Comparison of Cigarette and Water-Pipe Smoking by Arab and Non–Arab-American Youth

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Background: Water-pipe smoking is a rapidly growing form of tobacco use worldwide. Building on an earlier report of experimentation with cigarette and water-pipe smoking in a U.S. community sample of Arab-American youth aged 14–18 years, this article examines water-pipe smoking in more detail (e.g., smoking history, belief in harmfulness compared to cigarettes, family members in home who smoke water pipes) and compares the water-pipe–smoking behaviors of Arab-American youth with non–Arab-American youth in the same community.

Methods: A convenience sample of 1872 Arab-American and non–Arab-American high school students from the Midwest completed a 24-item tobacco survey. Data were collected in 2004–2005 and analyzed in 2007–2008.

Results: Arab-American youth reported lower percentages of *ever* cigarette smoking (20% vs 39%); current cigarette smoking (7% vs 22%); and *regular* cigarette smoking (3% vs 15%) than non–Arab-American youth. In contrast, Arab-American youth reported significantly higher percentages of *ever* water-pipe smoking (38% vs 21%) and *current* water-pipe smoking (17% vs 11%) than non–Arab-American youth. Seventy-seven percent perceived water-pipe smoking to be as harmful as or more harmful than cigarette smoking. Logistic regression showed that youth were 11.0 times more likely to be currently smoking cigarettes if they currently smoked water pipes. Youth were also 11.0 times more likely to be current water-pipe smokers if they currently smoked cigarettes. If one or more family members smoked water pipes in the home, youth were 6.3 times more likely to be current water-pipe smokers. The effects of ethnicity were reduced as a result of the explanatory value of family smoking.

Conclusions: Further research is needed to determine the percentages, patterns, and health risks of water-pipe smoking and its relationship to cigarette smoking among all youth. Additionally, youth tobacco prevention/cessation programs need to focus attention on water-pipe smoking in order to further dispel the myth that water-pipe smoking is a safe alternative to cigarette smoking.

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Introduction

Cigarette smoking is well-recognized as the most common form of tobacco use among American youth. Their current cigarette smoking (smoking one or more cigarettes in the preceding 30 days) in the 2005 Youth Risk Behavior Surveillance Survey (YRBSS), for 9th through 12th graders, was 23%; 54% ever had smoked; and 9.4% were frequent (regular) smokers.[1] Cigarette smoking varies by ethnicity and cultural group.[2,3] In 2005, percentages ranged from a low of 12.8% for Asian/Pacific Islanders[4] to a high of 56% for Native Americans.[5] Less is known about tobacco use by other ethnic subgroups like Arab Americans.

Arab Smoking Practices

Michigan is home to nearly one-half million Arab Americans; the highest proportion live in the Detroit metropolitan area.[6] More than one third (36%) identify Lebanon as their country of origin.[7] Most Arab Americans come from Middle Eastern countries where tobacco use is high; on average, 45% of adult men smoke cigarettes.[8] Traditionally, cigarette use by women in the Middle East is low (5%), but increas-

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ing.[9] Arab nations with the highest adult cigarette smoking rates include Iraq (40%), Yemen (45%), and Lebanon (58%).[10] Among youth aged 15–19 years, cigarette smoking is greater in young men than young women; current cigarette smoking percentages vary by country (e.g., 10.6% in Lebanon, 13.6% in Jordan, 14.6% in Gaza, and 21.9% in the United Arab Emirates).[11] Tobacco use in many Arab countries is not limited to cigarettes. Water-pipe smoking, a long-established form of tobacco use, has a history more than 500 years old. Traditionally a behavior of older men, it has undergone a revival and is growing in popularity among youth in the Middle East, the U.S., and worldwide.[12,13] Contributing to this revival is the belief that water-pipe smoking is less harmful than cigarettes.[14] It is viewed as a social activity.[13,15] Water-pipe tobacco and equipment cost less than cigarettes and are not uniformly regulated by law. As a result, more than one million people in Asia, Africa, and the Middle East smoke water pipes.[16,17]

Youth and Water-Pipe Smoking

Most studies of water-pipe smoking have been conducted in the Middle East with adults[18–20]or college-aged students.[21–23] Water-pipe smoking tends to be higher among men, although its use by women is generally more acceptable than cigarette smoking.[9] Among college-aged students, water-pipe smoking varies from 32%[21] to 62.6%.[22] Only four studies have explored water-pipe smoking by youth in the Middle East.[24–27]

The only research that has examined both cigarette and water-pipe smoking in U.S. youth was a community-based study of 1671 Arab-American youth (aged 14–18 years) conducted in 2001–2002.[28] Researchers found that 25.7% had experimented with water-pipe smoking, which increased from 25.3% of youth aged 14 years to 42% of youth aged 18 years. By comparison, cigarette-experimentation percentages were 15% of youth aged 14 years to 44% of youth aged 18 years. Almost 15% of the youth had experimented with both cigarettes and water pipes. This earlier study did not collect data on water-pipe smoking by non–Arab-American youth. The data collected on water-pipe smoking were limited to *ever* smoked; data were not collected on *current* or *regular* water-pipe smoking.

The current research was conducted in the same community[28] 3 years later and addressed the following research questions: (1) *What are the tobacco use (i.e., cigarette and water pipe) patterns and percentages in Arab-American and non–Arab-American youth aged 14–18 years?* (2) *Which of the demographic and cultural factors of age, school grade, gender, and ethnic identity predict current cigarette and/or water-pipe smoking in Arab-American and non–Arab-American youth?*

Methods

Design

Data for this cross-sectional study of tobacco use were obtained from a survey completed by Arab-American and non–Arab-American high school students in grades 9, 10, and 12. Students in Grade 11 were not surveyed because they were the first class in the schools to have participated in a 4-week, NIH-funded, school-based cigarette prevention/cessation program. Their participation in that program may have affected their subsequent smoking behaviors. Data for this study were collected in 2004–2005. Tobacco use included (1) *ever*, defined as ever smoking a cigarette and/or water pipe, even a few puffs; (2) *current*, defined as smoked one or more cigarette(s) and/or water pipe within the past 30 days; and (3) *regular* use, defined as smoked one or more cigarettes and/or water pipe per day for the last 30 days.

Participants

The setting was two large, suburban Midwest high schools that had student enrollments ≥45% Arab-American; approximately one third of the adult population in this suburb claim Arabic heritage. A third public high school in the community was not included because of its small enrollment of Arab-American students. Seventy percent of the sample was Arab American, with family roots in Lebanon, Yemen, Iraq, Egypt, Palestine, and Syria. Thirty percent of the sample was non-Arab, predominately white, non-Hispanic. Participants were 1872 high school students who (1) agreed to complete a tobacco survey, (2) had not previously participated in a federally funded smoking prevention/cessation program, (3) were aged 14–18 years, and (4) were able to read and write English. Information letters describing the study were mailed to parents by the school administration; fewer than 0.1% of the parents refused participation. Prior to completing the study questionnaire, all interested youth were given an information sheet approved by the Human Investigative Committee (HIC) describing the study. Youth were free to answer or not answer any question(s), and to stop participation at any time; none refused to continue. Although 2504 students completed the questionnaire, all students in Grade 11 (585) and some students in grades 9 and 10 (47) who had participated in the NIH-funded smoking prevention/cessation program within the past year (in addition to the schools' required tobacco-prevention efforts) were excluded from the analyses.

Measures

A 24-item tobacco-use questionnaire was used to collect information on select personal and cultural variables, tobacco-use history, and factors related to tobacco use. The first eight items included personal-background questions (e.g., date of birth, school grade, ethnic identity). The next eight items were adopted from the widely used YRBSS to assess cigarette age of initiation (age when smoked first whole cigarette); the amount of smoking (number of cigarettes per day in the past 30 days); and the frequency of smoking (number of days smoked in past 30 days). Mean kappa for the YRBSS cigarette smoking items was 68.8% (CI=64.9, 72.7).[29] To more fully assess water-pipe–smoking history, six questions addressing water-pipe use were added, using YRBSS item stems. In

addition, two questions were constructed to measure (1) how harmful water-pipe smoking was thought to be in relationship to cigarette smoking, and (2) who in the home smoked water pipes. From this last item, a dichotomous variable was created, with 1=one or more family members in the home smoking water pipes and 0=no one in the home smoking a water pipe. For this study, the internal consistency reliability (α) for the cigarette set of items was 0.79 and for the water-pipe–smoking set of items was 0.74.

Data-Collection Procedure

Data were collected in 2004–2005 from all eligible students during their 2nd-hour class during a 2-day period in both schools. Teachers asked students to provide self-coding information and to complete the tobacco-use questionnaire during the same class hour and time. On the days of data collection, a trained researcher was available to answer questions and to collect the completed surveys from the classrooms. Participants were instructed to place their completed surveys in a classroom-coded envelope that was sealed; these were collected by a research team member. Absent students were noted on the front of the classroom-coded envelopes by teachers for follow-up 1 week later. Of the total school enrollment, 8%–11% were absent from the two schools on the scheduled day of data collection; of those, fewer than 1% did not return to class and, therefore, did not participate. The study and information sheet were approved by the HIC of Wayne State University.

Statistical Analysis

Descriptive statistics including means, SDs, and percentages were used to describe water-pipe and cigarette-smoking behaviors. Chi-square was used to compare percentages by ethnicity. Logistic regression analysis was used to examine the association between current water-pipe smoking and current cigarette smoking. Two equations were estimated, with current water-pipe smoking and current cigarette smoking switching roles. The regressions controlled for gender, ethnicity, grade in school, and number of family members in the home who smoke water pipes. Data were not collected on family members' cigarette smoking in the home, so the regressions were somewhat asymmetric. For each analysis, all predictors were entered simultaneously, so that each odds ratio (OR) was adjusted for the same set of predictors. The significance level for all analyses was $p \leq 0.05$. Statistical analysis was conducted with SPSS 16.0 software; analysis was completed in 2007–2008.

Results

Participants were 1872 youth; 70% (n=1313) were Arab American. Fifty-three percent of the Arab Americans were male compared to 48% of non–Arab-American males ($p<0.001$). Mean age of the sample was 15.6 (SD=1.19) years; age did not differ by ethnicity.

Tobacco-Use Behaviors

All but 1%–2% of participants reported on their cigarette and water-pipe use. Table 1 presents the percentages for *ever*, *current,* and *regular* cigarette and water-pipe smoking by ethnicity, school grade, and gender. Total cigarette smoking percentages were significantly higher for non–Arab-American youth. Total water-pipe smoking percentages were higher for Arab-American

Table 1. Percentage of cigarette and water-pipe smoking by grade in school and ethnicity, by gender and ethnicity, and by total percentage for each of the six smoking behaviors (N=1872, ArA=1313, non–ArA=559)

		Cigarette smoking			Water-pipe smoking		
	Ethnicity	Ever[a]	Current[b]	Regular[c]	Ever [a]	Current [b]	Regular[c]
Grade							
9	ArA	10.5**	3.2**	1.4**	28.4**	12.0*	4.0
	Non–ArA	26.4	10.8	8.0	10.8	6.0	1.8
10	ArA	20.2**	5.9**	2.3**	39.4**	16.7	6.3
	Non–ArA	40.6	22.8	15.4	21.0	11.2	4.5
12	ArA	34.6**	13.6**	7.3**	51.0**	24.0	12.0
	Non–ArA	50.3	31.7	21.6	33.0	17.0	9.1
Gender							
Male	ArA	24.1**	9.3**	4.8**	38.9**	17.4	7.4
	Non–ArA	36.5	20.3	14.2	24.0	14.0	7.3
Female	ArA	16.0**	3.9**	1.5**	37.1**	16.0*	6.3*
	Non–ArA	42.0	23.2	15.7	19.0	8.9	3.1
Total smoking percentages							
	ArA	20.1**	6.9**	3.2**	38.0**	16.7**	6.9
	Non–ArA	39.3	21.9	15.0	21.3	11.3	5.1

Note: Not included are 585 students in Grade 11 and 47 students in grades 9 and 10 who had participated in an NIH-funded tobacco-control intervention in the past 12 months.
Asterisks show which Arab-American behaviors differ from non–Arab-American behaviors within each grade, by gender, and overall.
Percentage of the valid data for the behaviors ranged from 97.9% to 99.9% complete.
[a]Ever=ever smoked a cigarette and/or water pipe, even a few puffs
[b]Current=smoked one or more cigarette(s) and/or water pipe within the past 30 days
[c]Regular=smoked one or more cigarette(s) and/or water pipe per day for the last 30 days
*$p<0.05$; **$p<0.01$
ArA, Arab American; non–ArA, non–Arab American

Table 2. Significant predictors for current cigarette smoking (N=1872)

Variables in equation	OR	95% CI	
		Lower	Upper
Water pipe smoked last 30 days	11.02	7.39	16.42**
Non–Arab American	7.84	5.23	11.77**
Gender: male	1.22	0.88	1.70
Grade in school (by grade)	1.48	1.30	1.70**
Family water-pipe smoking	1.61	1.06	2.45*

*$p<0.05$; **$p<0.001$

youth for *ever* and *current* use ($p<0.05$); *regular* use did not differ.

This same pattern was consistent across grade levels. In terms of the actual percentages observed, there were no inconsistencies in this pattern. However, current water-pipe smoking percentages did not differ significantly between Arab-American and non–Arab-American students in grades 10 and 12. In regard to gender, it is interesting that current water-pipe–smoking percentages were very similar for Arab-American (17.4%) and non–Arab-American (14.0%) youth. Otherwise, percentages by gender were similar to previously identified patterns.

Potential Risk Factors in Water-Pipe Use

Youth were asked if they thought that water-pipe smoking was more, the same, or less harmful than smoking cigarettes. Overall, 22.8% of youth believed that water-pipe smoking was less harmful; 38% thought it was equally as dangerous; and 39% believed water-pipe smoking was more harmful than smoking cigarettes. This differed by ethnicity ($p<0.000$). Forty-four percent of Arab-American youth, compared to 24% of non–Arab-American youth, believed that water-pipe smoking was more harmful than cigarette smoking. To more fully explore how perceptions of harmfulness were related to smoking behaviors, the perceived harmfulness of water-pipe smoking was examined in relation to each of the water-pipe–smoking behaviors. Only experimentation with water-pipe smoking was related to perceived harmfulness ($p<0.01$): 37% of youth who experimented with water-pipe smoking perceived it as more harmful, compared to 31% who did not.

In response to the question *Who in the home smokes water pipes*, 51.6% of Arab-American youth, compared to 14.3% of non–Arab-American youth, reported that one or more family members smoked water pipes in the home. With regard to male family members, Arab-American youth reported that 24.5% of their fathers, 24.5% of their uncles, and 17.2% of their brothers smoked water pipes in the home. In comparison, non–Arab-American youth reported that 5.3% of their fathers, 4% of their uncles, and 4.2% of their brothers smoked water pipes in the home. With regard to female family members, 3.4% of Arab-American mothers and 6% of Arab-American sisters smoked water pipes in the home, compared to 3.6% and 1.8% of non–Arab-American mothers and sisters, respectively.

Logistic Regression

As shown in Table 2, youth were 11.0 times more likely to be currently smoking cigarettes if they currently smoked water pipes. Non–Arab-American youth were 7.8 times more likely to be smoking cigarettes than Arab-American youth. As shown in Table 3, youth were also 11.0 times more likely to be current water-pipe smokers if they were currently smoking cigarettes. Youth who reported one or more family members smoking water pipes in the home were 6.3 times more likely to be current water-pipe smokers. Interestingly, the effects of ethnicity were much reduced in this equation as a result of the explanatory value of family smoking.

Discussion

This study is important as it is the first known U.S. study to report findings on water-pipe smoking among non–Arab-American youth. The findings show differences in tobacco-use patterns among Arab-American and non–Arab-American youth aged 14–18 years who attend two public high schools in the Midwest where nearly one half of the students are of Arab-American descent. Overall, the total percentages of cigarette smoking (*ever* and *current*) were higher for non–Arab-American youth compared to Arab-American youth. In contrast, total percentages of water-pipe smoking were higher for Arab-American youth. This pattern held true across grades 9, 10, and 12 and for boys and girls separately. Also interesting were the percentages of water-pipe use in the non–Arab-American youth: *ever*, 21.3%; *current*, 11.3%; and *regular*, 5.1%. In fact, there were no significant differences in *current* and *regular* water-pipe percentages between Arab-American and non–Arab-American males. This may indicate the adoption of Middle Eastern values surrounding tobacco use. The finding that water-pipe smoking was reported by non–Arab-American youth may be due to a number of factors, including (1) the proliferation of water-pipe smoking in hookah bars and cafes throughout the U.S. (M. O'Hegarty, poster presentation, 2003 National

Table 3. Significant predictors for current water pipe smoking (N=1872)

Variables in equation	OR	95% CI	
		Lower	Upper
Cigarette smoked last 30 days	11.03	7.37	16.50**
Arab American	1.63	1.10	2.49*
Gender: male	1.21	0.90	1.62
Grade in school (by grade)	1.32	1.17	1.50**
Family water-pipe smoking	6.34	4.47	8.98**

*$p<0.05$; **$p<0.001$

Conference on Tobacco or Health, 2003); (2) participation in behaviors of a peer group to which youth want to belong[30]; (3) the modeling of behavior viewed by youth as novel[31]; and (4) experimentation with adult-like behaviors.[32]

There has been speculation that youth are experimenting with water-pipe smoking because it is perceived as less harmful than cigarettes.[8,12–14,23] To address this common assumption, youth were asked if water-pipe smoking was less harmful, about the same, or more harmful than smoking cigarettes. For all youth, 77% believed that water-pipe smoking was just as harmful or more harmful than cigarette smoking. However, more Arab-American youth than non–Arab-American youth believed water-pipe smoking was more harmful. The evaluation of perceived harm by water-pipe smoking status showed that only experimentation was related to perceived harmfulness. Why current water-pipe smokers do not perceive the practice as harmful is unclear. Perhaps when experimenters smoked a water pipe for the first time, they experienced harsh coughing or burning sensations (known to be associated with water-pipe smoking), and they then perceived the practice as potentially harmful. For those who became current water-pipe smokers, the positive environmental and social experiences of water-pipe smoking may have outweighed the coughing and burning experienced.[33] These findings challenge the commonly held myth that water-pipe smoking is perceived to be a safe alternative to cigarette smoking.[8,12–14,23] They are, however, similar to the findings reported by Maziak and colleagues.[33]

Water-pipe smoking by family members in the home was reported by 52% of Arab-American youth compared to 14.3% of non–Arab-American youth. As expected, more male family members than female family members smoked water pipes in the home for both Arab Americans and non–Arab Americans. These high percentages of home exposure are a concern for youth because of the hazards associated with secondhand smoke exposure[34] as well as the increased likelihood of becoming a tobacco user when family members smoke.[35,36] While the percentages of non–Arab-American family members smoking water pipes in the home were low, it calls for further investigation with adults as well as youth among all racial/ethnic groups.

It was interesting that water-pipe smoking was the strongest predictor of current cigarette smoking while current cigarette smoking was the strongest predictor of current water-pipe smoking. It would appear that smoking, regardless of type, may be a gateway to the use of other forms of tobacco,[37] or youth may be substituting cigarettes with water pipes, or vice versa.[12] It is also possible that youth who first smoke cigarettes believe that if they smoke water pipes, they are not adding to their tobacco addiction or tobacco burden and, therefore, are not exposing themselves to the well-recognized health risks of cigarette smoking. Water-pipe smoking in the family was a strong predictor of youth water-pipe smoking, and accounted for much of the effect of ethnicity. Tobacco use, either by family members or by peers, appears to contribute to the adoption of this alternative form of tobacco use. These findings raise important questions, given the growing cultural and youth use of water pipes in Middle Eastern countries, the U.S., and Europe.[14]

Limitations

Some study limitations exist. This school-based survey was completed on two school-selected target dates; the schools were selected by convenience because they reported student populations of ≥45% Arab-American youth. While the sample is large, there may be differences between the students attending the other public high school in the community, which has a smaller Arab-American population, and those in the target schools. A second limitation is the data-collection survey itself. Interpreting the survey items may have been difficult, particularly for recent immigrants who were less familiar with English and the process of completing a questionnaire. The fact that data were not collected on family members' cigarette smoking in the home resulted in somewhat asymmetrical logistic regression results. Further studies need to include the smoking behaviors of family as well as of peers, both of which are known to influence tobacco use in youth. Another limitation is the uneven number of Arab-American (n=1310) and non–Arab-American (n=562) participants. Although this reflected the community from which the sample was drawn, it resulted in statistical biases. A more equal distribution may have provided different smoking percentages and patterns by ethnicity, gender, and patterns of tobacco use.

Conclusion

It is important to understand how tobacco is being used, particularly among youth from ethnic subgroups, in order to discourage its adoption and continued use. In addition to presenting information on smoking among Arab-American youth, this is the first known study to present information on percentages of water-pipe smoking by American youth, in particular those not of Arabic ancestry. Noted was the surprising number of non–Arab-American youth who had experimented or were currently smoking water pipes. Less than one quarter (22.8%) of all youth believed that water-pipe smoking is safer than cigarette smoking.[8,12–14,23] Water-pipe smoking was believed to be more harmful by Arab-American youth (44%) than by non–Arab-American youth (25%).

Despite the growing adoption of water-pipe smoking globally,[14,15] there remains limited research in this area. Further research is needed to determine the percentages, definitive patterns, and health risks of

water-pipe smoking and its relationship to cigarette smoking and other forms of tobacco for all youth. Surveys and health-history assessments need to include tobacco-use questions that specifically ask about water-pipe smoking. In addition, all youth-targeted tobacco prevention/cessation programs need to include specific attention to water-pipe smoking as a growing form of use as well as details about its harmful health effects. The perception by youth that water-pipe smoking is equally or more harmful than cigarette smoking must be reinforced. However, changing the perception of those who believe that water-pipe smoking is less harmful than cigarette smoking is a bigger challenge—but a challenge that must be confronted in order to curb the growing trend of water-pipe smoking and the harmful health consequences of its use.

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