



# Factors related to the use of hookah among medical students

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## ABSTRACT

**Objective:** This study evaluated the factors related to the use of hookah among medical students, the level of knowledge about the involved harms, and their relationship with the use and intention to stop using it. **Methods:** Students of the 1st and 6th year of medical school were evaluated. A multivariate logistic regression model was used to evaluate the association between the outcome (use of hookah in the last 30 days) and demographic, subjective psychosocial data and level of knowledge about the harms of hookah use. **Results:** The experimentation rate of hookah and current use was high (59.6% and 27.7%, respectively), with no difference between the 1st and 6th year groups ( $p=0.70$ ). The 6<sup>th</sup> grade students were more knowledgeable about the harm of using hookah when compared to the 1<sup>st</sup> year students ( $p < 0.0001$ ), and there was no association between the use of hookah in the last 30 days and the knowledge about its harms. Cigarette smoking and the use of alcoholic beverages were associated with the use of hookah in the last 30 days, with unadjusted Odds Ratio (OR) of 11.3; 95% CI 4.62-27.7;  $p < 0.0001$  and OR 8.74; 95% CI 3.78-20.2;  $p < 0.0001$ ; respectively. **Conclusion:** There is a high experimentation, current use of hookah and cigarettes among medical students. Sixth year students are more knowledgeable about the harms involved. There was no association between the use of hookah in the last 30 days and the knowledge about its harms. Smoking and the use of alcoholic beverages are independent predictors of use of hookah.

**Keywords:** Water pipe smoking; Tobacco for water-pipe; Smoking; Medical education.

## INTRODUCTION

An estimated number of 100 million people in the world use hookah for tobacco consumption. In the last decades its consumption has increased considerably in the Americas,<sup>(1)</sup> reaching experimentation rates of up to 50% among high school students in the North Caroline (USA).<sup>(2)</sup>

The way tobacco is consumed through hookah is completely different from the cigarette. Hookah fans get together to share the device, what could predispose the user to acquire bacteria, viruses and fungi contamination, as shown in literature.<sup>(3)</sup> Flavored bar tobacco is placed inside the hookah and submitted to high temperatures through coal combustion, which is used for burning. The inhalation sends the smoke through a recipient containing water, which is located in the lower part of the hookah and which cools the smoke, apparently smoothing the inhalation, according to users. Each hookah session lasts between 45 and 60 minutes, which represents one exposition equivalent to 100-200 cigarettes, thus offering higher levels of nicotine and higher exposition to carbon monoxide.<sup>(4)</sup>

The use of hookah is associated to a higher risk of developing lung diseases, periodontal disease, lung cancer<sup>(5)</sup> and nicotine addiction.<sup>(3)</sup>

A study performed in 2013 with 1,203 university students in the United States estimated an experimentation frequency of 46.4% and of continuous use in the last year of 28.4%.<sup>(6)</sup> Another study with 744 students at the University of Virginia found a hookah experimentation rate of 48.4%, and 20.4 declared having used it in the last 30 days.<sup>(7)</sup>

In Brazil, the general prevalence of hookah tobacco consumption is still little known. Data from the health national research of Brazilian students in 2015, counted with a sample of 102,301 students from the ninth grade of elementary school, found that around 6.1% used other tobacco products (cigarillo, hookah or snuff) on the 30 days prior to the research, and that the greatest prevalences were found in the Mid-West region (10%) and South region (9.6%).<sup>(8)</sup> Meanwhile, another study performed with 586 university students in Brazil found a prevalence of 47.32% of hookah use.<sup>(9)</sup>

The present study aims to evaluate the Hookah use frequency among students of the beginning and end of the medical course and relate psychosocial, demographic and level of knowledge factors about the hazards of Hookah use with frequency use and intention of stopping using it.

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## METHODS

It is a transversal study, performed in a single meeting, with students from the 1<sup>st</sup> and 6<sup>th</sup> grade of the medical course of Pontifícia Universidade Católica de Goiás. We used an investigative and structured data collection tool, without identification and self-filling. More detailed information can be found in the online supplement of the JBP (Chart S1, available at [http://www.jornaldepneumologia.com.br/detalhe\\_anexo.asp?id=70](http://www.jornaldepneumologia.com.br/detalhe_anexo.asp?id=70)). Data related to psychosocial aspects were approached with objective questions copied from PENSE study,<sup>(9)</sup> containing the following questions: 1) Do you practice sports regularly (more than 2x week)?; 2) Are you overweight?; 3) Do you frequently feel sad or depressed (more than 2x week)?; 4) Are you engaged in any remunerated activity in your spare time?; 5) Do you consume alcoholic drinks at least 2x/week?

The particularities on Hookah use were evaluated with the following questions copied from Smith et al.<sup>(10)</sup> study questionnaire: Do you smoke or have already smoked? (comprising the consumption not only of regular cigarettes but also of other devices of tobacco use); 2) Have you ever smoked Hookah? (question that identifies Hookah experimentation);<sup>(11)</sup> 3) In the last 6 months, did you smoke Hookah?; 4) In the last 30 days, how many times did you smoke Hookah? (question that identifies current consumers/prevalence of Hookah current use);<sup>(11)</sup> 5) If you smoke Hookah, or other tobacco products, do you intend to stop?

In order to check the knowledge about the cigarette and Hookah hazards, we asked the following questions: 1) Compared to a regular cigarette, which, do you think, is more harmful?; 2) Which has more nicotine?; 3) Which is more carcinogenic?; 4) Which produces more carbon monoxide?; 5) Which produces more heavy metals? Such questions were elaborated from studies previously published in Brazil<sup>(12)</sup> and from the GTSS<sup>(13)</sup> data collection instrument.

We submitted to the approval of the Ethics Committee on Human Beings Research of the Pontifícia Universidade Católica, with opinion number 2313290 and CAEE number 7337551740000037. The questionnaire was applied after the students had signed the Informed Consent Form. We distributed 172 questionnaires, corresponding to the number of students that met the inclusion criteria (to be a student from the 1<sup>st</sup> or 6<sup>th</sup> grade of the medical course and to be present at the activity performed at the moment of the data collection). A total of 155 students agreed with the study, and from these 141 questionnaires were filled up correctly and selected for participation.

The results were analyzed with the program Stata version 13.1 (StataCorp, Texas, USA), and the level of significance was 5% ( $p < 0.05$ ). Data normality was evaluated with the Shapiro-Wilk test. As the continuous variables did not present regular distribution, they were described using median and interquartile interval.

The qualitative variables were described using absolute values and proportions. The qui square test was used to analyze the categorical variables and were calculated the non-adjusted relative risk estimates (Odds ratio) of the association between Hookah use in the last 30 days and each variable studied with confidence interval of 95%. All possible predictive variables were included in a multivariate logistic regression model to evaluate the association between the outcome (Hookah use in the last 30 days) and each independent variable while it was done the control of co-variables included in the model.

## RESULT

A total of 172 students from 1<sup>st</sup> and 6<sup>th</sup> grades of the medical course, who were present at the moment of the data collection, were invited to participate in the study. From these, 155 (90%) were included and answered a self-applied questionnaire. The final sample consisted of 141 students, 72 (51.1%) from the 1<sup>st</sup> year and 69 (48.9%) from the 6<sup>th</sup>. A number of 14 individuals were excluded due to incomplete forms or with erasures (Figure 1).

The studied sample was predominantly formed by female individuals (54.6%), white (68.8%), average age of 23 years old (IQR 20-24 years), who lived with their parents or relatives (81.6%) and practiced sport with frequency  $\geq 2x/week$  (68.1%). We verified that the students of the 6<sup>th</sup> year were older ( $p < 0.0001$ ), lived alone in higher proportion ( $p = 0.02$ ) and considered themselves overweight too in higher proportion ( $p = 0.01$ ) when compared to the 1<sup>st</sup> year ones.

Hookah experimentation rate was of 59.6% and did not differ from the groups of the 1<sup>st</sup> and 6<sup>th</sup> grades ( $p = 0.70$ ), and the same was observed regarding current smoking (40.4%,  $p = 0.32$ ).

From the 141 individuals, 39 (27.7%) reported having consumed Hookah more than 5 times in the

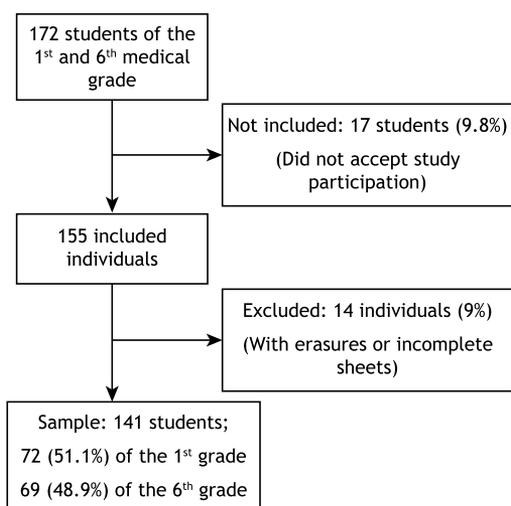


Figure 1. Research flowchart.

last 30 days, and this proportion was similar between the groups of the 1<sup>st</sup> and 6<sup>th</sup> grade ( $p=0.68$ ).

When asked if Hookah would be more harmful and presented higher exposition to nicotine compared to cigarette, we observed higher proportion of correct answers in the 6<sup>th</sup> grade when compared to the 1<sup>st</sup> ( $p<0.0001$ , to both questions). However, there was no difference between the groups regarding the knowledge of Hookah generating more cancer and providing more exposition to heavy metals or to CO. We did not observe association between Hookah consumption and greater or lesser knowledge about its harms (Table 1)

Most participants that used cigarettes or Hookah (85%) reported that they intended to stop using it, and we did not observe significant differences between the groups regarding that intention (Table 2).

Cigarette smoking and the use of alcoholic drinks were associated to Hookah use in the last 30 days (current consumption) (Table 1), with unadjusted Odds Ratio of 11.3; IC95% 4.62-27.7;  $p<0.0001$  and OR 8.74; IC95% 3.78-20.2;  $p<0.0001$ ; respectively. The multivariate analysis confirmed that both smoking and alcoholic drinks use are independent predictors of Hookah, adjusted OR of 7.74; IC95% 2.99-19.99;  $p<0.0001$  and OR 5.62; IC95% 2.25-14.0;  $p<0.0001$ ; respectively.

## DISCUSSION

From the 141 students of medical course that correctly answered the applied questionnaire, there was a high Hookah experimentation index (59.6%), which did

not differ between the groups of the 1<sup>st</sup> and 6<sup>th</sup> grade ( $p=0.70$ ). Comparatively, this frequency was above the values found among students of medical schools in Canada (40%),<sup>(14)</sup> South Africa (43.5%),<sup>(15)</sup> England (51.7%),<sup>(16)</sup> however very similar to what was observed at a former study among university students of the medical course in the city of São Paulo, where Hookah experimentation rates got to 47.32%.<sup>(17)</sup>

We observed a prevalence of 27.7% current use, which was higher than the one found in another study. In the latter one, Hookah experimentation levels got to approximately 40% and the current use corresponded to 17% of the interviewed (considering the use in the last 30 days among the ones who reported the initial date of consumption prior to these 30 days).<sup>(2)</sup> Also higher than another study that found experimentation of 33% and a prevalence of current consumption of 10.2%, considering the use of at least once in the last 30 days.<sup>(18)</sup> Hookah use usually occurs in reunions with friends, in an intermittent way, in a social atmosphere and in a recreational way,<sup>(10)</sup> what could explain the differences between the experimenters' frequencies and the regular users. It is also observed in the literature, a wide variation of current consumers' definitions and the experimentation in the different studies. A standardization on the current users' definition and the experimentation definition would favor a comparison of these findings in different populations.

A study with 486 students, from a private university in New York (USA), evaluated predisposing and protector factors for onset of Hookah consumption did not find a correlation among factors described as protectors, such as: self-esteem sensation, religiosity and high

**Table 1.** Characteristics and psychosocial factors associated to Hookah use in the last 30 days among medical students in Goiânia, Goiás, (n=141 individuals).

	No n=102	Yes n=39	P
Age, years, average (IQR)	23 (19-24)	23 (20-24)	0.95
Male gender, n (%)	47 (46.1)	17 (43.6)	0.79
Color, n (%) white	66 (64.7)	31 (79.4)	
brown	30 (29.4)	7 (18)	0.23
black	6 (5.9)	1 (2.6)	
Lives alone n (%)	21 (20.6)	5 (12.8)	0.29
Smoking in activity, n (%)	26 (25.5)	31 (79.5)	<0.0001*
Sport $\geq 2x$ /week, n (%)	66 (64.7)	30 (76.9)	0.16
Above ideal weight n (%)	27 (26.5)	11 (28.2)	0.84
Depressed $\geq 2x$ /week n (%)	35 (34.3)	14 (35.9)	0.86
Remunerated activity, n (%)	9 (8.8)	6 (15.4)	0.26
Alcohol $\geq 2x$ /week, n (%)	23 (22.6)	28 (71.8)	<0.0001*
Hookah more harmful (hits), n (%)	62 (60.8)	17 (43.6)	0.07
Hookah more nicotine (hits), n (%)	44 (43.1)	12 (30.8)	0.18
Hookah more cancer (hits), n (%)	48 (47.1)	22 (56.4)	0.32
Hookah more CO (hits), n (%)	65 (63.7)	26 (66.7)	0.74
Hookah more heavy metals, (hits), n (%)	59 (57.8)	17 (43.6)	0.24
Total n° of hits, average (IQR)	2 (2-4)	2 (2-3)	0.24

Sample with data from n: 141 individuals, n: 102 individuals who were not used in the last 30 days and n: who were used in the last 30 days. Values expressed as median (IQR: interquartile range) or as absolute and percentage n (%). \*p values <0.05 were statistically evaluated.

**Table 2.** Characteristics, hookah use and knowledge among medical students Goiânia, Goiás, within the studied period (n=141 individuals).

	All individuals n=141	1 <sup>st</sup> grade n=72	6 <sup>th</sup> grade n=69	p
Age, years, average (IQR)	23 (20-24)	20 (18.5-21)	24 (23-27)	<0.0001*
Male gender, n (%)	64 (45.4)	33 (45.8)	31 (44.9)	0.91
Color, n (%) white	97 (68.8)	48 (66.7)	49 (71)	
brown	37 (26.2)	20 (27.7)	17 (24.6)	0.85
black	7 (5.0)	4 (5.6)	3 (4.4)	
Lives alone n (%)	26(18.4)	8 (11.1)	18 (26.1)	0.02*
Smoking, n (%)	57 (40.4)	32 (44.4)	25 (36.2)	0.32
Sport ≥2x/week, n (%)	96 (68.1)	54 (75)	42 (60.9)	0.07
Above ideal weight, n (%)	38 (27)	12 (16.7)	26 (37.7)	0.01*
Depressed ≥2x/week, n (%)	49 (34.8)	26 (36.1)	23 (33.3)	0.73
Remunerated activity, n (%)	15 (10.6)	10 (13.9)	5 (7.3)	0.20
Alcohol ≥2x/week, n (%)	51 (36.2)	30 (41.7)	21 (30.4)	0.17
Has already tried hookah, n (%)	84 (59.6)	44 (61.1)	40 (58)	0.70
Hookah in the last 6 months, n (%)	47 (33.3)	24 (33.3)	23 (33.3)	1.00
Hookah in the last 30 days, n (%)	39 (27.7)	21 (29.2)	18 (26.1)	0.68
Hookah more harmful (hits), n (%)	79 (56)	27 (37.5)	52 (75.4)	<0.0001*
Hookah more nicotine (hits), n (%)	56 (39.7)	17 (23.6)	39 (56.5)	<0.0001*
Hookah more cancer (hits), n (%)	70 (49.7)	33 (45.8)	37 (53.2)	0.36
Hookah more CO (hits), n (%)	91 (64.5)	45 (62.5)	46 (66.7)	0.61
Hookah more heavy metals, (hits), n (%)	76 (53.9)	36 (50)	40 (58)	0.43
Total n° of hits, average (IQR)	2 (2-4)	2 (2-3)	3 (2-5)	0.001*
Intends to stop using Hookah, n (%)	75 (85.2)	44 (91.7)	31 (77.5)	0.06

Values expressed as median (IQR: interquartile range) or as absolute and percentage n (%). \*p values <0.05 were statistically evaluated.

academic performance and the onset of Hookah use, and among the factors described as risk factors, only the impulsive behavior was related with Hookah experimentation.<sup>(19)</sup> In our study, psychosocial data, such as regular physical exercise practice, to feel depressed, to be overweight, live alone or be engaged, work in some remunerated activity in addition to the activities of the university education, were not different among Hookah users and non-users.

We observed that the onset of Hookah use happens at a later time, after the individuals had contact with alcohol, marijuana or cigarette<sup>(2,10,20)</sup> and is frequently associated with alcoholic drinks consumption.<sup>(19,21)</sup> Our study found that alcoholic drinks consumption is around three times higher among Hookah smokers when compared to non-smokers. At a longitudinal study performed with 936 university students from the New York region (USA) and surroundings, around 96% of Hookah users reported the current use of alcohol compared to 61% of non-smokers.<sup>(19)</sup>

Some theories about psychological development suggest that both Hookah experimentation and other substances such as alcohol and marijuana would be related to a transition process from adolescence to adult age<sup>(22)</sup> and that it most frequently happens within the university student environment.<sup>(19)</sup> The closeness

of university environment to bars where the use of hookah and alcohol is encouraged could be related to the higher popularity of this device in this specific population,<sup>(17)</sup> what could at least partially explain this association frequently found in the different studies.

Regarding the knowledge about the Hookah hazards, different studies demonstrated that there is a mistaken perception that Hookah could be less harmful than the cigarette, and this could reinforce the experimentation and consumption.<sup>(10)</sup> In our study, however, when we compared the groups with greater or lesser correct knowledge assessment, both Hookah experimentation and habitual use and the intention to stop using it did not relate to a higher or lower knowledge about Hookah hazards. In another study performed among university students from the medical course, the lack of knowledge was also not related to a higher use of the device.<sup>(17)</sup>

In conclusion, we verified that there is a high Hookah and cigarettes experimentation and use among medical students. The higher knowledge about the use hazard among the 6<sup>th</sup> grade was not associated with a lower use frequency or with a higher intention of interrupting its consumption. It was demonstrated that smoking and the use of alcoholic drinks are independent predictors of Hookah use. However, more studies are

necessary to elucidate additional factors related to the high frequency of Hookah use observed in this population, in order to suggest further strategies and public policies of awareness and engagement against the use of this device.

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