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ORIGINAL ARTICLE

Smoking-Alcohol-Sex Exposure and Knowledge About Oral and Oropharyngeal Cancer Among Brazilian Adolescents: An Exploratory-Observational Approach

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Abstract

Objective: To investigate the involvement of young Brazilian students about five behaviors: tobacco use, alcohol consumption, sexual intercourse, knowledge about HPV, and knowledge about oral and oropharyngeal cancer. **Material and Methods:** Through a cross-section design, we explored some factors that might be associated with boys and girls. Statistical Regression methods were applied to identify differences, considering the estimation of the Odds Ratio. **Results:** Half of the sample had already consumed alcohol and at least 1 in 10 individuals had already tried smoking. One-third of adolescents have had sexual intercourse. Three factors related to boys were associated in the multiple regression analysis: have heard about HPV, have not heard about oral cancer, and think that HPV can cause oropharyngeal cancer. In conclusion, it seems that boys and girls were equally exposed to smoking-alcohol-sex; however, some differences were verified concerning the knowledge about HPV and oral / oropharyngeal cancer. **Conclusion:** Keep monitoring adolescents should be a priority to our study area, considering that those youngers had already being exposed to the risk factors for cancer.

Keywords: Adolescent Behavior; Mouth Neoplasms; Pharyngeal Neoplasms; Substance-Related Disorders.

Introduction

Cancer remains one of the greatest challenges worldwide. From 2007 to 2017 incidence of cancer increased by 33%, and between 1990 to 2017, neoplasms increased among the top causes of disability-adjusted life-years (DALYs) from the sixth to the second place [1]. Recent data estimate a global incidence of 18.1 million new cases and 9.6 million cancer-related deaths for the year 2018 [2]. In the United States, 51,540 new cases of cancers were related to mouth and oropharynx in 2018, and an increase of 1% per year between 2005 and 2014 was observed, much of this increase was associated with Human Papillomavirus (HPV) in the oropharynx region [3]. Data for Brazil from the National Cancer Institute (INCA) estimated an incidence of 14,700 new cases for the year 2018, 590 (4%) related to oral cavity cancer [4].

Behaviors considered risk factors for oral and oropharyngeal cancer, such as alcohol consumption, smoking and exposure to HPV begin in adolescence [5,6]. This phase of life is marked by a series of events that affect the life of adolescents, such as puberty and exposure to new physical, psychological and environmental structures associated with the historical and cultural insertion of the individual, which determine various ways of living according to gender [7].

Many individuals have their first sexual intercourse still in adolescence, sometimes with more than one partner, which may expose them, in addition to unintended pregnancies, to a real chance of contracting Sexually Transmitted Infection (STIs), such as HPV [6,8]. HPV infection has been identified as one of the factors responsible for the increase in the incidence of oral and oropharyngeal cancer in young patients, mainly women [9].

In the United States, the Centers for Disease Control and Prevention (CDC) has developed major monitoring of the main risks to young population, known as Youth Risk Behavior Surveillance (YRBS), establishing as follow-up priorities such as alcohol and tobacco consumption, sexual behavior, violence, diet and physical activity [10]. In Brazil, two large studies have monitored the life of Brazilian adolescents; the National School Health Survey – PeNSE [11] of the Brazilian Institute of Geography and Statistics and the Study of Cardiovascular Risks in Adolescents – ERICA [12], that is resulted of national cooperation of several research institutes.

The global aim of this study was to investigate the involvement of young Brazilian students about five behaviors: tobacco use, alcohol consumption, sexual intercourse, knowledge about HPV, and knowledge about oral and oropharyngeal cancer. Federal Institutes of Education of the state of Alagoas (northeastern region of Brazil) were used as research scenario.

Material and Methods

Study Design and Scenario

A cross-sectional and observational study was carried out with Brazilian high school students enrolled at Federal Institutes of Education (IFs) of the state of Alagoas – IFAL, aged 14-19 years from June to December 2017. Education in IFs in Brazil differs from traditional one because, in addition to theoretical classes, students have the possibility of studying technical subjects that will be the basis for their professionalization. The duration of the full course in the IF is four years, divided into four grades: 1st year, 2nd year, 3rd year, and 4th year.

The study was carried out in the northeastern region of the country, which has the highest illiteracy rate at the age over 15 years (18.2%), according to the Brazilian Institute of Geography and Statistics [13]. At the time of the research, the state had 12 IFs distributed in the state capital (Maceió) and other municipalities:

Arapiraca, Maragogi, Marechal Deodoro, Murici, Palmeira dos Índios, Penedo, Piranhas, Santana do Ipanema, Satuba and Viçosa.

Participants

High school students from one of IFs in the state of Alagoas aged 14-19 years participated in this study. Minimum age of 14 years is required to attend high school in the Institutes, so there were no children aged 10-13 years. Regular enrollment in the high school of IFs was adopted as main inclusion criterion. Students who were in Special Home Care during the collection period were excluded. This service is governed by the Organizational Standards of the state, when the student has the possibility of performing academic activities at home in the following cases: infectious-contagious disease; health treatment; need to accompany first-degree relatives; and maternity leave [14].

Variables

Adolescent's gender was used as a factor of analysis, coded as "0" = boy and "1" = girl. The behavior of adolescents in relation to five categories of interest was investigated: 1- alcohol consumption; 2- smoking; 3- sexual behavior; 4- knowledge about HPV (transmission and symptomatology); 5- knowledge about the etiology of oral and oropharyngeal cancer. The first three categories were measured by the YRBS questionnaire in its validated Brazilian version [15], while the latter two were collected in a standard form containing information about knowledge about HPV and oral and oropharyngeal cancer. In addition to variables related to the primary study objective, social and demographic characteristics of the sample, such as age, gender, Institute location, grade, and self-reported ethnicity, were also assessed.

In order to facilitate data collection procedures, all questions were exported to a standard, anonymous and electronic questionnaire in the Google forms® format. In addition to variables related to the primary study objective, social and demographic characteristics of the sample, such as age, gender, Institute location, grade, and self-reported ethnicity, were also assessed.

Study Size - Sampling Plan

The population of adolescents enrolled in the 12 state IFs during the survey was 6,100 students divided into 236 classes. To reach a representative sample of this population, the sample size was initially calculated, followed by the sampling design stratified by the population stratum of high school students of each Institute. First, the minimum sample size based on population size was determined, which was considered to be finite. The sample size calculation considered an alpha value of 0.05 (5%), error of 0.05 an expected prevalence of 0.5 (50%). In the equation below, we have the formula to calculate the sample:

$$n_{adj} = \frac{N\ x\ [1{,}96^2\ x\ P_{exp}(1-P_{\exp})/d^2]}{N+[1{,}96^2\ x\ P_{exp}(1-P_{exp})/d^2]}$$

n_{adj} = sample size; N = population; 1.96 = population standard deviation; P_{exp} = expected prevalence; d = standard error.

We found the minimum sample size of 361, representing 5.9% of the total, which is the necessary proportion of students for each Institute by applying proportional distribution. The map detailed in Figure 1 shows the proportional sample size reached in our study. Two classes were randomly drawn for each Institute, except for the capital, in which three classes were drawn due to the larger population size. A sample size of 426 students was reached, number that exceeds 18% the statistical sample size required.

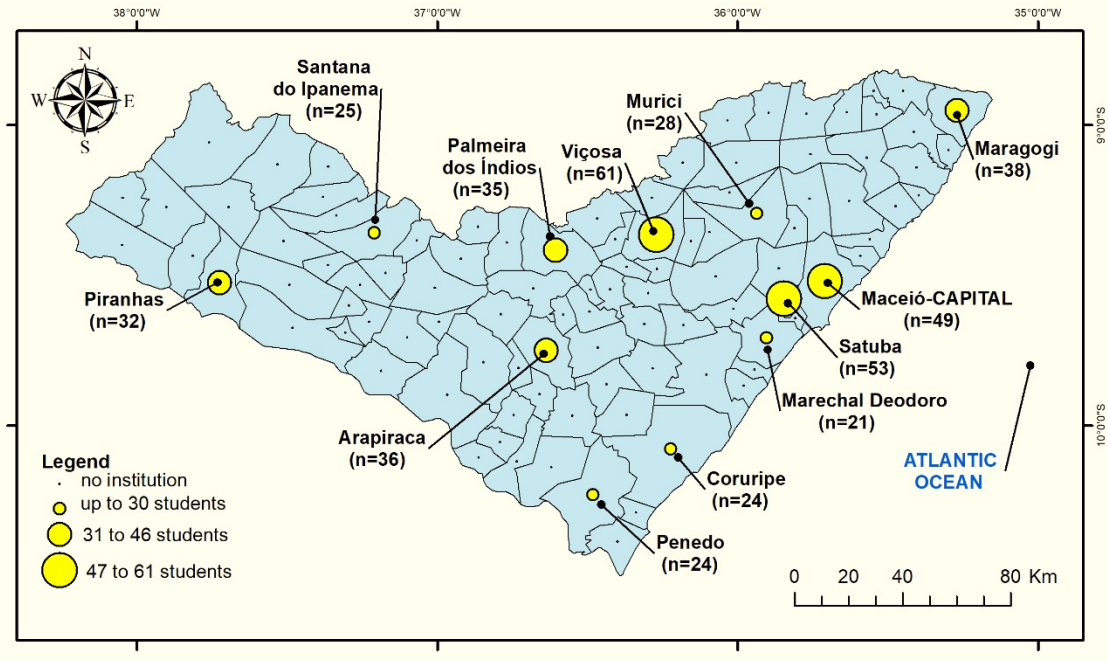

Figure 1. Mapping of municipalities participating in the study, distributed according to sample size.

Data Sources and Access

Data collection was performed after approval of the research by the Principals of each Institute, and dates and times were scheduled for disclosure and performance with participants. After return of the Informed Consent Form and the Assent Form, each class was taken to a computer room at their respective school, where they individually answered the electronic questionnaire, which was accessed through a link sent by email.

The main researcher was present at all moments of data collection, both on the day of research disclosure and delivery of consent forms, and in data collection. The presence of researcher to clarifying the access to the questionnaire link, as well as possible doubts of adolescents regarding terms, acronyms or unknown words. At the end of the electronic questionnaire filling, which lasted an average of 30 minutes, adolescents sent it, signed a participation list and informed their emails so that they could receive the participation certificate. Data were received by the researcher's email center, which carried out storage in suitable software for future analysis.

The final questionnaire was structured and composed of questions, which were subdivided into six sections: (1) sociodemographic information (age, gender, municipality, high school grade and ethnicity); (2) tobacco-related questions; (3) alcohol-related questions; (4) sexual behavior; (5) knowledge about HPV; and (6) knowledge about oral and oropharyngeal cancer. Questions related to alcohol, tobacco use and sexual behavior were extracted from the Brazilian validated version of the YRBS questionnaire [15].

We collect information contained in the validated questionnaire; however, due to the large volume of information, the most interesting results to be discussed and included in the inferential analysis were selected. Regarding smoking, we included: "Have you ever tried cigarette smoke even one or two puffs?". Regarding alcohol consumption, the following questions were included: "During your life, how many days did you drink at least one dose of alcohol?"; "How old were you when you had your first drink?"; "In the last 30 days, on how many days did you drink at least one dose of alcohol?"; "For the last 30 days, how did you obtain alcohol?". Exposure to sexual life by adolescents considered the following variables: "Have you ever had sexual intercourse?"; "How old were you when you had your first sexual intercourse?"; "During your life, how many

different people have you had sex with?"; "In the last 3 months, how many different people have you had sex with?"; "Have you had any alcohol or drugs before having sex?"; "The last time you had intercourse, did you or your partner use a condom?".

Statistical Analysis

The individual gender was used as dependent factor: "boys" *versus* "girls". All predictive factors that could be associated with adolescent's gender assumed absolute and percentage values. Firstly, bivariate analysis was applied through Simple Logistic Regression to estimate the Odds Ratio-unadjusted (OR), with respective 95% Confidence Intervals (CI-95%). After this step, the analysis of interaction of several factors simultaneously in relation to individuals' gender was included through Multiple Logistic Regression, adjusting factors to the model that best suited. Initially, all variables within the statistical model were inserted by the "insert" method, followed by removal of non-significant variables. Three prerequisites were used for the analysis of multiple factors: 1- factors that obtained at least significance of 20% ($p < 0.20$) in the simple regression; 2- absence of multicollinearity among independent variables (Tolerance Value > 0.1; VIF < 10); and 3- minimum expected frequency of 5 cases. The final model obtained adjusted OR and 95% Confidence Interval. We consider the adjust of Hosmer-Lemeshow test and the absence of outliers in the final model. First, we observed the adjust of the model without categories, later we observed how was the goodness of fit after include all variables in the model. The interpretation of the Hosmer-Lemeshow test is better when the null hypothesis (H_0) is confirmed, and the predicted-values in the model are statically equal to the observed-values. For statistical significance effect, value of 5% was adopted ($p < 0.05$).

Ethical Issues

The precepts of bioethics involving research with human beings during the recruitment and data acquisition phases were followed. The national recommendations of the Ministry of Health in its 466 / 2012 Resolution, as well as international recommendations of the Declaration of Helsinki, were adopted. The research was submitted to an independent Ethics Research Committee, obtaining approval according to Protocol No. 2.080.412.

Results

A total of 426 adolescents participated in the study. Overall descriptive sample data showed a slight predominance of girls (54.2%); mean age of 16.01 years (± 1.3); brown ethnicity (58.8%), followed by white (22.5%), black (16.7%), and 0.9% did not want to respond. In relation to the school grade at the institute, students attended the 1st year of high school (60.3%), followed by 2nd year (24.6%), 4th year (9.4%) and 3rd year (5.6%). Of the total number of adolescents, 11.5% have tried smoking at some point in their lives; 1.8% had smoked cigarettes at least 1 day during the 30 days before the survey; 51.6% have ingested alcoholic beverages at some point of life; 24,5% have ingested alcohol 30 days before the survey; 28.4% have had sexual intercourse; 91.3% have heard about HPV; 48.1% never heard about oral cancer and 76.1% never heard about oropharyngeal cancer.

Table 1 describes the OR-unadjusted values for sociodemographic factors among adolescents. There were no significant differences between Odds, except for students who attended the 4th year, where OR was 0.42 (CI-95%: 0.20-0.87), indicating lower proportion of boys in relation to the reference category (1st year).

Table 1. Simple logistic regression with estimation of unadjusted odds ratio (OR) according sociodemographic conditions.

Variables	Gender		Total	$OR^{unadjusted}$ (CI-95%)	p-value
	Boy N (%)	Girl N (%)	N (%)		
Age					
14 Years	11 (39.3)	17 (60.7)	28 (100.0)	1	
15 Years	70 (43.2)	92 (56.8)	162 (100.0)	1.17 (0.51-2.66)	0.69
16 Years	61 (57.0)	46 (43.0)	107 (100.0)	2.04 (0.87-4.79)	0.09
17 Years	26 (44.8)	32 (55.2)	58 (100.0)	1.25 (0.50-3.14)	0.62
18 Years	15 (38.5)	24 (61.5)	39 (100.0)	0.96 (0.35-2.61)	0.94
19 Years	10 (33.3)	20 (66.7)	30 (100.0)	0.77 (0.26-2.26)	0.63
Location of Institute					
Arapiraca	14 (38.9)	22 (61.1)	36 (100.0)	0.78 (0.32-1,87)	0.58
Coruripe	8 (33.3)	16 (66.7)	24 (100.0)	0.61 (0.22-1.69)	0.34
Maceió	22 (44.9)	27 (55.1)	49 (100.0)	1	
Maragogi	22 (57.9)	16 (42.1)	38 (100.0)	1.68 (0.71-3.96)	0.23
Marechal Deodoro	9 (42.9)	12 (57.1)	21 (100.0)	0.92 (0.32-2.58)	0.87
Murici	7 (25.0)	21 (75.0)	28 (100.0)	0.40 (0.14-1.13)	0.08
Palmeira dos Índios	21 (60.0)	14 (40.0)	35 (100.0)	1.84 (0.76-4.43)	0.17
Penedo	7 (29.2)	17 (70.8)	24 (100.0)	0.50 (0.17-1.43)	0.20
Piranhas	13 (40.6)	19 (59.4)	32 (100.0)	0.84 (0.34-2.07)	0.70
Santana do Ipanema	11 (44.0)	14 (56.0)	25 (100.0)	0.96 (0.36-2.54)	0.94
Satuba	26 (49.1)	27 (50.9)	53 (100.0)	1.18 (0.54-2.57)	0.67
Viçosa	35 (57.4)	26 (42.6)	61 (100.0)	1.65 (0.77-3.52)	0.19
Grade					
1st year	122 (47.5)	135 (52.5)	(100.0)	1	
2nd year	53 (50.5)	52 (49.5)	(100.0)	1.12 (0.71-1.77)	0.60
3rd year	9 (37.5)	15 (62.5)	(100.0)	0.66 (0.28-1.57)	0.66
4th year	11 (27.5)	29 (72.5)	(100.0)	0.42 (0.20-0.87)	0.02
Ethnicity Self-Reported*					
Brown	117 (47.2)	131 (58.3)	248 (100.0)	1.25 (0.77-2.01)	0.35
White	40 (41.7)	56 (52.8)	96 (100.0)	1	
Black	33 (46.5)	38 (53.5)	71 (100.0)	1.21 (0.65-2.25)	0.53

*Indigenous were excluded as 2 expected frequencies < 5.

Table 2 shows the Simple Logistic Regression results for factors related to smoking, alcohol, and sex. Smoking-related variables showed no differences between genders. Alcohol consumption evidenced one association: for those who have consumed at least one dose of alcoholic beverage in the last 30 days for a period of 1 or 2 days, using as reference category "no day" (OR = 0.45; 95% CI: 0.25-0.82), evidencing that the girls drank more than boys.

Questions regarding sexuality showed that three factors were associated in the bivariate analysis (Table 2). The likelihood of boy / girl having had sexual intercourse was higher than the likelihood of not having had it (OR = 2.16; 95% CI: 1.40-3.32). The fact of having had sexual intercourse with 3 or more partners, both during lifetime (OR = 2.98; 95% CI: 1.40-6.35), and in the last 3 months were also associated with males (OR = 4.75; 95% CI: 1.65-13.6).

Adolescents' knowledge regarding HPV and oral cancer was associated with three factors in the bivariate analysis (Table 3). The number of boys who had heard about HPV was 4.79 times higher than those who had never heard about it (95% CI: 2.02-11.3), and the likelihood of a boy reporting that HPV is symptomatic was 0.33 times lower than those who did not know. The likelihood of a boy never heard about oral cancer compared to girls was 1.49 times higher (95% CI: 1.01-2.19) than those who have heard of it.

Table 2. Simple logistic regression with estimation of unadjusted odds ratio (OR) according to smoke, alcohol and gender.

Variables	Gender		Total	$OR^{unadjusted}$ (CI-95%)	p-value
	Boy N (%)	Girl N (%)	N (%)		
Have you ever tried cigarette smoke even one or two puffs?					
Yes	19 (38.8)	30 (61.2)	49 (100.0)	0.73	0.31
No	173 (46.4)	200 (53.6)	373 (100.0)	1	
During your life, on how many days have you had at least one drink of alcohol?					
1 or 2 Days	44 (44.4)	55 (55.6)	99 (100.0)	1	
3 to 9 Days	19 (45.3)	23 (54.8)	42 (100.0)	1.03	0.93
10 to 19 Days	17 (54.8)	14 (45.3)	31 (100.0)	1.51	0.31
≥ 20 Years	19 (39.6)	29 (60.4)	48 (100.0)	0.81	0.57
How old were you when you had your first drink of alcohol other than a few sips?					
17 or More Years Old	7 (36.8)	12 (63.2)	19 (100.0)	1	
15 or 16 Years Old	33 (47.1)	37 (52.9)	70 (100.0)	1.52 (0.53-4.34)	0.42
13 or 14 Years Old	35 (38.0)	57 (62.0)	92 (100.0)	1.05 (0.37-2.92)	0.92
11or 12 Years Old	20 (50.0)	20 (50.0)	40 (100.0)	1.71 (0.56-5.25)	0.34
≤ 9 Years Old	12 (54.5)	10 (45.5)	22 (100.0)	2.05 (0.58-7.21)	0.26
During the past 30 days, on how many days did you have at least one drink of alcohol?					
0 Days	152 (47.8)	166 (52.2)	318 (100.0)	1	
1 or 2 Days	18 (29.5)	43 (70.5)	61 (100.0)	0.45 (0.25-0.82)	0.01
3 to 5 Days	11 (45.8)	13 (54.2)	24 (100.0)	0.92 (0.40-2.12)	0.85
≥ 6 Days	11 (61.1)	7 (38.9)	18 (100.0)	1.71 (0.64-4.54)	0.27
During the past 30 days, how did you usually get alcohol you drank?					
Convenience Store, Supermarket or Gas Station	12 (66.7)	6 (33.3)	18 (100.0)	[a]	[a]
I Bought it at a Restaurant, Bar, or Club	4 (33.3)	8 (66.7)	12 (100.0)	[a]	[a]
I Bought at Parties, Shows or Sporting Events	11 (44.0)	14 (56.0)	25 (100.0)	[a]	[a]
I Gave Someone Money	1 (14.3)	6 (85.7)	7 (100.0)	[a]	[a]
Someone Gave it to Me	8 (24.2)	25 (75.8)	33 (100.0)	[a]	[a]
A Family Member Gave Me	4 (36.4)	7 (63.6)	11 (100.0)	[a]	[a]
Other Way	2 (40.0)	3 (60.0)	5 (100.0)	[a]	[a]
Have you ever had sexual intercourse?					
Yes	70 (57.9)	51 (42.1)	121 (100.0)	2.16 (1.40-3.32)	<0.001
No	113 (38.8)	178 (61.2)	291 (100.0)	1	
How old were you when you had sexual intercourse for the first time?					
19-18 Years	4 (44.4)	5 (55.6)	9 (100.0)	[b]	[b]
17-16 Years	17 (45.9)	20 (54.1)	37 (100.0)	[b]	[b]
15-14 Years	28 (58.3)	20 (41.7)	48 (100.0)	[b]	[b]
< 13 Years	21 (80.8)	5 (19.2)	26 (100.0)	[b]	[b]
During your life, with how many people have you had sexual intercourse?					
1 Person	22 (42.3)	30 (57.7)	52 (100.0)	1	
≥ 2 People	46 (68.7)	21 (31.3)	67 (100.0)	2.98 (1.40-6.35)	0.004
During the past 3 months, with how many people have you had sex intercourse?					
1 Person	24 (40.0)	36 (60.0)	60 (100.0)	1	
≥ 2 People	19 (76.0)	6 (24.0)	25 (100.0)	4.75 (1.65-13.6)	0.004
Did you drink alcohol or use drugs before you had sexual intercourse the last time?					

Yes	9 (75.0)	3 (25.0)	12 (100.0)	[c]	[c]
No	70 (59.8)	47 (40.2)	117 (100.0)	[c]	[c]
The last time you had sexual intercourse, did you or your partner use a condom?					
Yes	29 (35.8)	52 (64.2)	81 (100.0)	0.53 (0.24-1.15)	0.10
No	20 (51.3)	19 (48.7)	39 (100.0)	1	

[a]Not calculated: 6 expected frequencies < 5; [b]Not calculated: 1 expected frequency < 5; [c]Not calculated: 1 expected frequency < 5.

Table 3. Simple Logistic Regression with estimation of unadjusted Odds Ratio (OR) according to knowledge about HPV, oral and oropharyngeal cancer.

Questions	Gender		Total	OR[unadjusted] (IC-95%)	p-value
	Boy N (%)	Girl N (%)	N (%)		
Have you ever heard about HPV?					
Yes	223 (57.3)	166 (42.7)	(100.0)	4.79 (2.02-11.3)	<0.001
No	7 (21.9)	25 (78.1)	(100.0)	1	
Do you think that an infected person with HPV would feel symptomatology?					
Yes	164 (57.7)	120 (42.3)	284 (100.0)	0.33 (0.12-0.91)	0.03
No	61 (49.6)	62 (50.4)	123 (100.0)	0.46 (0.16-1.31)	0.46
Do Not Know	6 (31.6)	13 (68.4)	19 (100.0)	1	
Can orogenital contact transmit HPV?					
Yes	98 (44.3)	123 (55.7)	221 (100.0)	0.84 (0.53-1.32)	0.45
No	31 (39.7)	47 (60.3)	78 (100.0)	0.69 (0.38-1.25)	0.22
Do Not Know	54 (48.6)	57 (51.4)	111 (100.0)	1	
Can contact with skin and mucosa transmit HPV?					
Yes	33 (47.8)	36 (52.2)	69 (100.0)	0.96 (0.53-1.76)	0.91
No	96 (41.7)	134 (58.3)	230 (100.0)	0.75 (0.48-1.19)	0.75
Do Not Know	54 (48.6)	57 (51.4)	111 (100.0)	1	
Can contact with intimate objects transmit HPV?					
Yes	56 (40.0)	84 (60.0)	140 (100.0)	0.69 (0.41-1.14)	0.15
No	73 (45.6)	87 (54.4)	160 (100.0)	0.87 (0.53-1.41)	0.57
Do Not Know	54 (49.1)	56 (50.9)	110 (100.0)	1	
Can sexual intercourse using condom transmit HPV?					
Yes	10 (40.0)	15 (60.0)	25 (100.0)	0.70 (0.29-1.70)	0.43
No	119 (43.4)	155 (56.6)	274 (100.0)	0.81 (0.52-1.26)	0.35
Do Not Know	54 (48.6)	57 (51.4)	111 (100.0)	1	
Have you ever heard about oral cancer?					
Yes	89 (40.8)	129 (59.2)	128 (100.0)	1	
No	104 (50.7)	101 (49.3)	205 (100.0)	1.49 (1.01-2.19)	0.04
Have you ever heard about oropharyngeal cancer?					
Yes	38 (40.0)	57 (60.0)	95 (100.0)	1	
No	154 (47.4)	171 (52.6)	325 (100.0)	1.35 (0.84-2.15)	0.20
Do you think that HPV can cause oral cancer?					
Yes	89 (46.1)	104 (53.9)	193 (100.0)	1.36 (0.90-2.08)	0.14
No	65 (38.5)	104 (61.5)	169 (100.0)	1	
Do you think that HPV can cause oropharyngeal cancer?					
Yes	82 (47.4)	91 (52.4)	173 (100.0)	1.49 (0.97-2.29)	0.06
No	65 (37.6)	108 (62.4)	173 (100.0)	1	
Tobacco is a risk factor for oral / oropharyngeal cancer?					
Yes	127 (43.1)	168 (56.9)	295 (100.0)	0.65 (0.34-1.24)	0.20
No	45 (51.1)	43 (48.9)	88 (100.0)	0.91 (0.43-1.89)	0.80

Do Not Know	23 (53.5)	20 (46.5)	43 (100.0)	1	
Alcohol is a risk factor for oral / oropharyngeal cancer?					
Yes	81 (43.8)	104 (56.2)	185 (100.0)	0.67 (0.34-1.31)	0.25
No	91 (46.0)	107 (54.0)	198 (100.0)	0.74 (0.38-1.43)	0.37
Do Not Know	23 (53.5)	20 (46.5)	43 (100.0)	1	
Sun exposure is a risk factor for oral / oropharyngeal cancer?					
Yes	21 (56.8)	16 (43.2)	37 (100.0)	1.14 (0.47-2.76)	0.77
No	151 (4.6)	195 (56.4)	346 (100.0)	0.67 (0.35-1.27)	0.22
Do Not Know	23 (53.5)	20 (46.5)	43 (100.0)	1	

After adjusting variables in a multiple logistic regression model, factors were adjusted for "Have you ever heard about HPV?" (OR = 4.76; 95% CI: 1.70-13.6); "Have you ever heard about oral cancer?" (OR = 1.60; 95% CI: 1.03-2.49), and "Do you think HPV can cause oropharyngeal cancer?" (OR = 1.57; 95% CI: 1.01-2.45). The multiple model satisfied previously established requirements (Tolerance = 0.99; VIF = 1.00). The model with no factor included could classify correctly 57.6%, and after the interaction between the three variables cited above, the classification increased to 62.5%. The Hosmer-Lemeshow obtained a p-value of 0.809, indicating that our model could predict correctly our dependent variable (Table 4).

Table 4. Multiple logistic regression with the model adjusted to three independent factors.

Questions	$OR^{adjusted}$ (CI-95%)	p-value	β
Have you ever heard about HPV?			
Yes	4.76 (1.70-13.6)	0.003	1.56
No	1		
Have you ever heard about oral cancer?			
Yes	1		
No	1.60 (1.03-2.49)	0.03	0.47
Do you think that HPV can cause oropharyngeal cancer?			
Yes	1.57 (1.01-2.45)	0.04	0.45
No	1		

Discussion

The present study presents the results of an exploratory observational investigation regarding health risk behaviors of Brazilian adolescents, considering differences between boys and girls. Our approach included a set of 5 priorities, including smoking, alcohol consumption, sexual behaviors, knowledge about HPV and knowledge about oral / oropharyngeal cancer. Our research scenario addressed students from several Federal Institutes of education located in different municipalities of the Brazilian state of Alagoas, which allowed us obtaining a better problem representation.

Sociodemographic data did not show great differences between genders, with a balanced distribution between boys and girls. However, the last year of high school (4^{th}) was different from the 1^{st} year in its composition, being mostly composed of females. This indicates the possibility of a temporal inversion along the school years regarding gender distribution, although the study design does not allow this kind of inference.

The prevalence of adolescents who have already experienced smoking in their lifetime was slightly below the national level found in two large Brazilian studies; ERICA study [16], whose prevalence was 18.5% in relation to 2013-2014, and PeNSE study, which found value of 18.4%, referring to the year 2015 [11]. This does not mean a favorable situation of adolescents in our research since 11.5% reported having smoked at least

once in their lifetime. Comparing to United State, the prevalence of smoking among adolescents in this country, during the 30 days before the survey, was hither (10.8%) [10], and the same for Canada (8%) in 2017 [17], while we found that only 1.8% had smoked for this period. European statistics from the Health Behaviour in School aged Children (HBSC 2013/2014) showed that tobacco use among adolescents was quite similar to adults in countries such as Czech Republic, Latvia and Lithuania [18].

It should be highlighted that smoking is responsible for increased morbidity and mortality due to cardiovascular diseases, respiratory system disorders and increased incidence of cancer [19]. Such early exposure of these adolescents to smoking may undoubtedly represent an increased risk for these disorders. There were no differences between genders for the "smoking" factor, as in the ERICA study.

Alcohol consumption was notable among adolescents (51.6% lifetime and 24.5% last 30 days), with no differences between boys and girls, indicating that both genders are equally exposed. This finding is worrying considering that alcohol is a risk factor for a series of problems, onset of smoking, use of illicit drugs, violence, as well as physical and mental impairment. The prevalence estimated in the current study for alcohol consumption was very similar to the result of the national PeNSE study, which reported 50.3% [5]. Comparing to other world regions our prevalence of alcohol consumption is close to the U.S. (32.8% for the last 30 days). In Canada, the consumption reported for the whole year of 2016 was 57% among adolescents aged 15-19 years. On the other hand, Europe has declined the weekly alcohol consume among teens, greatest reduction to Ireland/Great Britain, from 34% to 8% among girls and 42% to 11% among boys [20].

Of factors listed in Table 2, none showed a significant difference between genders in the multiple model. Observing the percentage distribution associated with the form to which adolescents obtained alcoholic beverages, it was observed that the majority received from someone. The second most common way was buying at parties, shows and sporting events. Considering that most individuals in the present study were minors under the age of 18, it is expected that a large number of them have illegally obtained alcoholic beverages since the sale to this public is prohibited by Brazilian law.

A study carried out in the Brazilian state of Minas Gerais identified, after a Multiple Logistic Regression model, that male gender was more associated with exposure to alcohol. In addition, it was also associated with the fact that many of them work and have a poor relationship with their mothers [21].

Alcohol and tobacco consumption among adolescents deserves special attention, since precocity observed in this and other studies [5,22] regarding the experimentation of these substances can generate negative impacts on the health of adolescents, exposing them to excessive consumption in adulthood, which could make them compulsive drinkers and smokers. In addition, the use of licit drugs may follow the use of illicit drugs [21,23]

The likelihood of a boy having had intercourse was 2.6 times greater than the likelihood of not having had it. This represents an early exposure to sexual practices, which may represent a risk for a number of communicable diseases. In the percentage distribution, boys started their sexual life earlier. This result corroborates a cohort [24] of 4,325 adolescents who were evaluated for sexual behavior in the city of Pelotas, Brazil. The authors of this study hypothesize that factors of the Brazilian context, such as social and cultural issues associated with masculinity, may explain the precocity in boys. Similar results were also found in a cross-sectional study in Peru [25] were men aged between 15-18 years had 2.78 times more likely to have had sexual intercourse (CI-95%: 1.66-4.67). In Brunei, a study including 2599 school-going adolescents indicates that males had greater sexual activity [26]. In the U.S., over half of teens had sexual intercourse bay age 18,

and the percentual between 15-18 was 42% among females and 44%among teen males, showing an equal exposure for gender [27].

Some studies have shown that adolescents who use alcoholic beverages or other types of licit or illicit drugs are more likely to engage in risky sex [21,28]. However, in the present investigation, few adolescents reported using alcohol or other types of drugs during their last sexual intercourse. We hypothesized that the non-use of drugs among adolescents during sexual intercourse could be related with the no access of alcohol and other drugs, at least in the period of the sexual relationship. In Brazil, the use of alcohol and drugs among teens is more common in situations of social meeting among friends and colleagues, usually in open public space, away from family care.

Knowledge about HPV showed that most boys knew about its existence, a factor that remained significant in the final model. However, with regard to transmission routes, the majority erroneously affirmed that contact with skin and mucosa does not transmit the virus, and that sexual intercourse with condom does not transmit the virus. Many adolescents reported that condoms are a protective factor against the HPV virus, which is not always true, since the virus may be present in the external parts of the genitals, where condoms may not provide protection [29].

Worse results concerning knowledge about HPV among adolescents were found in a public school of Rio de Janeiro, where less than 1% of the sample of 213 adolescents associated HPV with a virus and 68% were unaware of its forms of transmission [30]. Another descriptive study among university adolescents from Ribeirão Preto (Brazil) found that 54.3% of 58 participants did not know what the HPV virus can cause [31]. This last result was similar to a Malaysian study where 50.3% of the school students did not know about HPV existence [32]. In Mexico, 64.6% were unaware of HPV [33], compared with only 7.6% in our sample. In Greek, the knowledge about HPV among unsatisfactory, with no difference between males and females [34].

The last factor analyzed was the knowledge about oral and oropharyngeal cancer. It is noteworthy that about half of the sample did not know oral cancer and only one third were aware of oropharyngeal cancer. In addition, the fact that boys did not know oral cancer remained significant in the final statistical model. Another significant fact for boys is that they reported knowing that HPV may be a potential factor for oral cancer. This result should be interpreted with caution, since most boys did not even know about oropharyngeal cancer.

Studies related to cancer knowledge in the oral and oropharynx region are usually performed with university students, with few studies involving adolescents. A study carried out in Curitiba (Brazil) found that although students were aware of oral cancer and the association with tobacco use, few (8%) associated alcoholism as a factor [35]. In our study, alcohol was better recognized as a risk factor for oral cancer (69.2%). In the literature, few studies had investigated the knowledge about oral/oropharyngeal among adolescents. A recent study including a sample with 727 youngers aged between 12-24 years compared the knowledge about head and neck cancer and found that the Canadian youngers knew more about head and neck cancer than those Nigerian [36].

The results of the present study indicate that adolescents have already experienced the main risk factors for oral cancer. The use of the valid Brazilian version of the Youth Risk Behavior Surveillance questionnaire allowed us verifying some behavioral patterns among young population. Half of the adolescents surveyed had already consumed alcohol in their life and at least 1 in 10 individuals had already tried smoking. Sexual exposure among adolescents was a reality for one-third of respondents. No significant behavioral differences between boys and girls for smoking / alcohol / sex exposure were found. In the final statistical

model, there was significance for some questions related to knowledge about HPV and oral / oropharyngeal cancer. Boys had more knowledge about HPV and identified it as a potential cause of oral cancer; however, many of them reported not knowing the existence of oral cancer, which generates doubt about their actual knowledge about the subject. Further studies on the monitoring of adolescent health and the potential risks to adult life need to be carried out in the state of Alagoas – Brazil with the purpose of obtaining representative data for public health actions / decisions in the young population.

Limitations of the present study could be related with the possible omission of information reported by the adolescents, once that the questions are really strong such as drug-sex information. These youngers could be inhibited to answer some specific questions especially by shame or fear of family exposure or social/moral judgment. Despite that, our cross-sectional approach can only observe association and not cause-effect relationship.

Conclusion

Boys and girls are equally exposed to smoking-alcohol-sex. Compared with girls, the boys presented greater knowledge to some specific questions concerning HPV and oropharyngeal cancer. Although we have many investigations about smoking-alcohol-sex in youngers, researches of knowledge about oral/oral cancer knowledge are sparse and we support some evidence to this literature gap. Further studies in different national/international regions could help a better understanding about this issue involving adolescent sample.

Authors' Contributions

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All authors declare that they contributed to critical review of intellectual content and approval of the final version to be published.

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Conflict of Interest

The authors declare no conflicts of interest.

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