

Waterpipe Smoking in Health-Care Students: Prevalence, Knowledge, Attitudes, and Motives

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BACKGROUND: Waterpipe (hookah) smoking is a form of tobacco smoking that is noticeably increasing worldwide, particularly among young adults. A growing body of literature indicates that college students may not be as knowledgeable as they should be in making decisions about waterpipe smoking. **PURPOSE:** This study evaluated the prevalence, knowledge, and attitudes regarding waterpipe smoking use among college-based health-care students. **METHODS:** Two instruments were found to be appropriate to the study, and permission was obtained to modify usage in this specific study. Three hundred nineteen college-based health-care students were asked to participate and complete a questionnaire. Data were analyzed by using statistical software. **RESULTS:** Respondents used or tried waterpipe smoking before ($n = 156$ [49%]). Many respondents were able to identify health hazards that might result from waterpipe smoking, but 58% ($n = 187$) believed that cigarette smoking was more harmful than waterpipe smoking. Chi-square tests revealed significant differences between age groups ($P = .029$) and program of study ($P = .01$) but no differences among sex ($P = .76$), ethnicity ($P = .19$), or educational status ($P = .65$). **CONCLUSIONS:** This study showed that waterpipe smoking was common but not widespread among this group of health-care students. Their knowledge of the risks and health-related attitudes toward waterpipe smoking was lacking. Many had misinformation and misconceptions when comparing waterpipe smoking versus cigarette smoking. Further studies are needed to fully understand the reasons for waterpipe smoking among health-care students. Also, there is a need to offer educational campaigns that increase students' knowledge and awareness as well as to correct misinformation that can lead to misguided beliefs and attitudes. *Key words:* waterpipe; hookah; smoking; knowledge; beliefs; attitudes; students; college students; health care. [Respir Care 2019;64(3):321–327. © 2019 Daedalus Enterprises]

Introduction

Tobacco smoking is a major problem in the world. Smoking accounted for 100 million deaths in the 20th century,

outweighing the deaths from World Wars I and II combined.¹ Waterpipes are one of the first new tobacco device products of the 21st century. Waterpipes originated in the Middle East, and estimations are that ~1 billion smokers

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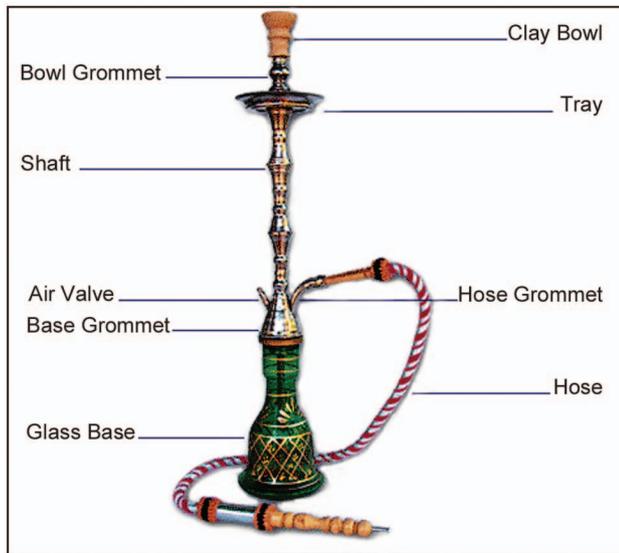


Fig. 1. A waterpipe (hookah) with the main components labeled.

use waterpipes throughout the world.^{2,3} Waterpipe smoking is known by 3 primary names: hookah, narghile, and shisha (Fig. 1).^{4,5} Smoking a waterpipe has been linked to lung cancer, respiratory diseases, low birthweight, periodontal disease, bladder cancer, nasopharyngeal cancer, esophageal cancer, oral dysplasia, infertility, and hepatitis C infection.⁶ However, many smokers believe that smoking through a waterpipe is less dangerous than cigarette smoking because the water filter and hose eliminate the harmful toxic carcinogens.⁷

The exposure time when smoking a waterpipe is ~9 times longer than cigarette smoking (~45 vs ~5 min) and can almost double the increase of nicotine exposure (~1.7 times) when compared with cigarette smoking.⁸ Inadequate cleaning of the waterpipe, lack of awareness among the public, and the fact that some hookah bars are not mandated to change the mouthpiece are not widely known hazards of waterpipe smoking that can lead to disease transmission.⁹ Most waterpipe smokers are young adults (18–24 y old), and several studies examined college-age student use of waterpipes for smoking tobacco.¹⁰⁻²⁰ However, none of these studies has specifically looked at health-care students' use of waterpipe smoking while enrolled in a health-related professional program.

Health-care students play an important role in the health-care industry because they are the practitioners of tomorrow. Society, in general, may have an expectation that health-care students should have a baseline of knowledge, suitable attitudes, and good health-related beliefs that smoking, in all its forms, is not healthy. Yet, little is known about health-care students initiating waterpipe smoking. Therefore, the purpose of this study was to determine the prevalence, knowledge, attitudes, and reasons for waterpipe smoking among college-based health-care students at

QUICK LOOK

Current knowledge

Most waterpipe smokers are young adults (18-24 y old). Health-care students play an important role in the health-care industry because they are the practitioners of tomorrow. Society, in general, may have an expectation that health-care students should have a baseline of knowledge, suitable attitudes, and good health-related beliefs that smoking, in all its forms, is not healthy.

What this paper contributes to our knowledge

Waterpipe smoking was common among this group of health-care students. Their knowledge of the risks and health-related attitudes toward waterpipe smoking was lacking. Many had misinformation and misconceptions when comparing waterpipe smoking with cigarette smoking.

an urban research-based university in the southeastern United States.

Methods

The instrument used in this study was established from 2 surveys: the first survey was from Holtzman et al¹⁵ to evaluate the student knowledge and attitudes toward waterpipe usage among university students, and the second survey was developed by Jawaid et al²¹ to study the awareness, perceptions, and practice of university students about waterpipe smoking (see the supplementary materials at <http://www.rcjournal.com>). In January 2017, after approval from the Georgia State University Institutional Review Board, a convenience sample of participants were chosen based on their enrollment in the following undergraduate and graduate programs: nursing, nutrition, occupational therapy, physical therapy, and respiratory therapy. During spring semester 2017, and after institutional review board approval and informed consent, graduate students received an e-mail asking them to complete a Web-based survey. Undergraduates were asked by the student researcher (MA) to participate personally by completing a paper copy of the survey near the end of a pre-arranged class without the professor in the classroom. Data were confidential and anonymous. Web-based surveys were retrieved from Qualtrics (Qualtrics, Provo, Utah) to SPSS v. 22 (SPSS, Chicago, Illinois), and the student researcher (MA) entered data from the paper surveys directly into the SPSS program. The test for significance was based on a P value $\leq .05$.

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Table 1. Demographics Characteristics of the Sample Population

Characteristic	<i>n</i> (%)
Age	
18–25 y	201 (63.0)
26–30 y	60 (18.8)
31–39 y	39 (12.2)
≥40 y	19 (6.0)
Sex	
Men	76 (23.8)
Women	243 (76.2)
Education status	
Undergraduate students (junior), first year in the program	96 (30.1)
Undergraduate students (senior), second year in the program	89 (27.9)
Graduate students, first year in the program	83 (26.0)
Graduate students, second year in the program	51 (16.0)
Education profession	
Nursing	105 (32.9)
Nutrition	48 (15.0)
Occupational therapy	21 (6.6)
Physical therapy	66 (20.7)
Respiratory therapy	79 (24.8)
Ethnicity	
African American	86 (27.0)
American Indian	1 (0.3)
Asian	46 (14.4)
Hispanic or Latino	20 (6.3)
Middle Eastern	12 (3.8)
Native Hawaiian or Other Pacific Islander	1 (0.3)
White	153 (48.0)

N = 319.

Results

The total number of respondents in this study was 319. More undergraduate students participated than did graduate students. Most respondents were women in the first year of their professional program (*n* = 179 [56%]) and identified as white, although no ethnicity was in the majority (*n* = 153 [48%]). More respondents were enrolled in the undergraduate nursing program, followed by respiratory therapy, and physical therapy (Table 1). Fifty-one percent of the respondents had never tried to smoke tobacco from a waterpipe (*n* = 163) but 48.9% (*n* = 156) indicated that they had used or tried waterpipe smoking before. Of those who have tried smoking tobacco through a waterpipe (*n* = 156), the vast majority smoked approximately once a year (*n* = 144 [92.4%]) and were with one or more friends when smoking (*n* = 142 [91%]). Also, most respondents were in a cafe or restaurant (*n* = 101 [64.7%]) when they first used waterpipe to smoke tobacco (Table 2). Respondents indicated the

Table 2. Characteristics of Waterpipe Users

Statement	<i>n</i> (%)
Have you ever used a waterpipe to smoke tobacco?	
Yes	156 (48.9)
No	163 (51.1)
How often do you smoke tobacco by using a waterpipe?	
At less than once a year	94 (60.3)
At least once a year but not monthly	50 (32.1)
At least once a month but not weekly	9 (5.8)
At least once a week but not daily	1 (0.6)
At least once a day or most days each month	2 (1.3)
How old were you when you first used a waterpipe to smoke tobacco?	
13–15 y	6 (3.8)
16–18 y	51 (32.7)
19–21 y	67 (42.9)
22–24 y	19 (12.2)
25–29 y	7 (4.5)
≥30 y	6 (3.8)
Who were you with when you first used a waterpipe to smoke tobacco?	
No one, I was alone	1 (0.6)
With one friend	21 (13.5)
With more than one friend	121 (77.6)
With a family member	8 (5.1)
With more than one family member	5 (3.2)
Where were you when you first used a waterpipe to smoke tobacco?	
In a cafe or restaurant	101 (64.7)
At a friend's or acquaintance's home	42 (26.9)
In my own home (apartment, condominium, house)	4 (2.6)
In my own dormitory room	3 (1.9)
At a family member's home	2 (1.3)
At a fraternity or sorority house	2 (1.3)
In someone else's dormitory room	2 (1.3)

N = 319.

harmful effects that might result from waterpipe smoking as respiratory problems (*n* = 308 [96.6%]), cancer (*n* = 258 [80.9%]), smoking while pregnant (*n* = 214 [67.1%]), and cardiovascular impairments (*n* = 202 [63.3%]) being the 4 most known health risks (Table 3).

The question of nicotine harm and addictive properties of smoking cigarettes when compared with waterpipe smoking revealed that the majority of respondents perceived that cigarette smoking was more harmful (*n* = 187 [58.6%]) and was more addictive when compared with waterpipe smoking (*n* = 206 [64.6%]) (Table 4). However, when asked why they considered waterpipe smoking to be less harmful than cigarette smoking, more than two thirds of the respondents answered that they did not believe waterpipe smoking to be less harmful given the choices on the survey. Unfortunately, there was no space provided to an-

Table 3. Knowledge of Harmful Effects of Waterpipe Smoking (in Rank Order)

Harmful Effect	Frequency, <i>n</i> (%)	
	Yes	No
Respiratory problems	308 (96.6)	11 (3.4)
Cancer	258 (80.9)	61 (19.1)
Smoking while pregnant	214 (67.1)	105 (32.9)
Cardiovascular impairments	202 (63.3)	117 (36.7)
Hematologic impairments	98 (30.7)	221 (69.3)
Diarrhea	37 (11.6)	282 (88.4)

N = 319.

Table 4. Perception of Harmfulness and Addiction: Waterpipe or Cigarette Smoking

Statement	Frequency, <i>n</i> (%)
Waterpipe smoking is more harmful	19 (6.0)
Cigarette smoking is more harmful	187 (58.6)
Equally harmful	113 (35.4)
Waterpipe smoking is more addictive	17 (5.3)
Cigarette smoking is more addictive	206 (64.6)
Equally addictive	96 (30.1)

N = 319.

swer open-ended questions (Table 5). In terms of their general opinion and attitudes, waterpipe smoking was more socially acceptable compared with cigarette smoking (*n* = 210 [68.5%]), but there was less agreement when considering if it was a good coping strategy, or a safe habit, or indicated a high social status. (Table 6). When asked why waterpipe smoking is so popular in the United States, the highest ranked reasons were its increased availability, followed by the flavor and/or aroma of waterpipes, a leisure activity, and peer pressure. Conversely, a lack of other entertainment sources, boredom, and free time were reasons as well but to a lesser extent. (Fig. 2).

To explore the effect of demographic factors of waterpipe smoking, a chi-square test compared the differences in prevalence of waterpipe smoking. There was a significant difference in the prevalence of waterpipe smoking among the 5 health profession categories surveyed (*P* = .01); of note, the difference was more significant among the respiratory therapy and nutrition students; nutrition students had the highest incidence of smoking waterpipes (69%), followed by physical therapy students (53%), nursing students (48%), and 38% for both respiratory therapy and occupational therapy students. There was a significant difference in the prevalence of waterpipe smoking among different age groups (*P* = .029), the significant

difference was noticeable among students who were between ages 26–30 y and students who were ≥40 y old, waterpipe smoking varied among different age groups: 18–25 y old (52.2%), 26–30 y old (53.3%), 31–39 y old (38.5%), and ≥40 y old (21.1%). There were no differences in the prevalence of waterpipe smoking among the different ethnicity groups (*P* = .19), nor among graduate and undergraduate students (*P* = .57). Furthermore, there was no difference in the prevalence of waterpipe smoking among the level of education (*P* = .65). Also, there was no significant difference in the prevalence of waterpipe smoking between men (*n* = 76) and women (*n* = 243) (*P* = .76) (Table 7).

Discussion

Few studies have been performed on the prevalence, knowledge, beliefs, and attitudes regarding waterpipe smoking among college-age students, and even fewer studies specifically investigated students enrolled in health-care professional programs. The prevalence of waterpipe smoking in our study was (*n* = 156 [48.9%]) compares well with 2 similar studies about college students who smoke waterpipes. Holtzman et al,¹⁵ reported that 43% of students had smoked waterpipes, and Martinasek et al²² found that 64% of students had smoked waterpipes. These studies included students from all majors (health-care students and non-health-care students) across the college and university campuses, but the characteristics of waterpipe users were similar when comparing how often and at what age they first tried smoking tobacco through waterpipes. The students in our study report smoking approximately once a year and at an older age (19–21 y), whereas Holtzman et al¹⁵ reported that students smoked waterpipes “at rate of at least once a year, but not monthly” and first used a waterpipe to smoke tobacco at a younger age (16–18 y). Moreover, students in our study self-reported that they were with friends (65.7%) or in a cafe or restaurant (26.9%) when they first used a waterpipe to smoke tobacco. Jawaid et al,²¹ whose study occurred in Pakistan, indicated that students were with their friends (77.6%) or in a cafe or restaurant (64.7%) when they tried waterpipe smoking for the first time.

The understanding reported of different diseases that habitual waterpipe smoking may cause are similar to previous studies as well.^{21,22} Even though the respondents were health-care students, a majority indicated that cigarette smoking was more addictive and more harmful than waterpipe smoking, which confirmed earlier studies.^{23,24} They also believed that waterpipe smoking was more acceptable to their peers and an alternative to cigarette smoking. Their beliefs were supported and consistent with past studies because there are many misconceptions about cigarette versus waterpipe smoking.^{11,16} As a result, miscon-

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Table 5. Why Waterpipe Smoking Is Believed to Be Less Hazardous Than Cigarette Smoking (in Rank Order)

Statement	Frequency, <i>n</i> (%)	
	Yes	No
Because there is less nicotine in waterpipe smoke	98 (30.7)	221 (69.3)
Because there are fewer cancerous substances in waterpipe smoke	89 (27.9)	230 (72.1)
Because waterpipe smoking is less hazardous than consuming >20 cigarettes per day (chain smoking)	75 (23.5)	244 (76.5)
Because waterpipe smoking is less irritating and thus less toxic to the respiratory tract	58 (18.2)	261 (81.8)
Because waterpipes have an efficient filtration mechanism	43 (13.5)	276 (86.5)
Because the fruit flavor in the waterpipe detoxifies the smoke	15 (4.7)	304 (95.3)

n = 187.

Table 6. Attitudes and Opinions Toward Waterpipe Smoking (in Rank Order of Agreement)

Statement	Frequency, <i>n</i> (%) [*]	
	Agree	Disagree
It is more socially acceptable than cigarettes	210 (68.5)	109 (34.2)
Makes one look relaxed	135 (42.3)	184 (57.7)
Is a good stress-coping strategy	124 (38.9)	195 (61.1)
Shows the person is adventurous	103 (32.3)	216 (67.7)
Adds intimacy among persons from the opposite sex	73 (22.9)	246 (77.1)
It is a safe habit	62 (19.4)	257 (80.6)
Makes one look attractive	48 (15)	271 (85)
Sign of high social status	42 (13.2)	277 (86.8)

N = 319.
^{*} Percentage of agreement and disagreement.

ceptions may influence students' willingness to try waterpipe smoking. Convenience may also influence student attitudes and opinions regarding why waterpipe smoking is so popular. Near college campuses, there are many locations (eg, cafes, coffee shops) where waterpipe smoking is available. The sweet smell of waterpipes in "hookah cafes" is deceiving because exposure from similar toxins as cigarettes (carbon monoxide, tar) plus 82 other toxins have been identified.²⁴ These examples indicate a need for tobacco educational programs to increase awareness and to promote prevention about tobacco alternative products. Also, behavioral strategies are needed because boredom, free time, and lack of entertainment are reasons for waterpipe smoking.²⁰

Implication for Practice

These findings shed light on the prevalence, knowledge, beliefs, and attitudes of waterpipe smoking among college-based health-care students. Our study added to the literature by providing common impressions and miscon-

ceptions of waterpipe smoking when compared with tobacco cigarette smoking. Information regarding usage patterns of waterpipe smoking and characteristics of those who had used waterpipe before, including common reasons for waterpipe smoking, is important to understand because waterpipe smoking continues to increase in popularity.

College-based health-care students are to become the health-care providers in the future and that necessitates the importance of addressing the waterpipe tobacco smoking in health-care programs. Students should also receive tobacco prevention and cessation information to limit tobacco use, especially among young adults. In addition, these programs can increase the awareness level of alternative tobacco products, such as waterpipes, among health-care profession students to address any misinformation and misconceptions. Knowledge can positively influence their understanding of the hazards of alternative tobacco products. This can also allow students to be more confident when involved in tobacco control campaigns in their future workplaces.

Limitations

There were limitations to this study. The respondents were from one educational institution (Georgia State University) and from one college (The Lewis College of Nursing and Health Professions) within that institution. The small sample size (*n* = 319) was a limitation, and these findings should not be generalized to health-care students. More representative samples are needed in future research. It was not surprising that most of the participants in this study were women and that most of the participants were nursing students. The undergraduate nursing program was the largest program, and women accounted for most of the student population in the programs offered in this college (80% women to 20% men). Therefore, it was not feasible to interpret data for sex and program affiliation differences. The statistical significance found among the 4 age groups and among the 5 different health profession cate-

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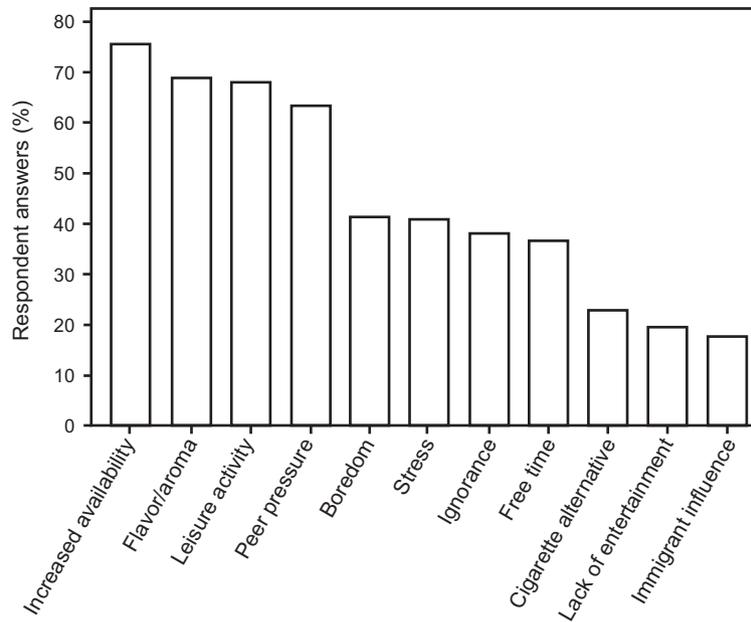


Fig. 2. Answers given by respondents stating why waterpipe (hookah) smoking is so popular in the United States.

Table 7. Prevalence of Waterpipe Smoking Among Demographics

Statement	<i>P</i>
Is there a difference in the prevalence of waterpipe smoking among 5 different health profession categories?	.01
Is there a difference in the prevalence of waterpipe smoking among 4 different age groups?	.029
Is there a difference in the prevalence of waterpipe smoking among 8 different group ethnicities?	.19
Is there a difference in the prevalence of waterpipe smoking among graduates vs undergraduates?	.57
Is there a difference in the prevalence of waterpipe smoking among 4 different groups of educational status?	.65
Is there a difference in the prevalence of waterpipe smoking of men vs women?	.76

N = 319.

gories may not be clinically important because the sample size was not large enough to make generalizations.

Recommendation for Future Studies

To ensure the reproducibility of this study, more research among different colleges of health professions with larger sample sizes are needed. It is recommended to involve non-health-care students and the educators in health professions so that a more-complete image about prevalence, knowledge, and attitudes toward waterpipe smoking is learned. Results of our study showed the importance of addressing the waterpipe tobacco smoking in professional health-care programs and curricula. Students should receive tobacco prevention and control information to limit tobacco use, especially among young adults. Also, tobacco-control campaigns should be offered at colleges and universities to increase students' awareness and to offer prevention strategies.

Conclusions

This study showed the prevalence of waterpipe smoking, common beliefs, and misperceptions among current students enrolled in health-care-related educational programs. Waterpipe smoking was noticeably highly among young adults. Moreover, the top 4 health hazards that were identified by students were respiratory problems, cancer, smoking during pregnancy, and cardiovascular impairment. In addition, the study expressed that many of the students indicated that cigarette smoking was more addictive and more harmful than waterpipe smoking. By increasing students' knowledge and awareness of the perils of waterpipe smoking, along with reinforcement of the hazards of all forms of tobacco abuse, behavior and attitudes can be changed. Thus, health-care students who are able to weigh the risks of smoking tobacco through a waterpipe are able to make a more informed decision and not by unguided beliefs and attitudes.

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