

Smoking among undergraduate students in the area of health

Tabagismo entre acadêmicos da área de saúde

Ana Flávia Granville-Garcia¹
Dmitry José de Santana Sarmento¹
Jalber Almeida Santos¹
Tássia Almeida Pinto¹
Raulison Vieira de Sousa¹
Alessandro Leite Cavalcanti¹

Abstract *The aim of this study was to evaluate the relationship between smoking and socio-demographic and behavioral factors among undergraduate students in the area of health at the State University of Paraíba, Brazil. An analytical cross-sectional study was conducted with a representative sample from each of the following courses: Dentistry, Nursing, Psychology, Pharmacy, Physical Therapy and Physical Education. A total of 492 students were interviewed using a structured questionnaire. The chi-square and Fisher's Exact tests were used for statistical analysis at a 5% level of significance. Smoking prevalence was 5.7% and stress was the main reason for starting the habit (36.8%). In the multivariate analysis by logistic regression, the variables of gender, religious persuasion, semester attended in the course, and alcohol consumption were significantly associated with smoking ($p < 0.05$). Although other studies reported a strong relationship between university students and smoking, the prevalence of smokers was low. Most of the variables studied revealed a correlation with smoking. Since smoking and alcohol consumption are the two major human addictions, this study suggests a bidirectional relationship between these variables.*

Key words *Smoking, Students, Alcoholism, Epidemiology, Risk factors*

Resumo *Avaliar a relação entre o tabagismo e os fatores comportamentais e sociodemográficos entre acadêmicos da área de saúde da Universidade Estadual da Paraíba (UEPB). Foi realizado um estudo transversal analítico, no qual foi obtida uma amostra representativa de cada curso (Odontologia, Enfermagem, Psicologia, Farmácia, Fisioterapia e Educação Física). Foram entrevistados 492 alunos por meio de formulário estruturado. Os testes estatísticos utilizados foram Qui-quadrado e o Exato de Fisher (significância de 5%). A prevalência de tabagismo foi de 5,7% e o estresse foi a principal razão para o início do hábito (36,8%). Na análise multivariada por regressão logística as variáveis, sexo, prática de religião, período cursado e consumo etílico apresentaram-se associadas ao hábito de fumar ($p < 0,05$). Apesar de estudos relatarem uma forte relação entre estudantes universitários e fumo, a prevalência de tabagismo foi baixa. A maioria das variáveis estudadas demonstrou associação com o hábito de fumar. Sendo o fumo e o álcool as duas maiores dependências humanas, este estudo sugere uma relação bidirecional entre estas variáveis.*

Palavras-chaves *Tabagismo, Estudantes, Alcoolismo, Epidemiologia, Fatores de risco*

¹Departamento de odontologia, Universidade Estadual da Paraíba (UEPB). Rua Capitão João Alves de Lira 1325/410, Bela Vista. 58.428-800 Campina Grande Paraíba. anaflaviagg@hotmail.com.

Introduction

Smoking is currently considered a silent pandemic, the most important public health problem and the main preventable cause of death, responsible for the death of 1 in every 10 adults worldwide (5 million people *per year*). If the current patterns persist, smoking will cause 10 million deaths *per year* by the year 2020. Seventy percent of these deaths will occur in developing countries¹.

Nicotine addiction has three basic aspects: *physical dependence*, responsible for the withdrawal syndrome symptoms; *psychological dependence*, responsible for the feeling of the cigarette as a support in moments of stress, loneliness, threat, etc; and *conditioning*, due to the usual associations of smoking (smoking and drinking coffee, smoking and working, smoking and driving, smoking after meals, etc)².

Smoking has been identified as the major risk factor for the development of several diseases such as lung cancer, heart, circulatory, coronary and respiratory diseases, nicotine addiction, and sexual impotence in men. Also, it is usually the direct cause of 30% of cancer cases³⁻⁵. In addition, smoking is related to psychiatric disorders such as depression and schizophrenia, neurobehavioral developmental disorders such as attention deficit hyperactivity disorder (ADHD), drug abuse, decrease of intellectual performance and alcohol consumption^{6,7}.

The World Health Organization (WHO) Framework Convention on Tobacco Control (FCTC) was established in response to the global tobacco epidemic. This is a landmark for public health and was embraced by all WHO member countries on May 21st 2003. Brazil signed the FCTC on June 16th 2003 and it is effective in the country starting February 2005. The FCTC contains chapters designed to protect the present and future generations from the devastating sanitary, social, environmental and economic results of tobacco consumption and tobacco smoke exposure⁸. Since then, tobacco consumption control has been regarded as an ethical matter and a social responsibility of the governments towards their populations⁹. However, there is a worldwide trend of increased prevalence of smokers among the adolescents and young adults. One third of the world population over 15 years of age smokes and Brazil has approximately 2.8 million smokers in the 5-19-year-old range^{1,10,11}.

College is considered a critical period of vulnerability for the onset of smoking^{12,13}. In general, studies reveal a prevalence of smokers varying

from 8.5% to 52.5% among undergraduate students, with lack of physical activity, alcohol consumption, stress, and engagement in religious practice, among others, being considered as associated factors^{2,10,14-16}. Students of health sciences courses deserve special attention in relation to smoking because they will become behavioral models conveying the basic concepts of health into the community. The aim of this study was to investigate the relationship between smoking and behavioral and sociodemographic factors among undergraduate students from health sciences courses of a public Brazilian university.

Methods

An exploratory cross-sectional study was performed with undergraduate students enrolled in health sciences courses (Dentistry, Nursing, Psychology, Pharmacy, Physical Therapy and Physical Education) at the State University of Paraíba, in the city of Campina Grande, PB, Brazil.

The sample size was calculated based on the prevalence found in an earlier study (40.7%)¹⁶. The population comprised 1,813 students, with random probabilistic sampling proportional to the number of students in each course, using a 95% ($Z=1.96$) confidence level and 5% error margin. The following equation was used: $n = \sigma^2 \times p \times q \times N / E^2 (N - 1) + \sigma^2 \times p \times q$

Where n = corresponds to the sample size; σ^2 = confidence level chosen by number of deviations (sigma); p = proportion of the characteristics sought in the universe, measured in percentage; q = proportion in the universe that lacks the studied characteristic ($q = 1 - p$), measured in percentage ($q = 100 p$); N = population size; and E^2 = allowed error estimation. In this way, the minimum sample size comprised 307 undergraduate students. This number was increased by 10% corresponding to the estimated losses, plus a 1.5 correction factor. After these calculations, the sample size consisted of 507 students.

Data collection was performed by two calibrated researchers between August and November 2008, using a structured questionnaire containing questions related to the smoking habit and associated behavioral and sociodemographic factors: tobacco use, starting age of smoking, number of cigarettes smoked *per day*, health sciences course and semester attended in the course, gender, age, marital status, engagement in religious practice and physical activity). At baseline, the study purpose was fully explained and the

participants were asked to sign an informed consent form. The reliability of the responses was tested in 10% of the subjects by the face validation method, in which the researcher asks the subjects to explain in their own words what they understood about each question¹⁷. The interviewed subjects showed no difficulty to answer the questions contained in the questionnaire. The cutoff point for definition of smokers was based on a WHO criterion¹⁸: “to have smoked 1 or more cigarettes *per day* for at least 1 month” and of former smokers was: “to have stopped smoking for more than 1 month”. The questionnaire was based on previous studies^{19,20}.

Data were organized using the SPSS (Statistical Package for the Social Sciences - SPSS Inc., Chicago, IL, USA) statistical software package, presented by descriptive (absolute and percentage distributions) and analytical statistics. Associations among variables were estimated by the cross-products - odds ratio (OR) and 95% confidence intervals. The chi-square and Fisher's exact tests were used to assess the significance of the associations. Logistic regression models were used for the multivariate analysis with the variable 'response to smoking'. In the initial model were included the variables with $p < 0.15$, and after adjustment only the variables significant at 5%.

In compliance with the Resolution 196/96 of the Brazilian National Health Council/Ministry of Health on research involving human subjects, the research protocol was recorded at the National System of Information on Ethics in Research Involving Human Beings (SISNEP) as well as submitted to and approved by the Research Ethics Committee of the State University of Paraíba, Brazil.

Results

Thirteen students refused to take part on the research, reducing the sample size to 492 undergraduate students aged 17 to 50 years (mean age = 22.20 ± 4.34 years; median of 21.00 years). As to gender distribution, 39.2% were males and 60.8% females.

Table 1 shows that most of the subjects were enrolled in the Nursing course (22.4%), half of them were attending up to the 4th semester and were Caucasians, and 69.1% were Catholics. This table also shows that most students affirmed to drink alcohol (58.7%), had family income up to 3 minimum wages (39.4%), were single (93.3%) and did not live with their parents (54.5%)

Table 1. Behavioral and sociodemographic characteristics of the subjects

Variable	N	%
Course		
Dentistry	90	18.3
Psychology	75	15.2
Nursing	110	22.4
Pharmacy	71	14.4
Physical Therapy	72	14.6
Physical Education	74	15.0
Semester		
1st to 4 th	246	50
5th to 10 th	246	50
Race		
Caucasian	246	50.0
Mixed black-whites	185	37.6
Indigenous	6	1.2
Black	32	6.5
Other	23	4.7
Religion		
None	77	15.7
Catholic	340	69.1
Evangelical	56	11.4
Spiritist	12	2.4
Mormon	3	0.6
No answer	4	0.8
Total	492	100.0
Alcoholism		
Yes	289	58.7
No	203	41.3
Total⁽¹⁾	407	82.7
Family income (minimum wage)		
Up to 3	194	39.4
4 to 6	181	36.8
7 or more	117	23.8
Marital status		
Single	459	93.3
Married	33	6.7
Living with parents		
Yes	224	45.5
No	268	54.5
Total	492	100.0

(1): The difference among n values was due to lack of information.

Table 2 shows a smoking prevalence of 5.7% and that Psychology undergraduates accounted for the highest percentage of smokers (12.0%). Among the smokers, more than half (56.3%) consumed 1 to 3 cigarettes *per day* and 75% reported smoking while drinking. Regarding the starting age of smoking, the most prevalent age group was 13 to 18 years (63.2%), and stress was the main reason (36.8%) alleged by the students.

Table 2. Prevalence and Academic Profile of Smokers

Variable	N	%
Smoking		
Yes	28	5.7
No	464	94.3
Course		
Dentistry	4	4.4
Psychology	9	12.0
Nursing	4	3.6
Pharmacy	5	7.0
Physical Therapy	5	6.9
Physical Education	1	1.4
Total	28	5.7
Consumption of cigarettes per day		
1 to 3	9	56.3
4 to 10	7	43.7
Total⁽¹⁾	16	100.0
Occasion to smoke		
Drinking	12	75
feeling like it	1	6.3
Stressed	3	18.7
Total⁽¹⁾	16	100.0
Starting age of smoking		
13 to 18	12	63.2
19 or more	7	36.8
Total⁽¹⁾	19	100.0
Reason for start smoking		
Stress	7	36.8
Influence	3	15.8
Problems with spouse	1	5.3
None	5	26.3
Other reasons	3	15.8
Total⁽¹⁾	19	100.0

(1): The difference among n values was due to lack of information.

Table 3 shows that in the total sample, smoking was proportionally higher among students aged over 30 years ($p = 0.065$), males ($p < 0.001$), Caucasians ($p = 0.744$) and single ($p = 1.000$), among those not engaged in religious practice ($p < 0.001$), those in the later semester of the course ($p = 0.020$), those who worked ($p = 0.120$), those with family income higher than 7 minimum wages ($p = 0.819$), physical activity practitioners ($p = 0.895$) and alcohol consumers ($p = 0.001$). After the multivariate analysis by logistic regression, it was found that smoking probability is higher if the student is male (OR = 3.29, 95% CI 1.32 to 8.21 and $p = 0.011$), not engaged in religious practice (OR = 3.30, 95% CI 1.44 to 7.57, $p = 0.005$), is attending the second half of the course (OR = 2.45, 95% CI 1.02 to 5.87, $p = 0.044$) and is an alcohol consumer (OR = 3.71, 95% CI 1.06 to 12.47 $p = 0.040$) (Table 4).

Discussion

The WHO considers health professionals as the primary target of antismoking actions²¹, as they are future health multiplier agents. In addition, knowing the behavioral and sociodemographic factors of smoking habits provides subsidies to direct the development of research as well as educational and preventive measures on this subject.

The prevalence of smokers among students has been shown to range from 8% to 52.5%^{10-12,16}. In the present study, the prevalence was low (5.7%), with no reports of former smokers, following a trend observed in similar studies^{12,15}. This result may be due to a greater awareness of the harmful effects of smoking or to well succeed national and state antismoking policies. In this sense, the Paraíba state in Brazil has adopted strict policies, banning smoking in private and public collective environments, and providing educational programs²² on the smoking addiction. The Paraíba State University follows an antismoking policy, provides supporting groups for former smokers and those wishing to quit the habit. There are antismoking banners on the campuses, particularly at sectors that offer clinical treatments to the population. The Psychology (12%) and Physical Education (1.4%) courses had the highest and lowest prevalence of smokers, respectively. As regards the Psychology course, which is considered as a human science course by other institutions, a health protection attitude did not seem so evident. This result is consistent with those of a previous study reporting higher prevalence of smokers among the human sciences students as compared to health sciences students (8.7% vs. 3.4%)²³. This trend was also noticed in other areas. It has been reported a higher incidence of smokers among exact sciences students compared to health sciences students (27.1% vs. 16.3%)²⁴ and among social sciences students compared to health sciences students (32.9% vs. 5.6%)¹². Specifically in relation to the low prevalence of smokers among physical education students, this may be explained by the fact that these students adopt healthier lifestyles, including regular physical activity.

The number of cigarettes smoked *per day* is directly related to morbidity and mortality of smokers. Consumption of more than 1 pack *per day* (> 20 cigarettes/day) increases by 13 times the risk of developing head and neck cancers, while the consumption of 1 to 20 cigarettes *per day* has been associated with an increased risk of stomach cancer²⁵. Most people reported con-

Table 3. Assessment of smoking habits according to sociodemographic and behavioral variables

Variable	Smoking						P value	OR (IC at 95%)
	Yes		No		Total			
	N	%	N	%	N	%		
Age group								
17 to 19	4	3.6	107	96.4	111	100	p ⁽¹⁾ = 0.065	1.00
20 to 29	20	5.6	335	94.4	355	100		1.60 (0.53 to 4.78)
30 or more	4	15.4	22	84.6	26	100		4.86 (1.13 to 20.94)
Gender								
Male	21	10.9	172	89.1	193	100	p ⁽¹⁾ < 0.001*	5.09 (2.12 to 12.23)
Female	7	2.3	292	97.7	299	100		1.00
Ethnical group/Color								
Caucasian	16	6.5	230	93.5	246	100	p ⁽²⁾ = 0.744	1.00
Mixed black-white	8	4.3	177	95.7	185	100		0.65 (0.27 to 1.55)
Black	2	6.3	30	93.8	32	100		**
Other	2	6.9	27	93.1	29	100		**
Marital status								
Single	27	5.9	432	94.1	459	100	p ⁽²⁾ = 1.000	**
Married	1	3.0	32	97.0	33	100		
Group Total	28	5.7	464	94.3	492	100		
Religious practice								
Yes	15	3.6	396	96.4	411	100	p ⁽¹⁾ < 0.001*	1.00
No	12	15.6	65	84.4	77	100		4.87 (2.18 to 10.88)
Group Total	27	5.5	461	94.5	488	100		
Course semester								
1 st to 4 th	8	3.3	238	96.7	246	100	p ⁽¹⁾ = 0.020*	1.00
5th to 10th	20	8.1	226	91.9	246			2.63 (1.14 to 5.10)
Work outside the home								
Yes	8	9.4	77	90.6	85	100	p ⁽²⁾ = 0.120	2.01 (0.85 to 4.73)
No	20	4.9	387	95.1	407	100		1.00
Family income (minimum wages)								
Up to 3	10	5.2	184	94.8	194	100	p ⁽¹⁾ = 0.819	1.00
4 to 6	10	5.5	171	94.5	181	100		1.08 (0.44 to 2.65)
7 or more	8	6.8	109	93.2	117	100		1.35 (0.52 to 3.53)
Physical activity practice								
Yes	12	5.9	193	94.1	205	100	p ⁽²⁾ = 0.895	1.05 (0.49 to 2.28)
No	16	5.6	271	94.4	287	100		1.00
Alcohol consumption								
Yes	25	8.7	264	91.3	289	100	p ⁽²⁾ = 0.001*	6.31 (1.88 to 21.20)
No	3	1.5	200	98.5	203	100		1.00
Group Total	28	5.7	464	94.3	492	100		

(*): significant association at 5.0%. (**): it was not possible to determine due to the very low frequency of occurrence. (1): by the Pearson's chi-square test. (2): Using the Fisher's Exact test.

sumption of 1 to 3 cigarettes *per* day, which a lower frequency than that reported in previous reports^{12,19,23}.

Most students affirmed that the smoking habit started early, between 13 and 18 years, which is consistent with the literature, since virtually all smokers acquire the habit during adolescence, beginning with a mere trial of a cigarette^{1,12,10}. The early starting age of smoking -90% under 19 years of age - has led the WHO to classify smok-

ing among the pediatric diseases, requiring proper diagnosis, treatment and preventive measures²⁶. A larger number of smokers were over 30 years of age, though without statistical significance. The 20-40-year-old age group has been described as the one with the highest prevalence of smokers^{15,21,23}.

This study revealed that stress was the main reason mentioned to start smoking, as reported elsewhere^{14,27}. Although smoking has been asso-

Table 4. Multivariate analysis of association logistic regression between selected variables and smoking.

Variable	OR and 95,0% IC	
	Adjusted (by the model)	p value
Gender		
Male	3.29 (1.32 to 8.21)	p = 0.011*
Female	1.00	
Religious practice		
Yes	1.00	p = 0.005*
No	3.30 (1.44 to 7.57)	
Course semester		
1st to 4th	1.00	p = 0.044*
5th to 10th	2.45 (1.02 to 5.87)	
Alcohol consumption		
Yes	3.71 (1.06 to 12.47)	p = 0.040*
No	1.00	

(*) – significance level at 5.0%.

ciated with emotional stress reduction²⁸, friends' influence and curiosity have also been reported as strong reasons for the onset of smoking^{11,12,20,29}.

Women have been extensively targeted by the marketing actions of the tobacco industry. For this group, the tobacco industry generally makes advertisements conveying messages of beauty and independence, with young people, photographic models, athletes and ideas that associate cigarette smoking with individual freedom²⁶. This approach has resulted in an increase of cigarette consumption. However, in spite of this trend of increase of female consumers^{21,30}, there was a higher prevalence among male students (OR = 3.29, 95% CI 1.32 to 8.21 and p = 0.011) in the present study. This result is supported by the literature^{10,19,24}. This smoker profile has also been reported in young students from the Paraíba capital city in a previous nationwide study²⁶.

The prevalence of smokers was similar among ethnical groups with no association between this variable and smoking habit (0.744). On this subject, it has been shown a larger number of smokers among Caucasian and Afro-descendant youngsters^{11,31}. There was no association between the marital status and smoking (p = 1.00). Similar results were reported by other authors^{7,23}.

Belonging officially to a particular religion is frequently just a formality not likely to influence the behavior¹⁴. Thus, the subjects were asked if they effectively practiced some religion. It is as-

sumed that by practicing a religion the individual belongs to a group with established and shared values and norms, in which there is an explicit and clear condemnation of overall drug use⁷. Confirming these assertions, there was greater chance of being a smoker among students not engaged in religious practice (OR = 3.30, 95% CI 1.44 to 7.57, p = 0.005). This was also observed in other studies^{7,20}.

There was a higher smoking prevalence in the second half of the course (OR = 2.45, 95% CI 1.02 to 5.87 p = 0.044) and these data are supported by literature^{24,27}. This could be due to the influence of friends, parties, especially if they believe that it is a normal way of relieving stress³². In addition, the stress throughout the course may have resulted in the increase in the number of smokers^{15,16}, as discussed earlier.

No association was found between working outside the home (p = 0.120), family income (p = 0.819) and smoking. The same finding was reported by Rondina *et al*²³. Since the practice of exercise helps maintaining a healthy lifestyle, it was checked if there was a possible association between this variable and smoking. However, there was no significant association between physical activity and smoking (p = 0.895), probably due to the low prevalence of smokers^{10,20}.

Tobacco and alcohol use are two major human addictions, and thus a possible association between these variables was also evaluated. Most smokers were alcohol consumers (OR = 3.71, 95% CI 1.06 to 12.47 p = 0.040). In addition, it was found that 75% of smokers smoked while drinking, suggesting a bidirectional relationship between tobacco and alcohol consumption. However, this relationship can also be unidirectional³³. The association between these two drugs has been demonstrated in other studies^{7,11,20,34}.

Conclusions

The knowledge of factors related to smoking is required for the achievement of adequate institutional programs aimed at reducing the number of smokers, especially in the health area. Higher education plays a key role for establishing plans and preventive actions to give the students an opportunity to influence the community where they operate. It is important to notice that the failure to perform the test-retest was a limitation of this study, and for this reason we suggest that they are performed in future studies. The smoking prevalence was low, with early starting

age and stress as the main reason for smoking. Among the behavioral and sociodemographic variables, gender, semester attended in the course, practice of religion and alcohol consumption were associated with smoking. Based on these results, the authors intend to perform a deeper investigation on this subject, including a qualitative research to evaluate differences in smoking prevalence among the graduation courses as well as the students' perception of smoking. A longitudinal study is also under consideration to evaluate the influence of the established tobacco-free environments at the State University of Paraíba on the decrease of prevalence of smokers among the students.

Collaborations

DJS Sarmiento, JA Santos, TCA Pinto and RV Sousa were responsible for the project design, data collection, database construction and preparation of the manuscript; AF Granville-Garcia was responsible for the project design, research orientation and reviewing the manuscript, AL Cavalcanti was responsible for reviewing the manuscript.

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