

Argileh Use Among College Students in the United States: An Emerging Trend

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ABSTRACT. Objective: This study examined the prevalence and predictors of argileh (hookah pipe) use among a sample of nonselected college students. **Method:** Participants were 602 students (24% male; 43% white; mean age = 22.06) at a large, ethnically diverse, urban university. All participants completed an online survey designed to assess various types of substance use. **Results:** More than 15% of the sample reported having used argileh at least once in their lifetime, exceeding the percentage of students who had tried stimulants, barbiturates, co-

caine, Ecstasy, heroin, or psychedelics. Arab ethnicity and cigarette smoking were the strongest predictors of argileh use; however, a substantial percentage of non-Arabs and nonsmokers also had tried argileh. **Conclusions:** Findings suggest that, in comparison with other substances, the prevalence of argileh use is high among college students in the United States. Physical health implications of these findings are discussed. (*J. Stud. Alcohol Drugs* **69**: 472-475, 2008)

Hi Alice,

My friends and I occasionally (once a week or so) like to smoke the "Hookah" sometimes referred to in Arabic as an "argeelay." The tobacco that it comes with smells really good and comes in all kinds of flavors, such as apple, mango, mixed fruit, etc. Anyway, I consider myself to be pretty healthy in that I have never experimented with drugs, never smoked cigarettes, and rarely drink alcohol. My question is about the health effects of smoking a hookah. The rewards are mostly relaxation after a long day of studying for law school. The hookah provides this through smell, flavor, and sound of the water that filters the tobacco when you puff on it. However, I don't know what the health risks are. How does it compare to cigarettes? People say that it's much safer than cigarettes... and according to the packaging that comes with the tobacco, there are far fewer harmful ingredients... in fact, it's mostly tobacco & molasses. It's a very popular trend these days. It's time we get a good source of information. So what's the verdict?

—Letter to Columbia University online advice columnist (July 23, 2003) (www.goaskalice.columbia.edu/2456.html)

THE USE OF ARGILEH (also known as nargile, hookah, hubble-bubble, and shisha) is a 400-year-old method of smoking in which tobacco is passed through a water pipe before being inhaled (Knishkowsky and Amitai,

2005; Maziak et al., 2005; Shihadeh et al., 2004). Argileh is typically smoked in social settings, such as cafes and restaurants, where water pipes are passed from person to person. Typical smoking sessions last between 45 and 50 minutes but may continue for several hours (Knishkowsky and Amitai, 2005; Maziak et al., 2005).

In recent years, argileh has been associated with a variety of adverse health outcomes, including esophageal cancer (Gunaid et al., 1995), decreased pulmonary function (Kiter et al., 2000), infertility (Inhorn and Buss, 1994), and infectious disease (Munckhof et al., 2003). In addition, the results of several studies suggest that argileh has the potential to cause physiological dependence (Maziak et al., 2005). Despite these harmful effects, however, there has been a recent, alarming increase in the popularity of argileh use, particularly in Middle Eastern countries (i.e., Kuwait, Syria, Egypt, and Lebanon), where lifetime rates of argileh smoking range from 20% to 70% (Knishkowsky and Amitai, 2005; Maziak et al., 2005).

Several factors may contribute to the rising popularity of argileh use. First, argileh is cheap and widely available, facilitating its use among youth and individuals of low socioeconomic status. In the United States, for instance, the average pack of cigarettes costs \$4.54, whereas the average box of argileh (lasting for approximately two to three 1-hour smoking sessions) costs \$2.50 (Arab Community Center for Economic and Social Services, unpublished data). Second, argileh smoking is often a social activity which takes place at cafes, restaurants, and parties. In fact, many individuals cite socialization as a primary reason for their argileh use (Maziak et al., 2004; Rice et al., 2006; Varsano et al., 2003). Finally, and perhaps most importantly, many

Received: August 23, 2007. Revision: January 10, 2008.

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smokers mistakenly believe that argileh is less harmful than other methods of tobacco use. For example, in a recent study of Israeli schoolchildren, 50% of the participants believed that argileh was less harmful than cigarettes, and 25% had smoked a hookah pipe with their parents (Varsano et al., 2003).

These false beliefs are bolstered by common misconceptions, such as (1) the idea that toxins in argileh are filtered out by water in the argileh pipe; (2) the belief that, because argileh is fruit-flavored, it is a harmless substance that is acceptable for children; and (3) the idea that the nicotine content in argileh is lower than that in cigarettes. In reality, argileh has a nicotine content of 2% to 4%, whereas cigarettes have a nicotine content of 1% to 3% (Kiter et al., 2000; Knishkowsky and Amitai, 2005).

Recent anecdotal evidence suggests that argileh use is becoming popular in the United States. Informal Internet searches yield hundreds of articles on argileh, and hookah pipes can easily be purchased online. In addition, in many parts of the country, "hookah bars" are common and rapidly growing in popularity. To date, however, not a single empirical study has examined argileh use among non-Arabs in the United States. This represents an important gap in the literature, given the strong association between argileh and harmful health outcomes. In addition, the fact that argileh use is a recent but quickly spreading phenomenon in the United States makes this an ideal time for research and intervention.

The current study aimed to characterize the prevalence and predictors of argileh use among a sample of American college students. More specifically, we addressed the following questions: (1) What percentage of students has tried argileh? (2) what percentage of students smokes argileh regularly? (3) to what degree is argileh associated with ethnicity? and (4) to what degree is argileh associated with cigarettes and other substances?

Method

Participants

The participants were 602 undergraduates (24% male; mean age = 22.06) at a large, ethnically diverse, urban university located in southeast Michigan. Participants were drawn from a sample of 1,994 students who were enrolled in psychology classes and who were eligible (but not required) to participate in research studies for extra credit. A total of 30.2% of eligible "subject pool" participants took part in the current study (data are not available for the 68.8% of subject pool students who did not register for the study). All participants registered online to participate in a Web-based survey of "College Student Life." Data were anonymous and could not be traced back to individual respondents.

The participant sample was 43% white, 27% black, 10% Asian, 9% Arab/Chaldean, 3% Hispanic, and 7% other. The ethnic composition of the sample is representative of the ethnic composition of the university as a whole (49% white, 27% black, 7% Asian, 8% nonresident alien, 0.6% American-Indian, 2% Hispanic, and 6% other; the university does not keep records of the percentage of Arab/Chaldean students at the school). The ethnic composition of the sample also is representative of southeast Michigan, home to 490,000 individuals of Arab descent and the second highest concentration of Arab individuals in the United States (Arab American Institute, 2006). Notably, however, the sample contained a larger number of female students (76% vs 59%; $\chi^2 = 74.90$, 1 df, $p < .01$; $n = 33,729$) and full-time students (87% vs 53%; $\chi^2 = 275.80$, 1 df, $p < .01$; $n = 30,085$) than the university as a whole.

Procedure

The participants completed a 150-question online survey designed to assess various types of substance use. Participants answered the survey independently from a computer of their choosing. All participants received one psychology course credit for completing the survey.

Measures

The participants were asked how old they were the first time they tried argileh, cigarettes, alcohol, marijuana, stimulants, Ecstasy, cocaine, psychedelics, barbiturates, and heroin. Participants also were asked how often they had used each of these drugs during the past year. Response options were "I've never used," "I've used but not in the past year," "2-5 times in the past year," "6-10 times in the past year," "11-20 times in the past year," "21-40 times in the past year," and "more than 40 times in the past year." (See Table 1.) Throughout the survey, argileh was referred to by multiple names (e.g., argileh, nargile, hookah, hubble-bubble, shisha). It is not clear, however, what percentage of respondents were familiar with the substance before completing the questionnaire.

TABLE 1. Lifetime and past-year prevalence of alcohol and drug use

Variable	Lifetime use: non-Arab %	Past-year use: non-Arab %	Lifetime use: Arab %	Past-year use: Arab %
Argileh	10.7	8.1	61.8	52.7
Cigarettes	40.9	27.5	32.7	21.4
Alcohol	82.8	76.6	49.1	47.3
Marijuana	39.2	21.4	12.7	10.9
Stimulants	7.8	3.9	5.5	5.5
Ecstasy	7.0	2.2	1.8	1.8
Cocaine	5.2	1.9	0.0	0.0
Psychedelics	7.6	2.2	1.8	1.8
Barbiturates	10.2	7.1	5.5	3.6
Heroin	5.9	2.8	5.5	5.5

Past-year use of all illicit drugs other than marijuana was minimal. As a result, a single variable was created to represent the use of stimulants, Ecstasy, cocaine, psychedelics, barbiturates, and heroin. Participants who had tried any of these "hard drugs" at least once were given a score of 1 on this variable ($n = 109$). All other participants were given a score of 0 ($n = 490$).

Results

Prevalence and demographics

Ninety-one participants (15.1% of the sample) reported having used argileh at least once in their lifetime. Seventy-three participants (12.4%) had used it in the past year, 28 participants (4.7%) had used it more than 10 times in the past year, and 12 participants (2.0%) had used it more than 40 times in the past year.

Argileh users were more likely than nonusers to be Arab ($\chi^2 = 100.31$, 1 df, $p < .01$; $n = 584$; odds ratio [95% confidence interval] = 13.68 [7.4-25.2]) and to be cigarette smokers ($\chi^2 = 14.39$, 1 df, $p < .01$; $n = 588$; odds ratio = 2.37 [1.5-3.7]). Notably, however, argileh was also used by non-Arabs and nonsmokers. Specifically, 10.7% of non-Arab participants ($n = 56$) and 10.8% of non-cigarette-smoking participants ($n = 38$) had tried argileh at some point in their lifetime. The majority of argileh users (58%) began using it after age 17, and only 6 participants reported trying it for the first time before age 15.

Measures of association

Correlations among substance use variables are presented in Table 2. As can be seen in the table, argileh use was positively associated with frequency of cigarette use, frequency of marijuana use, and male gender. Argileh use was not associated with frequency of alcohol use or hard drug use.

Predictors

Regression analyses were conducted to determine whether Arab status (dichotomized and dummy coded) or

cigarette use (dichotomized and dummy coded) predicted frequency of argileh use. The argileh frequency variable was square root transformed to reduce skew and kurtosis. Exploratory analyses did not find any moderating effects of gender. Therefore, results were collapsed across men and women, and gender was included as a covariate in the analysis.

Arab status, cigarette use, and the two-way interaction between these variables were entered simultaneously into the regression model. The results revealed that both Arab status ($n = 581$; $b = .34$, $p < .01$) and cigarette use ($n = 581$; $b = .15$, $p < .01$) predicted frequency of argileh use. In addition, we found a significant two-way interaction between Arab status and cigarette use ($n = 581$; $b = .18$, $p < .01$) such that cigarette smoking was more strongly related to argileh use among Arabs ($n = 54$; $b = .42$, $p < .01$) than among non-Arabs ($n = 526$; $b = .18$, $p < .01$).

Discussion

The results of this study suggest that many college students in the United States have used argileh. More than 15% of the respondents in our sample reported having tried argileh at least once in their life—exceeding the percentage of students who had tried stimulants (7.5%), barbiturates (9.7%), cocaine (4.7%), Ecstasy (6.5%), heroin (5.8%), or psychedelics (7.0%). Notably, however, many of the students in our sample reported using argileh only sporadically. For example, 63% of argileh users had smoked a hookah pipe fewer than five times in the past year, and 58% began smoking after age 17. These findings suggest that, for many students, argileh use may be a way of experimenting or seeking novel experiences during the college years.

As noted above, both Arab ethnicity and cigarette use were strong predictors of argileh use. Specifically, 62% of Arab students, as opposed to 11% of non-Arab students, had used argileh. Similarly, 22% of cigarette smokers, as opposed to 11% of non-cigarette smokers had used argileh. At the same time, argileh use was, by no means, exclusive to Arabs and cigarette smokers. In fact, 56 non-Arabs and 38 non-cigarette smokers reported argileh use. These findings are surprising and suggest that, although still largely a culturally bound phenomenon, argileh use may be spreading to non-Arab, non-cigarette-smoking populations. Future research is needed to monitor the spread of argileh and its associated health consequences.

The widespread use of argileh by college students represents a potentially serious health problem, given the adverse health consequences associated with the substance. Specifically, argileh has been linked to a variety of illnesses, ranging from esophageal cancer (Gunaid et al., 1995) to decreased pulmonary function (Kiter et al., 2000) and infectious disease (Munckhof et al., 2003). Moreover, the results of recent research suggest that the chemical components

TABLE 2. Product-moment correlations among predictor, control and outcome variables

Variable	1	2	3	4	5	6
1. Argileh use frequency		.03	.21 [†]	.14 [†]	-.02	.12 [†]
2. Alcohol use frequency			.41 [†]	.39 [†]	.29 [†]	-.05
3. Cigarette use frequency				.45 [†]	.42 [†]	.12 [†]
4. Marijuana use frequency					.37 [†]	.00
5. Hard drug use						.15 [†]
6. Gender (0 = female/1 = male)						

[†] $p < .01$.

of argileh smoke contain substantial amounts of carcinogenic material. For example, Shihadeh (2003) found that a single argileh smoking session produced as much tar as approximately 20 low-tar cigarettes. Other studies have found that the nicotine content in argileh is higher than that in cigarettes and that argileh has the potential to cause physiological dependence (Hadidi and Mohammed, 2004; Maziak et al., 2004). Although preliminary, these findings suggest that argileh is a substance that poses substantial health risks and that warrants further research.

It should be noted that our findings relied on retrospective reporting of argileh use. This type of reporting may be unreliable, and future studies using daily reports or objective measures (e.g., smoker puff volume) may provide more accurate data about the frequency and prevalence of argileh use. In addition, a number of relevant variables were not measured in this study, including reasons for smoking, peer smoking, and symptoms of abuse/dependence. Future research that assesses these variables is needed.

Finally, several factors may have limited the generalizability of our results. For example, our sample had a high percentage of Arab participants, a fact that likely increased the availability and awareness of argileh for all university students, regardless of ethnicity. In addition, our sample was composed exclusively of undergraduate psychology students. Although psychology subject pools are used frequently in substance use research (Ashare et al., 2007; Friedman et al., 2007; Kahler et al., 2004; McCarthy et al., 2007; O'Connor et al., 2007; Piasecki et al., 2007; Saules et al., 2007; Sugarman and Carey, 2007), it is possible that psychology students differ in meaningful ways from other types of undergraduates. Future studies are needed to address these issues and to determine the degree to which our findings generalize to a broader range of college students.

To our knowledge, this is the first empirical study of argileh use among non-Arabs in the United States. Our findings suggest that argileh use may be a significant trend among American youth. Moreover, our results indicate that argileh is used by both Arabs and non-Arabs and also by both cigarette smokers and non-cigarette smokers. At present, very little is known about argileh use in the United States. Future studies are needed to track the spread of this substance and to develop successful interventions aimed at reducing its prevalence.

Acknowledgments

The authors express their appreciation to Denis McCarthy and Patricia Brennan for their helpful comments on this manuscript.

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