In Hungary, where the consumption of distilled drinks is more common than in other regions, high incidence and mortality rates were found for oral cancer[11]. Higher risks of larynx cancer were found in the Italian population, which consumes wine more often[12]. In Brazil, most of the consumption of tobacco involves manufactured cigarretes[13]. In rural areas, there are more users of hand-rolled cigars in comparison to industrial cigars, more common in urban areas (13.8 and 3.6%, respectively)[14]. Variations also occur

regarding the intake of alcohol. Even though beer is the most consumed drink by the Brazilian population, in some areas of the North and the Northeast distilled drinks present higher proportions[15].

Smoking has decreased in the Brazilian population since the late 1980s, and this can affect the reduction of morbidity and mortality by HNC in the future[16]. From 2006 to 2015, the prevalence of smoking in Brazil fell from 20.2 to 12.8% among men, and, for women, from 13.0 to 8.3%[17,18]. The frequency of the smoking habit in the population (adults ≥ 18 years) is different in the capitals of the Brazilian states, for example: Goiânia (7.6%), Porto Alegre (14.9%), Rio de Janeiro (12.5%) and São Paulo (13.7%)[18]. Even though the frequency of smoking is decreasing in the population, the highest fraction of cancer in Brazil, in general, is attributed to tobacco. In a study conducted to estimate the population attributable fraction (PAF) of modifiable risk factors for 25 types of cancer, there were PAFs of 95.0 and 80.2% for oral cavity and larynx cancer, respectively[19], for the Brazilian population as a whole.

The prevalence of abusive alcohol consumption is around 17.2% among adults in the Brazilian population[18] and, unlike smoking, presents an increasing trend. Between 2006 and 2015, the abusive alcohol consumption rose from 16.1 to 25.3% among men, and 8.1 to 10.2% among women[17,18]. The abusive alcohol consumption among adults in Brazilian capitals is uneven, for instance: Goiânia (18.6%), Porto Alegre (14.4%), Rio de Janeiro (20.7%) e São Paulo (14.8%)[18].

The objective of this study was to examine the fraction of HNC attributable to tobacco and alcohol exposure in cities of three major Brazilian regions.

METHODS

The estimation of the attributable fraction (AF) was based on the data from the "Multicenter Latin American Study Virus and Cancer of the Oral Cavity and Larynx", coordinated by the International Agency for Research on Cancer, of the World Health Organization (IARC/OMS)[20], with the objective of investigating multiple risk factors for HNC. In this hospital-based case-control study, carried out from September 1998 to March 2003, data from five Brazilian cities were used: Goiânia (Center-West region), Rio de Janeiro and São Paulo (Southeast Region), Pelotas and Porto Alegre (South region).

To be included in the study, the cases had to be of patients diagnosed with primary invasive head and neck cancer, confirmed by histology, without previous treatment, of both genders; and they had to be living in the study cities for at least one year before the date of the interview. Cases were selected in four hospitals of Goiânia, four hospitals in Rio de Janeiro, seven hospitals in São Paulo, seven hospitals in Pelotas and one hospital in Porto Alegre. The cases were classified according to tumor topography, based on the tenth revision of the International Statistical Classification of Diseases and Related Health Problems (ICD-10)[21], including codes C00 to C14. Cases such as lip (codes C00.0, C00.1, and C00.2),

parotid gland (C07), large salivary glands (C08) and nasopharyngeal (C11) neoplasms were excluded for presenting different etiology from the other head and neck neoplasms[22,23].

Controls were selected among hospitalized patients or those being followed-up in outpatient clinics in the same hospitals recruiting the cases or in other hospitals in the same city. The selection of controls was carried out according to the frequency of cases by sex and age group (in five-year periods) and hospitals. The tracking of controls was simultaneous to the detection of cases and possible adjustments; and to guarantee the minimum number required in each stratum, they consented after the final recruitment of the cases. Patients diagnosed with conditions not related to the main risk factors examined in the study – tobacco and alcohol – were selected, and those with suspicious clinical recent or older history of HNC were excluded.

The individuals who met the inclusion criteria were invited to participate in the study and signed the Informed Consent Form. Each patient was informed that the adherence to the study was voluntary, and all information provided would be anonymous, treated in the analysis as a whole. Trained interviewers applied the same structured questionnaire to case and control patients, to obtain information about smoking, alcohol consumption, schooling and diet. The interviews were also conducted for suspicious cases which were not confirmed.

From the initial data base, with 1,919 cases and 1,410 interviewed controls, 27 cases were excluded for not meeting the inclusion criteria (living for at least 1 year in the city of residence; previous treatment for cancer; or cancer diagnosis before 1998, year when the study began). Other 74 cases were excluded for being diagnosed with lip (C00.0, C00.1, C00.2), parotid gland (C07); and other large salivary glands and non-specified (C08) and nasopharyngeal neoplasms (C11). The analysis also excluded 224 cases of esophageal cancer (C15), all originated from a single hospital. Among controls, 76 were excluded for diagnoses of diseases related with the consumption of tobacco and alcohol, and 15 for living in the city of diagnosis for less than 1 year. Twenty-seven cases of HNC diagnosed with histological confirmation, which had been classified, were also excluded as controls, as a mistake. After the exclusions, the analysis had 1,594 cases and 1,292 controls. The study was conducted based on ethical criteria, and approved by the National Research Ethics Committee (CONEP), and by the Research Ethics Committee of the Public Health School of Universidade de São Paulo.

Individuals considered smokers were those who informed to smoke at least one cigarette, cigar or pipe every day for at least one year. Three categories of smokers were used in the analysis: never smoked; former smoker (the ones who interrupted the smoking habit for 12 months or more in relation to the date of the interview); smoker (current smokers, and also the ones who informed having stopped for less than 12 months). The use of cigars (1.4%) and pipe smoking (3.4%) was reduced among the study participants.

Alcohol consumers were considered when they reported intaking alcohol at least once a month. The consumption was categorized as: never had alcohol; consumed some in the past year (those who stopped consuming it for 12 months or more, prior to the date of the interview); and current consumers (current consumer and the ones who stopped drinking for less than 12 months). The variables age, sex, schooling, vegetable consumption, fruit

intake, tobacco (at the analysis of alcohol effect) and alcohol (at the analysis of the effect of tobacco) were considered as confounding variables.

Age, in full years until the time of the study, was separated in the following class intervals in years: 50, 50 to 59, 60 to 69, and 70 or more. Schooling was examined in three levels: did not attend; studied until elementary school; until high/higher education. The intake of vegetables was categorized in three strata: consumption less than once a week; consumption at least once a week; consumption at least twice a week. The intake of fruits was treated dichotomically: consumption less than once a week; consumption at least once a week. For all of the studied variables, the reference category was the one that, according to the literature, presented lower risk for NHC.

STATISTICAL ANALYSIS

First, we conducted a descriptive analysis of the variables, using the absolute and relative frequencies, separately, according to the cities: Goiânia (Center-West), Rio de Janeiro and São Paulo (Southeast), and Pelotas and Porto Alegre (South).

Then, a univariate analysis using the χ^2 test was carried out to examine the association of each independent variable with NHC[24].

Odds ratio (OR) and respective 95% confidence intervals (95%CI) to estimate the odds ratio resulting from tobacco and alcohol in HNC, in the studied cities, were calculated by non-conditional logistic regression, using the stepwise forward method[25].

The independent models were adjusted for each set of studied cities. The final model maintained all of the variables which, in at least one stratum, presented p < 0.05.

To estimate the proportions of HNC attributable to smoking and the intake of alcoholic beverages in the cities of the three studied regions, AF was calculated using the OR as the approximation of the relative risk in the equation[26]: [AF = (OR - 1/OR) x 100].

The statistical package Stata, version 9.1 (Stata Corporation, College Station, United States) was used to conduct the statistical analyses.

RESULTS

The characteristics of cases and controls, according to the cities studied in the three Brazilian geographic regions, are presented in Table 1. The sample comprised 341 cases and 239 controls in Goiânia (Center-West region), 938 cases and 665 controls in Rio de Janeiro and São Paulo (Southeast), and 315 cases and 388 controls in Pelotas and Porto Alegre (South). Male individuals, aged between 50 to 59 years, with higher proportion of low schooling levels (illiterate and elementary school) were prevalent among the cases. Controls reported consumption of vegetables and fruits at least once a week in higher proportions than cases in all of the studied cities.

By comparing to the cases of people who have never smoked, estimates of non-smokers and former-smokers were higher among controls. Regarding the consumption of

Table 1. Characteristics of cases and controls in the cities Goiânia, Rio de Janeiro, São Paulo, Pelotas and Porto Alegre, Brazil, 1998–2003.

	Goiânia				Rio de Janeiro and São Paulo				Pelotas and Porto Alegre			
	Cases		Controls		Cases		Controls		Cases		Controls	
	(n = 341)		(n = 239)		(n = 938)		(n = 665)		(n = 315)		(n = 388)	
	n	%	n	%	n	%	n	%	n	%	n	%
Sex												
Female	65	19.1	47	19.7	135	14.4	145	21.8	43	13.6	78	20.1
Male	275	80.6	192	80.3	803	85.6	520	78.2	272	86.3	310	80.0
Age (years)												
⊠ 50	75	21.9	79	33.0	238	25.4	205	30.8	73	23.2	77	20.0
50 to 59	117	34.3	77	32.2	309	32.9	203	30.5	112	35.6	135	35.0
60 to 69	102	29.9	58	24.3	264	28.1	166	24.9	85	26.9	107	28.0
70 or more	46	13.5	25	10.5	127	13.5	91	13.7	45	14.3	69	18.0
Schooling												
Did not attend school	116	34.0	58	24.2	123	13.1	90	13.5	45	14.3	65	16.7
Up to elementar school	191	56.0	164	68.6	705	75.2	470	70.7	239	75.9	279	71.9
High school / higher education	34	9.9	17	7.1	110	11.7	105	15.8	31	9.8	44	11.4
Consumption of vegetables (per week)												
Less than once	169	49.6	68	28.4	409	43.6	274	41.2	120	38.1	149	38.4
At least once	49	14.4	39	16.3	245	26.1	195	29.3	49	15.6	90	23.2
At least twice	123	36.0	132	55.2	283	30.2	194	29.2	144	45.7	149	38.4
Intake of fruits (per week)												
Less than once	83	24.3	28	11.7	122	13.0	38	5.7	36	11.4	20	5.1
At least once	258	75.6	211	88.3	811	86.5	624	93.8	277	87.9	368	94.8
Smoking (status)												
Non-smoker*	12	3.5	64	26.8	50	5.3	199	29.9	21	6.8	133	34.3
Former smoker*	89	26.1	98	41.0	196	20.9	260	31.0	76	24.1	137	35.3
Smoker	240	70.4	77	32.2	691	73.7	260	39.1	218	69.2	118	30.4
Alcohol consumption (status)												
Does not drink	34	10.0	54	22.6	78	8.3	195	29.3	45	14.3	165	42.5
In the past**	132	38.7	85	35.6	326	34.8	204	30.7	93	30.7	102	26.3
Still drinks	174	51.0	100	41.9	534	57.0	265	39.9	177	56.2	121	31.2

*Individuals who have stopped smoking for more than one year prior to the interview; **Individuals who stopped drinking alcohol for more than one year prior to the interview. Variables with missing data: sex: 1 case without information in Goiânia; age: 1 case without information in Goiânia; consumption of vegetables: 1 case and 2 controls without information in São Paulo and Rio de Janeiro, 2 cases without information in Pelotas and Porto Alegre; consumption of fruits: 5 cases and 3 controls without information in São Paulo and Rio de Janeiro, 2 cases without information in Pelotas and Porto Alegre; smoking: 1 case without information in São Paulo and Rio de Janeiro; alcohol consumption: 1 case without information in Goiânia, 1 control without information in São Paulo and Rio de Janeiro.

alcohol, the proportion of cases in the categories referring to those who drank in the past, and to the ones who still drink, were higher among controls in all of the analyzed cities.

Laynx was the most common anatomic location of HNC in all of the Brazilian cities analyze — Goiânia (Center-West), 20.9%; Rio de Janeiro and São Paulo (Southeast), 19.5%; Pelotas and Porto Alegre (South), 18.3% — followed by oral cavity (12.1, 12.3, and 16.1%, respectively), and oropharynx (9.1; 10.8, and 3.1%, respectively).

Data not shown in Table 1.

The odds ratio was higher among smokers in Goiânia (OR = 13.6; 95%CI 6.4 – 28.6), compared to São Pauo and Rio de Janeiro (OR = 6.6; 95CI% 4.5 – 9.7) and Pelotas and Porto Alegre (OR = 8.8; 95%CI 4.7 – 16.2). The fraction of HNC attributable to smoking was slightly higher in Goiânia (AF = 90%) than in São Paulo and Rio de Janeiro (AF = 87%), and Pelotas and Porto Alegre (AF = 86%) (Table 2).

Table 2. Association between smoking and head and neck cancer in the cities of Goiânia, Rio de Janeiro, São Paulo, Pelotas and Porto Alegre, logistic regression model, Brazil, 1998–2003.

Cities	Status	Cases/controls	Crude OR	IC95%	Adjusted* OR	95%CI	p-value*
Goiânia	Non-smoker	12/64	1.0		1.0		< 0.001
	Former smoker	89/98	4.8	(2.4 – 9.6)	3.5	(1.6 – 7.4)	
	Smoker	240/77	16.6	(8.5 – 32.4)	13.6	(6.4 – 28.6)	
	Total	341/239					
Attributable fraction	90%						
São Paulo and Rio de Janeiro	Non-smoker	50/199	1.0		1.0		< 0.001
	Former smoker	196/206	3.8	(2.6 – 5.5)	2.3	(1.6 – 3.5)	
	Smoker	691/260	10.6	(7.5 – 14.9)	6.6	(4.5 – 9.7)	
	Total	938/665					
Attributable fraction	87%						
Pelotas and Porto Alegre	Non-smoker	21/133	1.0		1.0		< 0.001
	Former smoker	76/137	3.5	(2.0 – 6.0)	3.0	(1.6 – 5.7)	
	Smoker	218/118	11.7	(7.0 – 19.5)	8.8	(4.7 – 16.2)	
	Total	388/315					
Attributable fraction	86%						

OR: *odds ratio*; 95%CI: 95% confidence interval; *χ^2 test, variable status for smoking adjusted by sex, age, schooling, consumption of fruits, consumption of vegetables and alcohol consumption (do not drink, in the past, still drink). Without information: smoking status: 1 case without information in São Paulo and Rio de Janeiro.

Among alcohol consumers, São Paulo and Rio de Janeiro and Pelotas and Porto Alegre presented higher odds ratio than Goiânia. The fractions of HNC attributable to the consumption of alcohol were more expressive in São Paulo and Rio de Janeiro (AF = 78%), and Pelotas and Porto Alegre (AF = 77%), in relation to Goiânia (AF = 62%) (Table 3).

DISCUSSION

The AFs calculated in this study consist on the percentage of cases of HNC that could be preventing by removing the habits of smoking or drinking alcohol from the studied populations[26]. In the cities of the three geographic regions, the fractions of HNC attributable

Table 3. Association between alcohol consumption and head and neck cancer in the cities of Goiânia, Rio de Janeiro, São Paulo, Pelotas and Porto Alegre, logistic regression model, Brasil, 1998–2003.

Cities	Status	Cases/ controls	Crude OR	95%CI	Adjusted* OR	95%CI	p-value*
Goiânia	Does not drink	34/54	1.0		1.0		< 0.001
	In the past	132/85	2.5	(1.5 – 4.1)	2.3	(1.2 – 4.3)	
	Still drinks	174/100	2.8	(1.7 – 4.5)	2.8	(1.5 – 5.4)	
	Total	341/239					
Attributable fraction	62%						
São Paulo and Rio de Janeiro	Does not drink	78/195	1.0		1.0		< 0.001
	In the past	326/204	4.0	(2.9 – 5.5)	2.9	(2.0 – 4.3)	
	Still drinks	534/265	5.0	(3.7 – 6.8)	4.1	(2.9 – 6.0)	
	Total	938/665					
Attributable fraction	78%						
Pelotas and Porto Alegre	Does not drink	45/165	1.00		1.00		< 0.001
	In the past	93/102	3.3	(2.2 – 5.1)	2.9	(1.7 – 4.9)	
	Still drinks	77/121	5.4	(3.6 – 8.0)	4.7	(2.8 – 7.9)	
	Total	388/315					
Attributable fraction	77%						

OR: *odds ratio*; 95%CI: 95% confidence interval; *χ^2 test, variable status for the intake of alcohol adjusted by sex, age, schooling, consumption of fruits, consumption of vegetables and tobacco (non-smokers, former smokers, and smokers). Without information: alcohol drinking status: 1 case in Goiânia; 1 control in São Paulo and Rio de Janeiro.

to smoking were more expressive than that of alcohol consumption. The most remarkable difference was detected in Goiânia (90% attributable to tobacco, and 62%, to alcohol).

In a study carried out in Brazil to estimate the PAF of modifiable risk factors for 25 types of cancer, it was observed that highest PAF was related to smoking, followed by infections, low intake of fruits and vegetables, lack of physical activities, overweight and obesity[19]. The differences in HNC fractions attributable to tobacco and alcohol found in this study are similar to those observed for Latin America[5], however, higher than the ones detected in other regions of the world[10,23,27-29], and may be the expression of local patterns and habits of tobacco and alcohol consumption in the cities analyzed in the Center-West, Southeast and South regions. There is great variation in the occurrence of HNC in the world[30,31].

There were variations in Brazil as well[32,33]. In a systematic review about the consumption of alcohol and HNC, there were asymmetries in the occurrence of the disease by geographic regions, related to the prevalent consumption habits in the populations[8]. In Switzerland and Italy, higher risks of oral cavity and oropharynx cancer were associated with the consumption of wine; however, in Sweden, more expressive risks were detected for the consumption of beer and liqueur[8]. In Brazil, among the different alcoholic beverages, distilled drinks, especially cachaça, were associated with high risks of HNC[34].

In this study, the occurrence ratio of HNC between sexes ranged from 4.2 men per woman in Goiânia, and 5.9 in São Paulo and Rio de Janeiro, and 6.3 in Pelotas and Porto Alegre. These results are consistent with the ones observed in other studies, which reported occurrence ratios of HNC between sexes always higher than two men per one woman[35]. The highest incidence among men is the direct expression of the higher prevalence of smoking and drinking alcohol in the male population.

Socioeconomic determinants may influence behaviors and lifestyles[7], submitting the populations to different levels of exposure to carcinogens. Studies with migrants corroborate the physical, social and cultural influence of risk factors in the occurrence of cancer[36]. In this study, schooling was used as an indicator of socioeconomic status. In the cities of the Southeast and South regions, with higher level of industrialization, individuals who had studied until elementary school were more present in relation to Goiânia, where most participants had never attended school. According to a population survey carried out in Brazil[18], smoking presented a positive correlation with low schooling levels, whereas the intake of alcohol was more frequent in strata presenting higher schooling levels.

The magnitude of the HNC fraction attributable to smoking was slightly higher in Goiânia. A possible explanation for this fact, besides the lower schooling levels, would be the form of tobacco consumption. According to the National Household Sample Survey, especially regarding smoking (2008)[37], the Center-West region was one of the Brazilian regions where the practice of smoking hand-rolled cigars was more frequent. As mentioned by some authors, the different types of tobacco consumption lead to varied risks of HNC[38,39].

The HNC fractions attributable to the consumption of alcohol were higher in São Paulo and Rio de Janeiro; Pelotas and Porto Alegre. The positive correlation between the intake of alcohol and levels of industrialization and urbanization[40] is, at least partly, a possible explanation for the results.

The pattern of alcohol consumption between Brazilian regions is very heterogeneous, both in frequency and in type of beverage[15]. The South Region reveals a pattern of frequent consumption of alcohol, but in lower amounts; on the other hand, in the Center-West, Northeast and North regions, the intake is higher per each occasion. In the South region, wine is more consumed, whereas in the North, Northeast and Center-West, the consumption of distilled drinks, especially cachaá, is more common[15]. Higher risks of HNC have been observed among cachaça drinkers, and the absence or reduction of risk were detected among moderate wine consumers[35,41].

There are some limitations in this study. A hospital-based case-control study was carried out (1998-2003) with data collected retrospectively, using a questionnaire; however, it was subjected to selection and information bias. Despite the large sample size, it was not possible to carry out analyses per specific anatomic locations of the head and the neck. The sample was also a limiting factor for the analysis of the combined effect of tobacco and alcohol, which requires the division of the study population in smaller strata, thus reducing the number of observations in each level. Another limitation was the absence of the North and Northeast regions in the analysis, which reduces the amplitude of the interpretative potential of the studied phenomena.

CONCLUSION

To sum up, according to the results of this study, the HNC fractions attributable to smoking were more expressive than those attributable to alcohol, in all analyzed cities. Especially in Goiânia, the difference was more expressive: 90% attributable to tobacco, and 62%, to alcohol. On the other hand, the HNC fraction attributable to the intake of alcohol in Goiânia was less expressive than in Rio de Janeiro and São Paulo (78%) and Pelotas and Porto Alegre (77%).

Based on these results, it is possible to conclude that, even though smoking has presented a reduction in the Brazilian population, in population subgroups such as the individuals affected by HNC, this practice is highly prevalent. On the other hand, the intake of alcohol has increased in the population. Considering that the genetic load in the occurrence of cancer is 5 to 10%, and that 90 to 95% are a result of modifiable risk factors, the results in this study about HNC fractions attributable to tobacco and alcohol show that the removal of one of these two factors can reduce the load of cases in the population; therefore, it is important to conduct articulated programs to control these two risk factors. Strategies of education, in order to be effective, need to reach the entire population, considering socio-economic and cultural specificities, since these can lead to behaviors and habits related to the consumption of tobacco and alcohol.

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