ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Factors associated with the use of waterpipe and other tobacco products among students, Brazil, 2015

Fatores associados ao uso de narguilé outros produtos do tabaco entre escolares, Brasil, 2015

Deborah Carvalho Malta[I], Ana Luiza Curi Hallal[II], Ísis Eloah Machado[III], Rogério Ruscitto do Prado[IV], Patrícia Pereira Vasconcelos de Oliveira[IV], Maryane Oliveira Campos[IV], Maria de Fátima Marinho de Souza[IV]

ABSTRACT: *Objective:* To identify the frequency and factors associated with the use of waterpipe and other tobacco products among Brazilian students. *Methods:* This is a cross-sectional study based on data from the National Adolescent Student Health Survey. The sample consisted of 9th-grade students from elementary school. We conducted a descriptive analysis of the use of tobacco products in 2012 and 2015. To explore the relationship between the use of other tobacco products and factors such as sociodemographic characteristics, family, mental health, and life habits, we calculated the adjusted odds ratio. *Results:* The use of other tobacco products increased from 4.8% (95%CI 4.6 – 5.0) in 2012 to 6.1% (95%CI 5.7 – 6.4) in 2015, with a higher proportion among boys. Waterpipe was the most commonly used product in 2015 (71.6%; 95%CI 68.8 – 74.2), especially among girls. Factors positively associated with the use of other tobacco products were: attending private school, living with father/mother, working, not having friends, suffering domestic violence, skipping classes, consuming cigarettes and alcohol, experimenting drug, having had sex, having smoker parents or guardians, and seeing people smoking. The protective factors were: female gender, increasing age, multiracial or indigenous people, having meals with a guardian, family supervision, and practicing physical activity. *Conclusion:* The use of other tobacco products was high and has been increasing in recent years, particularly waterpipe. It is important to raise awareness of the risks and monitor the use of these products, as well as improve public policies of tobacco control in the country.

Keywords: Tobacco use disorder. Adolescents. Smoking water pipes. Health promotion. Tobacco products. Health surveys.

[I]Maternal-child and Public Health Nursing Department, Nursing School, Universidade Federal de Minas Gerais – Belo Horizonte (MG), Brazil.
[II]Public Health Department, Universidade Federal de Santa Catarina – Florianópolis (SC), Brazil.
[III]Nursing Graduate Program, Universidade Federal de Minas Gerais – Belo Horizonte (MG), Brazil.
[IV]Health Surveillance Secretariat, Ministério da Saúde – Brasília (DF), Brazil.
Corresponding author: Deborah Carvalho Malta. Avenida Alfredo Balena, 190, Santa Efigênia, CEP: 30130-100, Belo Horizonte, MG, Brasil. E-mail: dcmalta@uol.com.br

RESUMO: *Objetivo:* Identificar a frequência e os fatores associados ao uso de narguilé e outros produtos do tabaco entre os escolares brasileiros. *Métodos:* Estudo transversal com dados da Pesquisa Nacional de Saúde do Escolar. A amostra foi composta por alunos do 9º ano do Ensino Fundamental. Foi realizada análise descritiva do uso de produtos do tabaco em 2012 e 2015. Para explorar a relação de fatores como características sociodemográficas, familiares, saúde mental e hábitos de vida com o uso de outros produtos do tabaco, foram calculados *odds ratio* ajustados. *Resultados:* O uso de outros produtos do tabaco aumentou de 4,8% (IC95% 4,6 – 5,0), em 2012, para 6,1% (IC95% 5,7 – 6,4), em 2015, com maior proporção em meninos. O narguilé foi o produto mais usado em 2015 (71,6%; IC95% 68,8 – 74,2), sendo mais frequente em meninas. Foram positivamente associados ao uso de outros produtos do tabaco: escola privada, morar com pai/mãe, trabalhar, não ter amigos, sofrer violência familiar, faltar às aulas, fazer uso de cigarros e álcool, ter experimentado drogas, já ter tido relação sexual, ter pais ou responsáveis fumantes e presenciar pessoas fumando. Os fatores de proteção foram: sexo feminino, incremento da idade, cor da pele parda ou indígena, fazer refeições com responsável, ter supervisão familiar e praticar atividade física. *Conclusão:* Conclui-se que o uso de outros produtos do tabaco foi elevado, com aumento nos últimos anos, destacando-se o narguilé. Torna-se importante a conscientização dos riscos e a vigilância do uso desses produtos, bem como o avanço das políticas públicas de controle do tabagismo no país.

Palavras-chave: Tabagismo. Adolescentes. Narguilé. Promoção da saúde. Produtos do tabaco. Inquérito epidemiológico.

INTRODUCTION

Data from the Global Burden of Disease study indicate that tobacco use, including passive exposure, held the sixth place among major risk factors for the burden of diseases in the world[1]. In Brazil, data from the same study (2015) revealed that tobacco took the fourth and fifth places for men and women, respectively[2]. In 1990, tobacco use was responsible for 7.0% of years of life lost due to premature death and disability (disability-adjusted life year – DALY) and, in 2015, 6.43%[3].

Evidence shows that tobacco consumption is quite widespread and present in most countries[4]. In general, this practice starts in adolescence and youth[5], with most adult smokers having started using tobacco before the age of 20 years[4].

Tobacco can be consumed in various forms: smoked – e.g., pipe, cigar, cigarette, and hookah or waterpipe –, chewed, inhaled – snuff –, among others[6], all of them harmful to human health. Waterpipe has been used for centuries in Africa, Middle East, and Asia[7,8]; however, its consumption has grown in the West, in particular among young people[9]. According to estimates, around 100 million people use waterpipe in the world[10].

The National Adolescent Student Health Survey (*Pesquisa Nacional de Saúde do Escolar* – PeNSE) has been monitoring the consumption of smoked tobacco and other tobacco products in Brazil[11-13]. In 2012, with a sample of 61,037 students aged 13 to 15 years from Brazilian state capitals, the survey indicated that 22.7% of them had tried a cigarette, 6.1% were regular smokers, and 4.8% had tried other tobacco products[14].

It is essential to monitor the use and experimentation of all forms of tobacco in adolescence, as it is during this time of life that people have a greater chance of developing an addiction to tobacco products[15] and using other psychoactive substances, such as alcohol and illicit drugs[14].

Regarding factors associated with tobacco use among adolescents, we highlight exposure to cigarette at home, lack of interaction in the family environment and at school, and the influence of friends[16]. In Brazil, studies on risk factors for tobacco use among adolescents are scarce and show associations with work and tobacco use by parents[14], in addition to lack of family supervision and support[17].

To expand the monitoring of tobacco use and its various forms of consumption among adolescents, PeNSE 2012 included specific questions about the use of other tobacco products and, in 2015, detailed them[12,13]. We underline the contemporaneity of this theme in PeNSE and the opportunity to monitor the consumption of these products among Brazilian students, the changes in trends, and product preferences. The purpose of the present study was to describe the different forms of tobacco exposure among students in Brazil and identify factors associated with the use of other tobacco products.

METHODS

We performed a cross-sectional analysis of secondary data from PeNSE 2015[13]. PeNSE was conducted by the National Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística* - IBGE) in partnership with the Ministry of Health. The sample consisted of 9th-grade students from elementary school, both public and private, and was designed to estimate population parameters (proportions or prevalence ratios) in the following geographic domains: 26 states, 26 state capitals, the Federal District, 5 large geographical regions, and Brazil[13].

Students were informed in advance about the goals and main characteristics of the study, as well as that participation was voluntary, and they could interrupt it at any time. Those who agreed to participate answered an individual questionnaire on a smartphone under the supervision of IBGE researchers.

All students present from the classes selected on the day of data collection were invited to participate. The survey counted with 102,301 students enrolled in the 9th-grade of 3,040 schools around the country. Considering the students who were absent on the day or did not want to answer the questionnaire, the sample loss was 14.8%[13].

PeNSE included information about student health, such as eating habits, physical activity, substance use, family behavior, self-reported morbidity, demand for health care services, and health self-assessment. More details can be found in a previous publication[13].

We analyzed data related to the frequency of cigarette experimentation, regular consumption of cigarettes in the 30 days prior to data collection, use of other tobacco products, and use of cigarettes in combination with other tobacco products, which represented the

consumption of any tobacco product. Initially, we described the variables that characterize the use of other tobacco products, calculating the prevalence and confidence interval of 95% (95%CI). A descriptive analysis of the evolution of these indicators in the PeNSE 2012 and 2015 was also conducted.

The following question provided data on the use of other tobacco products: "Which other tobacco products have you used more often IN THE PAST 30 DAYS?". The options were: clove cigarettes (Bali cigarettes); hand-rolled cigarettes (straw or paper); cigarillos; cigars, small cigars; chewing tobacco; hookah (waterpipe); Indian cigarettes (beedis); electronic cigarette (e-cigarette), and other.

We analyzed the factors associated with the use of other tobacco products. The explanatory variables studied are listed below:

- sociodemographic variables: gender (male or female); age (≤ 13 years, 13 years, 14 years, 15 years, or 16 years and older); ethnicity/skin color (white, black, multiracial, Asian, or indigenous); type of school (public or private); mother's schooling (no schooling, incomplete/complete elementary school, incomplete/complete high school, or incomplete/complete higher education); currently working (yes or no); paid work (yes or no);

- family variables: lives with mother and/or father (yes or no); has meals with a guardian (no, 2 or less times a week, 3 to 4 times a week, or 5 or more times a week); has been physically assaulted by family members (yes or no); family supervision, defined as parents or guardians knowing what the student did in his or her free time in the past 30 days (yes or no); skips classes without telling the parents or guardians (yes or no); people smoked in the student's presence (yes or no); and parents or guardians smoked in the student's presence (yes or no);

- variables related to mental health: feels lonely (no – never – or yes – a few times in the past 12 months, most of the time, and always in the past 12 months); has insomnia (no – never – or yes – a few times in the past 12 months, most of the time, and always in the past 12 months); and has friends (no – none – or yes – 1, 2, 3 or more friends).

- behavioral variables and life habits: tobacco use in the past 30 days or regularly smokes (yes or no); drinks alcohol regularly or consumed it in the past 30 days (yes or no); has ever used/experimented drugs (yes or no); has had sex (yes or no); and practices physical activity daily (yes or no).

To explore factors associated with the use of other tobacco products, we conducted a bivariate analysis and calculated the proportions and non-adjusted odds ratio (OR) with their respective 95%CI. Next, we performed a multiple logistic regression, using the variables of interest – based on the literature –, which showed a $p < 0.20$. In the final adjusted model, only the statistically significant variables remained ($p < 0.05$).

All analyses considered the sampling frame and weights to obtain population estimates. Data analysis counted with the help of the Statistical Package for Social Sciences (SPSS), version 20.

PeNSE complied with the guidelines and regulatory standards for research involving human beings and was approved by the National Committee for Ethics in Research of the Ministry of Health (CONEP/MS).

RESULTS

According to Figure 1, the comparative analysis of two editions of PeNSE revealed an increase in prevalence of use of any tobacco product, which included cigarettes and/or other products, from 7.6% (95%CI 7.3 – 7.9) in 2012 to 9.0% (95%CI 8.6 – 9.5) in 2015, that is, a growth of 18.4% in 3 years. The use of smoked tobacco remained stable – 5.0% (95%CI 4.9 – 5.3) in 2012 to 5.6% (95%CI 5.3 – 5.9) in 2015 – while the consumption of other tobacco products increased from 4.8% (95%CI 4.6 – 5.0) in 2012 to 6.1% (95%CI 5.7 – 6.4) in 2015.

After separating the other tobacco products consumed in the 30 days prior to data collection, most students stated they used waterpipe (71.6%), with the percentage among girls being higher than among boys. Other products that stood out on the proportion of use among students of both genders were hand-rolled cigarettes (straw or paper) and clove cigarettes (Bali cigarettes) – 13.5 and 4.6%, respectively (Table 1).

The prevalence of use of other tobacco products was lower among girls; increased with age; was higher among those who work, reported insomnia, had no friends, were physically assaulted by family members, skipped classes, used other substances, and reported sexual
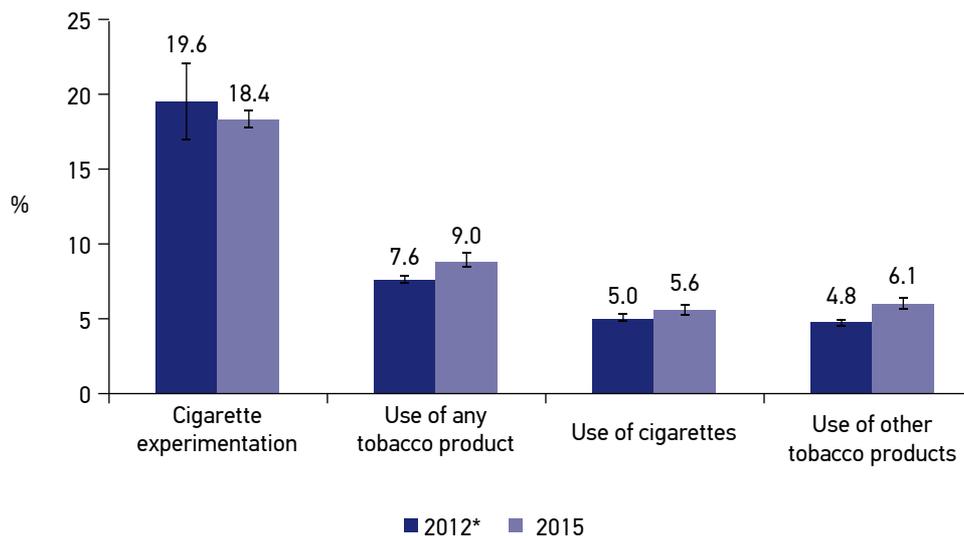
*Source: Data from 2012 were previously published in: Hallal et al.[18].

Figure 1. Frequency of use of tobacco products by Brazilian students, National Adolescent Student Health Survey, 2015.

initiation; and decreased among those who lived with their parents, had meals with their parents, and reported family supervision (Table 1).

Regarding sociodemographic variables, the multivariate analysis showed that the use of other tobacco products was associated with age. Taking the group of 13-year-olds as reference, the use of other tobacco products was less frequent among 14-year-olds (OR = 0.72), 15-year-olds (OR = 0.59), and 16-year-olds (OR = 0.36), as well as females (OR = 0.76) and groups of multiracial (OR = 0.86) and indigenous (OR = 0.67) people. Students from private schools (OR = 1.11) and who worked (OR = 1.19) showed higher frequencies (Table 2).

With respect to family context, the use of other tobacco products was higher among students who lived with their parents (OR = 1.24), reported that adults smoked in their presence (OR = 1.64), had smoker parents (OR = 1.15), were physically assaulted by family members (OR = 1.38), and skipped classes without telling their parents (OR = 1.33). On the other hand, having regular meals with parents – 3 to 4 times a week (OR = 0.88) and 5 or more times a week (OR = 0.81) – and parental supervision were protective factors (OR = 0.83) (Table 2).

Relating to mental health, feeling lonely (OR = 1.15) and not having friends (OR = 1.17) were associated with the use of other tobacco products. Behavioral variables and life habits had the strongest association: regular tobacco use (OR = 4.59), regular alcohol consumption (OR = 5.15), and drug experimentation (OR = 5.01). Having had sex was another factor associated with the use of other tobacco products (OR = 1.68) while daily physical activity showed an inverse association (OR = 0.90) (Table 2).

Table 1. Frequency of use of other tobacco products according to product type and gender of 9th-grade students from elementary school, National Adolescent Student Health Survey, Brazil, 2015.

Use of other tobacco products	Total		Male		Female	
	%	95%CI	%	95%CI	%	95%CI
Hookah (waterpipe)	71.6	(68.8 – 74.2)	51.8	(47.7 – 55.8)	67.5	(64 – 70.7)
Hand-rolled cigarettes (straw or paper)	13.5	(11.6 – 15.6)	12.9	(10.8 – 15.2)	9.3	(7.2 – 11.9)
Clove cigarettes (Bali cigarettes)	4.6	(3.7 – 5.7)	4.2	(3.2 – 5.5)	3.4	(2.4 – 4.8)
Electronic cigarette (e-cigarette)	3.2	(2.4 – 4.4)	3.3	(2.3 – 4.8)	2	(1.2 – 3.4)
Chewing tobacco	2.4	(1.8 – 3.3)	2.7	(1.9 – 3.9)	1.2	(0.7 – 2.2)
Cigars, small cigars	2	(1.4 – 2.9)	2.6	(1.7 – 3.9)	0.7	(0.4 – 1.2)
Cigarillos	1.4	(0.9 – 2.0)	1.8	(1.2 – 2.9)	0.4	(0.2 – 0.7)
Indian cigarettes (beedis)	1.3	(0.8 – 1.9)	1.5	(1.0 – 2.2)	0.6	(0.3 – 1.1)
Other	17.3	(14.9 – 19.9)	19.2	(16 – 22.9)	15.1	(12.7 – 17.8)

95%CI: confidence interval of 95%.

Table 2. Use of other tobacco products and associated factors among 9th-grade students from elementary school, non-adjusted and adjusted odds ratio prevalence, and their respective confidence interval of 95%, National Adolescent Student Health Survey, Brazil, 2015.

Variable	%	95%CI	OR_{na}	95%CI	p-value	OR_a	95%CI	p-value
Total	6.1	(5.9 – 6.2)						
Age (years)								
< 13	4.8	(3.1 – 7.3)	1.0	(0.6 – 1.6)	0.98	1.6	(0.9 – 2.8)	0.096
13	4.7	(4.3 – 5.2)	1.0	–	–	1.0	–	–
14	5.3	(4.9 – 5.7)	1.1	(1.0 – 1.2)	0.004	0.7	(0.7 – 0.8)	< 0.001
15	8.2	(7.6 – 8.9)	1.8	(1.7 – 2.0)	< 0.001	0.6	(0.5 – 0.7)	< 0.001
16 and older	7.9	(7.4 – 8.4)	1.7	(1.6 – 1.9)	< 0.001	0.4	(0.3 – 0.4)	< 0.001
Gender								
Male	6.5	(6.2 – 6.9)	1.0	–	–	1.0	–	–
Female	5.6	(5.4 – 5.8)	0.9	(0.8 – 0.9)	< 0.001	0.8	(0.8 – 0.9)	< 0.001
Ethnicity/skin color								
White	6.4	(5.5 – 7.4)	1.0	–	–	1.0	–	–
Black	6.8	(5.9 – 8)	1.1	(1 – 1.2)	0.047	0.9	(0.8 – 1.0)	0.139
Asian	5.6	(4.7 – 6.8)	0.9	(0.8 – 1.0)	0.069	0.9	(0.7 – 1.0)	0.097
Multiracial	5.6	(4.9 – 6.5)	0.9	(0.8 – 0.9)	< 0.001	0.9	(0.8 – 0.9)	< 0.001
Indigenous	5.4	(4.7 – 6.2)	0.8	(0.7 – 1.0)	0.029	0.7	(0.6 – 0.8)	< 0.001
School								
Public	6.2	(5.8 – 6.7)	1.0	–	–	1.0	–	–
Private	5.2	(4.8 – 5.6)	0.8	(0.8 – 0.9)	< 0.001	1.1	(1.0 – 1.2)	0.037
Currently working								
No	5.2	(4.9 – 5.5)	1.0	–	–	1.0	–	–
Yes	11.6	(11 – 12.1)	2.4	(2.3 – 2.5)	< 0.001	1.2	(1.1 – 1.3)	< 0.001
Paid work								
No	5.3	(5 – 5.6)	1.0	–	–	–	–	–
Yes	11.6	(11 – 12.2)	2.4	(2.2 – 2.5)	< 0.001	–	–	–
Lives with mother and/or father								
No	7.4	(6.7 – 8.1)	1.0	–	–	1.0	–	–
Yes	6.0	(5.8 – 6.1)	0.8	(0.7 – 0.9)	< 0.001	1.2	(1.1 – 1.4)	0.002

Table 2. Continuation.

Variable	%	95%CI	OR_{na}	95%CI	p-value	OR_a	95%CI	p-value
Has meals with a guardian								
No	10.9	(10 – 11.8)	1.0	–	–	1.0	–	–
2 or less times a week	8.5	(8 – 9)	0.8	(0.7 – 0.8)	< 0.001	1.0	(0.9 – 1.1)	0.719
3 to 4 times a week	7.8	(6.9 – 8.7)	0.7	(0.6 – 0.8)	< 0.001	0.9	(0.7 – 1.1)	0.186
5 or more times a week	5.1	(4.9 – 5.2)	0.4	(0.4 – 0.5)	< 0.001	0.8	(0.7 – 0.9)	0.001
Feels lonely								
No	5.3	(5.0 – 5.6)	1.0	–	–	1.0	–	–
Yes	9.7	(9.3 – 10.2)	1.9	(1.8 – 2.0)	< 0.001	1.2	(1.1 – 1.3)	0.001
Insomnia								
No	5.4	(5.1 – 5.8)	1.0	–	–	–	–	–
Yes	10.6	(10.1 – 11.2)	2.1	(1.9 – 2.2)	< 0.001	–	–	–
Friends								
One or more	5.9	(5.3 – 6.5)	1.0	–	–	1.0	–	–
None	9.1	(8.2 – 9.9)	1.6	(1.4 – 1.8)	< 0.001	1.2	(1.0 – 1.4)	0.033
Physical assault (by a family member)								
No	4.7	(4.4 – 4.9)	1.0	–	–	1.0	–	–
Yes	13.8	(13.2 – 14.3)	3.3	(3.1 – 3.5)	< 0.001	1.4	(1.3 – 1.5)	< 0.001
Family supervision								
No	10.0	(9.5 – 10.5)	1.0	–	–	1.0	–	–
Yes	4.0	(3.9 – 4.2)	0.4	(0.4 – 0.4)	< 0.001	0.8	(0.8 – 0.9)	< 0.001
Skips classes without telling the parents								
No	4.2	(4 – 4.4)	1.0	–	–	1.0	–	–
Yes	12.1	(11.6 – 12.5)	3.1	(3.0 – 3.3)	< 0.001	1.3	(1.3 – 1.4)	< 0.001
Regular tobacco use								
No	4.6	(4.2 – 5.0)	1.0	–	–	1.0	–	–
Yes	61.0	(59.1 – 62.9)	32.6	(30.0 – 35.5)	< 0.001	4.6	(4.2 – 5.0)	< 0.001

Table 2. Continuation.

Variable	%	95%CI	OR$_{na}$	95%CI	p-value	OR$_a$	95%CI	p-value
Drinks alcohol regularly								
No	1.7	(1.6 – 1.9)	1.0	–	–	1.0	–	–
Yes	19.8	(19.3 – 20.3)	14.0	(13.1 – 14.9)	< 0.001	5.2	(4.8 – 5.6)	< 0.001
Drug experimentation								
No	3.0	(2.8 – 3.1)	1.0	–	–	1.0	–	–
Yes	37.1	(36.1 – 38.2)	19.3	(18.2 – 20.4)	< 0.001	5.0	(4.7 – 5.4)	< 0.001
Sexual intercourse								
No	2.9	(2.7 – 3.0)	1.0	–	–	1.0	–	–
Yes	14.3	(13.9 – 14.7)	5.6	(5.3 – 6.0)	< 0.001	1.7	(1.6 – 1.8)	< 0.001
People smoked in the student's presence								
No	2.7	(2.5 – 2.8)	1.0	–	–	1.0	–	–
Yes	9.3	(9.1 – 9.6)	3.8	(3.5 – 4.0)	< 0.001	1.6	(1.5 – 1.8)	< 0.001
Smoker parents or guardians								
No	4.7	(4.5 – 5.0)	1.0	–	–	1.0	–	–
Yes	9.0	(8.7 – 9.4)	2.0	(1.9 – 2.1)	< 0.001	1.2	(1.1 – 1.2)	< 0.001
Daily physical activity								
No	5.9	(5.6 – 6.3)	1.0	–	–	1.0	–	–
Yes	6.6	(6.2 – 6.9)	1.1	(1.1 – 1.2)	0.001	0.9	(0.8 – 1.0)	0.008

95%CI: confidence interval of 95%; OR$_{na}$: non-adjusted odds ratio; OR$_a$: adjusted odds ratio.

DISCUSSION

The present study reveals that, in Brazil, the total consumption of any tobacco product (cigarettes and/or others) among adolescents was 9.0% in 2015. The use of other tobacco products corresponded to 6.1%, with waterpipe standing out, as it represented approximately three-quarters of consumption.

In the analysis of factors associated with the use of other tobacco products, being female, older (14, 15 and 16 years), and multiracial or indigenous constituted a protective effect. The percentage of use of other tobacco products was higher for private school students and those who worked. In the family context, students had a greater chance of using other tobacco products if they lived with their parents, had smoker parents, interacted with adults who smoked in their presence, reported suffering physical assault by family members, and

skipped classes without telling their parents. On the other hand, having regular meals with parents and being supervised by them showed a protective effect. Students who reported loneliness and had no friends made more use of other tobacco products. Consumption of substances (tobacco, alcohol, and drugs) and having had sex presented a positive association while daily physical activity was a protective factor.

The results of the present study indicate in an unprecedented way that the use of tobacco increased among adolescents in Brazil. In 2012, the use of any tobacco product corresponded to 7.6%[18], and the current study shows that this number rose 18.4% in only 3 years. The use of other tobacco products grew 27.0% between 2012 and 2015 nationwide, remaining stable in the capitals, 7.1[14] and 7.0% (data not shown). The inclusion of the question about the use of other tobacco products in PeNSE 2012 allowed us to verify this change and monitor the frequency of consumption of new products, such as waterpipe and electronic cigarette, which became a novelty among young adults and adolescents. In 2015, it was possible to detail the type of product used and know their separate prevalence rates among the target population of the research.

In contrast, other tobacco indicators showed a decrease in the capitals investigated: 20% drop in the prevalence of cigarette experimentation (from 24.0% in 2009[10] to 19.0% in 2015[13]), and 15.8% in the prevalence of regular smokers (from 6.3% in 2009[11,19] to 5.4% in 2015[13]).

The Global Youth Tobacco Survey (GYTS) 1999-2008 described similar results. This study involved more than 500,000 students aged 13 to 15 years from several countries and showed an increase in consumption of other tobacco products, while the prevalence of tobacco use remained stable or declining in some countries[20]. The 2005 GYTS in Lebanon also showed an increase in prevalence of other tobacco products, including waterpipe, and decrease in cigarette smokers[21].

The 2009 GYTS in Brazil, conducted in 3 state capitals – Campo Grande, São Paulo, and Vitória – with students aged 13 to 15 years, showed frequencies of use of other tobacco products of 18.3, 21.3, and 4.3%, respectively, with waterpipe being the most prominent[22]. Students of 8 American universities in North Carolina displayed the same behavior, indicating that waterpipe was already the second most commonly used tobacco product after cigarette, with prevalence of 17%[23] in the 30 days prior to data collection. In Birmingham, England, 40% of university students had already tried waterpipe, with prevalence of use of 8.0%, while the prevalence of cigarette was 9.4%[24].

Recent researches showed that waterpipe has high amounts of nicotine and its use brings significant risks to health, can lead to cigarette smoking, and even induce nicotine dependence[25,26]. Waterpipe presents the same harmful effects of tobacco, which include cancer of lungs and other organs, and respiratory and cardiovascular diseases[27,28], since its smoke contains the same substances (nicotine, carbon monoxide, hydrocarbons, toxins, among others)[29]. Furthermore, a single waterpipe session of approximately 1 to 2 hours can be equivalent to smoking between 100 and 150 cigarettes[30].

In Brazil, the National Health Survey (NHS), which counted with a sample of Brazilians aged 18 years or older, identified that 1.2% of participants who reported consuming any

tobacco product had already tried waterpipe, with higher use among younger individuals who completed elementary school, were from urban areas, and lived in the South and Midwest regions. Compared to the group aged 40 to 59 years, the use of waterpipe among young people aged 18 to 29 years was 36 times higher[31].

The present study found an association between the use of other tobacco products and males, which other studies have also evidenced both for adults[31] and adolescents[14,18]. This study also indicated a more significant proportion of users of other tobacco products among younger students, 13-year-olds, as evidenced in PeNSE 2012[18], contrary to most researches – both international[5,32,33] and national[34] – that shows that consuming substances tends to increase with age.

The use of other tobacco products occurred in greater proportion among students with parents and other adults who smoke in their presence. This finding corroborates a previous study with PeNSE 2012 data[18] and other researches that investigated the relationship between adolescents consuming cigarettes and having parents or people close to them who are smokers in Brazil[15] and Salvador[35]. A possible explanation for the influence of family and friends is the social learning theory[36]; thus, adolescents often exposed to passive smoking naturalize the practice and eventually adopt it. It is noteworthy that the frequency of passive smoking at home decreased over the three editions of PeNSE, which could indicate progress in dealing with the issue of tobacco in the country[11-13].

The present study revealed the importance of protective family practices and supervision in the life of adolescents, as highlights the literature[37]. It also evidenced that having meals with the family had a protective effect in relation to tobacco use, demonstrating the value of dialog and family cohesion[17]. In contrast, living with parents, suffering physical assault by family members, and skipping classes without telling the parents increased the chances of use of other tobacco products, confirming the importance of a family that welcomes, protects, cares, communicates, and supervises their adolescents, giving positive examples[5,17,32,38-41].

The proportion of use of other tobacco products was higher among adolescents who work. Other studies have found similar results[18,42], with their authors raising the hypotheses that when adolescents get paid jobs, they have more resources to buy cigarettes. In addition, due to their interaction with older individuals, adolescents who start working early expose themselves prematurely to adult practices, such as substance use, sexual intercourse, and violence[42,43].

Factors related to socialization and mental health were associated with tobacco use. The literature points out that loneliness, not having friends, or feeling isolated increases the chances of use of substances[17,38,44,45], indicating the importance of health professionals approaching these factors in primary care and at school.

In the present study, the use of other tobacco products was associated with the simultaneous display of risk behaviors, such as drug, alcohol, and tobacco consumption, which the national and international literature has also described[46,47].

Previous studies suggest that the tobacco control measures implemented in the country were fundamental in decreasing the prevalence of smoking among adults[48] and adolescents[14]. In the Americas, Brazil is the country that holds the lowest prevalence rates of

tobacco use among adolescents[49]. Out of the regulatory measures adopted, banning advertising stands out. The Act No. 12,546/2011[50], the Executive Order No. 8,262/2014[51], and the Interministerial Ordinance No. 2,647/2014[52] banned advertising at points of sale, determined the increase in prices and taxes, established that closed environments should be entirely smoke-free, and enlarged health warning images.

The executive order also prohibited the use of waterpipe in collective enclosed spaces[51]. However, it is crucial to implement and increase the supervision of establishments, given that the use of waterpipe is growing among adolescents since its novelty holds a power of attraction for this public.

After more than a decade of the ratification of the Framework Convention on Tobacco Control (FCTC), Brazil still faces major challenges to implement regulatory measures that protect adolescents and young adults from tobacco initiation. For instance, the Resolution of 15 March 2012, published by Anvisa, restricts the use of additives that give sweet flavors to cigarettes and other tobacco products sold in the country, which makes them more attractive and palatable, and favors tobacco initiation. However, this development is under threat since the Supreme Court granted an injunction suspending the effects of articles that deal with additives as a Direct Action of Unconstitutionality. Anvisa appealed and, currently, the annulment of this measure is in the process of voting[53].

Among the limitations of the present study, we underline that the data collected consists of the report of students, which might have resulted in information bias. Despite most Brazilian adolescents being in school (approximately 97%), those who are out of the educational environment have more significant health risks and display more risk behaviors, which tend to underestimate the prevalence found. In addition, this is a cross-sectional study, which does not allow establishing a cause-effect relationship between the associations observed here.

CONCLUSION

The results allowed us to conclude that the use of other tobacco products in the 30 days prior to data collection was high among Brazilian students, showing a consumption increase in the past 3 years, especially of waterpipe. It is important to raise awareness of the risks and monitor the use of these products, as well as improve public policies of tobacco control in the country.

ACKNOWLEDGMENTS

REFERENCES

1. GBD 2016 Risk Factors Collaborators. Global, regional, and national comparative risk assessment of 84 behavioural, environmental and occupational, and metabolic risks or clusters of risks, 1990–2016: a systematic analysis for the Global Burden of Disease Study 2016. Lancet. 2017; 390: 1345-422. https://doi.org/10.1016/S0140-6736(17)32366-8

2. Malta DC, Felisbino-Mendes MS, Machado ÍE, Passos VMA, Abreu DMX, Ishitani LH, et al. Fatores de risco relacionados à carga global de doença do Brasil e Unidades Federadas, 2015. Rev Bras Epidemiol. 2017; 20(Supl. 1): 217-32. https://doi.org/10.1590/1980-5497201700050018

3. Institute for Health Metrics and Evaluation. GBD Compare Data Visualization [Internet]. Seattle: IHME, University of Washington; 2016 [citado 26 set. 2017]. Disponível em: http://vizhub.healthdata.org/gbd-compare

4. Giovino GA, Mirza SA, Samet JM, Gupta PC, Jarvis MJ, Bhala N, et al. Tobacco use in 3 billion individuals from 16 countries: an analysis of nationally representative cross-sectional household surveys. Lancet. 2012; 380(9842): 668-79. https://doi.org/10.1016/S0140-6736(12)61085-X

5. Currie C, Zanotti C, Morgan A, Currie D, Looze M, Roberts C, et al. Social determinants of health and well-being among young people. Health Behaviour in School-aged Children (HBSC) study: international report from the 2009/2010 survey. Copenhagen: WHO Regional Office for Europe; 2012 (WHO Policy Series: Health Policy for Children and Adolescents, No. 6).

6. Instituto Nacional do Câncer. Organização Pan-Americana de Saúde. Pesquisa Especial de Tabagismo – PETab: relatório Brasil. Rio de Janeiro: INCA; 2011.

7. Knishkowy B, Amitai Y. Water-pipe (narghile) smoking: an emerging health risk behavior. Pediatrics. 2005; 116(1): e113-9. https://doi.org/10.1542/peds.2004-2173

8. Rastam S, Ward KD, Eissenberg T, Maziak W. Estimating the beginning of the waterpipe epidemic in Syria. BMC Public Health. 2004; 4: 32. https://doi.org/10.1186/1471-2458-4-32

9. Akl EA, Gunukula SK, Aleem S, Obeid R, Jaoude PA, Honeine R, et al. The prevalence of waterpipe tobacco smoking among the general and specific populations: a systematic review. BMC Public Health. 2011; 11: 244. https://doi.org/10.1186/1471-2458-11-244

10. Maziak W, Ward KD, Afifi Soweid RA, Eissenberg T. Tobacco smoking using a waterpipe: a re-emerging strain in a global epidemic. Tob Control. 2004; 13(4): 327-33. https://doi.org/10.1136/tc.2004.008169

11. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar – PENSE 2009. Rio de Janeiro: IBGE; 2009. 140 p.

12. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar (PeNSE) 2012. Rio de Janeiro: IBGE; 2013. 256 p.

13. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saúde do Escolar (PeNSE) 2015. Rio de Janeiro: IBGE; 2016. 126 p.

14. Barreto SM, Giatti L, Oliveira-Campos M, Andreazzi MA, Malta DC. Experimentation and use of cigarette and other tobacco products among adolescents in the Brazilian state capitals (PeNSE 2012). Rev Bras Epidemiol. 2014; 17(Supl 1): 62-76. https://doi.org/10.1590/1809-4503201400050006

15. Brook DW, Brook JS, Zhang C, Whiteman M, Cohen P, Finch SJ. Developmental trajectories of cigarette smoking from adolescence to the early thirties: personality and behavioral risk factors. Nicotine Tob Res. 2008; 10(8): 1283-91. https://doi.org/10.1080/14622200802238993

16. Chen CY, Wu CC, Chang HY, Yen LL. The effects of social structure and social capital on changes in smoking status from 8th to 9th grade: Results of the Child and Adolescent Behaviors in Long-term Evolution (CABLE) study. Prev Med. 2014; 62C: 148-54. https://doi.org/10.1016/j.ypmed.2013.11.003

17. Malta DC, Oliveira-Campos M, Prado RR, Andrade SSC, Mello FCM, Dias AJR, et al. Uso de substâncias psicoativas, contexto familiar e saúde mental em adolescentes brasileiros, Pesquisa Nacional de Saúde dos Escolares (PeNSE 2012). Rev Bras Epidemiol. 2014; 17(Supl. 1): 46-61. https://doi.org/10.1590/1809-4503201400050005

18. Hallal ALLC, Figueiredo VC, Moura L, Prado RR, Malta DC. Uso de outros produtos do tabaco entre escolares brasileiros (PeNSE 2012). Cad Saúde Pública. 2017; 33(Supl. 3): e00137215. https://doi.org/10.1590/0102-311x00137215

19. Barreto SM, Giatti L, Casado L, Moura L, Crespo C, Malta DC. Exposição ao tabagismo entre escolares no Brasil. Ciênc Saúde Coletiva. 2010; 15(Supl. 2): 3027-34. https://doi.org/10.1590/S1413-81232010000800007

20. Warren CW, Lea V, Lee J, Jones NR, Asma S, McKenna M. Change in tobacco use among 13-15 year olds between 1999 and 2008: findings from the Global Youth Tobacco Survey. Glob Health Promot. 2009; 16(2 Supl.): 38-90. https://doi.org/10.1177/1757975909342192

21. Saade G, Abou Jaoude S, Afifi R, Warren CW, Jones NR. Patterns of tobacco use: results from the 2005 Global Youth Tobacco Survey in Lebanon. East Mediterr Health J [Internet]. 2008 [citado 26 set. 2017]; 14(6): 1280-9. Disponível em: http://www.emro.who.int/emhj-volume-14-2008/volume-14-issue-6/05.html

22. Szklo AS, Sampaio MM, Fernandes EM, Almeida LM. Smoking of non-cigarette tobacco products by students in three Brazilian cities: should we be worried? Cad Saúde Pública. 2011; 27(11): 2271-5. https://doi.org/10.1590/S0102-311X2011001100020

23. Sutfin EL, McCoy TP, Reboussin BA, Wagoner KG, Spangler J, Wolfson M. Prevalence and correlates of waterpipe tobacco smoking by college students in North Carolina. Drug Alcohol Depend. 2011; 115(1-2): 131-6. https://doi.org/10.1016/j.drugalcdep.2011.01.018

24. Jackson D, Aveyard P. Waterpipe smoking in students: prevalence, risk factors, symptoms of addiction, and smoke intake. Evidence from one British university. BMC Public Health. 2008; 8: 174. https://doi.org/10.1186/1471-2458-8-174

25. Maziak W, Ward KD, Eissenberg T. Interventions for waterpipe smoking cessation. Cochrane Database Syst Rev. 2007; (4): Cd005549. https://doi.org/10.1002/14651858.CD005549.pub2

26. Ward KD, Eissenberg T, Gray JN, Srinivas V, Wilson N, Maziak W. Characteristics of U.S. waterpipe users: a preliminary report. Nicotine Tob Res. 2007; 9(12): 1339-46. https://doi.org/10.1080/14622200701705019

27. Akl EA, Gaddam S, Gunukula SK, Honeine R, Jaoude PA, Irani J. The effects of waterpipe tobacco smoking on health outcomes: a systematic review. Int J Epidemiol. 2010; 39(3): 834-57. https://doi.org/10.1093/ije/dyq002

28. Gatrad R, Gatrad A, Sheikh A. Hookah smoking. BMJ. 2007; 335(7609): 20. https://doi.org/10.1136/bmj.39227.409641.AD

29. Maziak W. The global epidemic of waterpipe smoking. Addict Behav. 2011; 36(1-2): 1-5. https://doi.org/10.1016/j.addbeh.2010.08.030

30. Maziak W, Rastam S, Ibrahim I, Ward KD, Shihadeh A, Eissenberg T. CO exposure, puff topography, and subjective effects in waterpipe tobacco smokers. Nicotine Tob Res. 2009; 11(7): 806-11. https://doi.org/10.1093/ntr/ntp066

31. Menezes AMB, Wehrmeister FCF, Horta BL, Szwarcwald CL, Vieira ML, Malta DC. Frequência do uso de narguilé em adultos e sua distribuição conforme características sociodemográficas, moradia urbana ou rural e unidades federativas: Pesquisa Nacional de Saúde (PNS), 2013. Rev Bras Epidemiol. 2015; 18(Supl. 2): 57-67. https://doi.org/10.1590/1980-5497201500060006

32. Surís JC, Michaud PA, Akre C, Sawyer SM. Health risk behaviors in adolescents with chronic conditions. Pediatrics. 2008; 122: 1113-8. https://doi.org/10.1542/peds.2008-1479

33. Griffin KW, Botvin GJ. Evidence-Based Interventions for Preventing Substance Use Disorders in Adolescents. Child Adolesc Psychiatr Clin N Am. 2010 Jul; 19(3): 505-26. https://doi.org/10.1016/j.chc.2010.03.005

34. Barreto SM, Giatti L, Casado L, de Moura L, Crespo C, Malta D. Contextual factors associated with smoking among Brazilian adolescents. J Epidemiol Community Health. 2012; 66(8): 723-9. https://doi.org/10.1136/jech.2010.122549

35. Machado Neto AS, Andrade TM, Napoli C, Abdon LCSL, Garcia MR, Bastos FI. Determinantes da experimentação do cigarro e do início precoce do tabagismo entre adolescentes escolares em Salvador (BA). J Bras Pneumol. 2010; 36(6): 674-82. https://doi.org/10.1590/S1806-37132010000600003

36. Fujimoto K, Valente TW. Social network influences on adolescent substance use: disentangling structural equivalence from cohesion. Soc Sci Med. 2012; 74(12): 1952-60. https://doi.org/10.1016/j.socscimed.2012.02.009

37. Currie C, NicGabhainn S, Godeau E, Roberts C, Smith R, Currie D, et al. Inequalities in young people's health: international report from the HBSC 2006/06 survey. Copenhagen: WHO Regional Office for Europe; 2008. (WHO Policy Series: Health policy for children and adolescents, No. 5).

38. Horta RL, Horta BL, Pinheiro RT. Drogas: famílias que protegem e que expõem adolescentes ao risco. J Bras Psiquiatr. 2006; 55(4): 268-72. https://doi.org/10.1590/S0047-20852006000400002

39. Pokhrel P, Unger JB, Wagner KD, Ritt-Olson A, Sussman S. Effects of parental monitoring, parent-child communication, and parents' expectation of the child's acculturation on the substance use behaviors of urban, Hispanic adolescents. J Ethn Subst Abuse. 2008; 7: 200-13. https://doi.org/10.1080/15332640802055665

40. Wagner KD, Ritt-Olson A, Chou CP, Pokhrel P, Duan L, Baezconde-Garbanati L, et al. Associations between family structure, family functioning, and substance use among Hispanic/Latino adolescents. Psychol Addict Behav. 2010; 24: 98-108. https://doi.org/10.1037/a0018497

41. Bovet P, Viswanathan B, Faeh D, Warren W. Comparison of smoking, drinking, and marijuana use between students present or absent on the day of a school-based survey. J Sch Health. 2006; 76(4): 133-7. https://doi.org/10.1111/j.1746-1561.2006.00081.x

42. Souza DPO, Silveira Filho DX. Uso recente de álcool, tabaco e outras drogas entre estudantes adolescentes trabalhadores e não trabalhadores. Rev Bras Epidemiol. 2007; 10(2): 276-87. https://doi.org/10.1590/S1415-790X2007000200015

43. Emerson PM, Souza AP. Is child labor harmful? The impact of working earlier in life on adult earnings. Econ Dev Cult Change. 2011; 59(2): 345-86. https://doi.org/10.1086/657125

44. Huurre T, Lintonen T, Kaprio J, Pelkonen M, Marttunen M, Aro H. Adolescent risk factors for excessive alcohol use at age 32 years. A 16- year prospective follow-up study. Soc Psychiatry Psychiatr Epidemiol. 2010 Jan; 45(1): 125-34. https://doi.org/10.1007/s00127-009-0048-y

45. De Micheli D, Formigoni ML. Drug use by Brazilian students: associations with family, psychosocial, health, demographic and behavioral characteristics. Addiction. 2004; 99(5): 570-8. https://doi.org/10.1111/j.1360-0443.2003.00671.x

46. Oliveira-Campos M, Nunes ML, Madeira FC, Santos MG, Bregmann SR, Malta DC, et al. Comportamento sexual em adolescentes brasileiros, Pesquisa Nacional de Saúde do Escolar (PeNSE 2012). Rev Bras Epidemiol. 2014; 17(Supl. 1): 116-30. https://doi.org/10.1590/1809-4503201400050010

47. Jackson C, Sweeting H, Haw S. Clustering of substance use and sexual risk behaviour in adolescence: analysis of two cohort studies. BMJ Open. 2012; 2(1): e000661. https://doi.org/10.1136/bmjopen-2011-000661

48. Malta DC, Vieira ML, Szwarcwald CL, Caixeta R, Brito SMF, Reis AAC. Tendência de fumantes na população Brasileira segundo a Pesquisa Nacional de Amostra de Domicílios 2008 e a Pesquisa Nacional de Saúde 2013. Rev Bras Epidemiol. 2015; 18(Supl. 2): 45-56. https://doi.org/10.1590/1980-5497201500060005

49. Warren CW, Jones NR, Peruga A, Chauvin J, Baptiste JP, Silva VC, et al. Global Youth Tobacco Surveillance, 2000-2007. MMWR [Internet]. 2008 [citado 26 set. 2017]; 57(SS01): 1-21. Disponível em: https://www.cdc.gov/mmwr/preview/mmwrhtml/ss5701a1.htm

50. Brasil. Lei nº 12.546, de 14 de dezembro de 2011. Institui o Regime Especial de Reintegração de Valores Tributários para as Empresas Exportadoras (Reintegra); dispõe sobre a redução do Imposto sobre Produtos Industrializados (IPI) à indústria automotiva; altera a incidência das contribuições previdenciárias devidas pelas empresas que menciona. Diário Oficial da República Federativa do Brasil. 2011.

51. Brasil. Decreto nº 8.262/2014, de 31 de maio de 2014. Altera o Decreto nº 2.018, de 1º de outubro de 1996, que regulamenta a Lei nº 9.294, de 15 de julho de 1996. Diário Oficial da República Federativa do Brasil. 2014.

52. Brasil. Portaria Interministerial MTE/MS nº 2.647 de 04/12/2014. Regulamenta as condições de isolamento, ventilação e exaustão do ar e medidas de proteção ao trabalhador, em relação à exposição ao fumo nos ambientes estabelecidos no art. 3º do Decreto nº 2.018, de 1º de outubro de 1996, alterado pelo Decreto nº 8.262, de 31 de maio de 2014. Diário Oficial da República Federativa do Brasil. 2014.

53. Agência Nacional de Vigilância Sanitária. Portal da Anvisa. Aditivos [Internet]. [citado 26 set. 2017]. Disponível em: http://portal.anvisa.gov.br/aditivos-em-produtos-derivados-do-tabaco