Predictors of Waterpipe Smoking among Male Students of Jazan University, Jazan, Saudi Arabia

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Abstract

Background: Smoking is the leading cause of preventable premature death worldwide. Therefore, tobacco consumption is labeled as one of the major threats to public health.

Aim of Study: To identify predictors of waterpipe smoking among male students of Jazan university.

Subjects and Methods: A cross-sectional study was conducted to evaluate characteristics and factors associated with tobacco use among 409 undergraduate male students in Jazan University, Jazan, Saudi Arabia. A self-administrated questionnaire was used for data collection. It consists of 26 questions in 3 domains, covering demographic and socioeconomic characteristics of participants, tobacco use history, and factors associated with waterpipe use.

Results: A total of 409 university students took part in this study. About three-quarters of students (73.8%) reported having a friend who smokes waterpipe and 37.7% had a sibling who smokes waterpipe, while 15.2% and 2.4% of participants had fathers and mothers who smoke waterpipe, respectively. Moreover, 22.1% of waterpipe smoker students reported that they smoke waterpipe once a day, 12.6% smoke twice a week, 9.1% smoke once a week, 14.7% smoke once a month and 16.9% smoke once a year. For students who smoke waterpipe, the average number of smoking times was 16 times during the last month, 5 times during the last week and twice during the last day. Regardless of waterpipe smoking, 48.4% of students try to smoke cigarettes at least once.

Conclusions: The main factors associated with waterpipe smoking are age, monthly income, and having a father, siblings or friends who smoke waterpipe. Furthermore, students who smoke cigarettes or tobacco or have many friends who smoke waterpipe are significantly more likely to engage in waterpipe smoking.

Key Words: Smoking, waterpipe, cigarette, nicotine, university students, Jazan, Saudi Arabia.

Introduction

Smoking is considered as the leading cause of preventable premature death in the world and because of this, tobacco consumption is labeled as one of the major threats to health. In the United States, the numbers are even higher with more than 480,000 tobacco-related deaths, including deaths from secondhand smoke)[1]. Cigarette smoking causes about one of every five deaths in the United States each year[2]. The economic loss due to tobacco in Saudi Arabia is estimated to reach between 22.6 or 25.6 billion US$ over the last decade. In the United States it costs more than $300 billion each year[3].

Cigarette consumption continues to rise worldwide[4]. The trend of tobacco consumption is increasing in Saudi Arabia(3). In 2010, WHO estimated that about 16% of Saudi Arabia's population smoked (approximately 3,092,300 persons) [5, 6]. The WHO Eastern Mediterranean Region (EMRO) today has the maximum growth rate in the cigarette market, whereas there were significant reductions in smoking rates in the United Kingdom, Australia, Brazil, and other countries [4].

Males at college age are at risk of indulging in risky behaviors predisposing them to injuries, diseases, and death [7]. The college students are known to be full of risky behaviors and experimentation with tobacco products like a cigar, waterpipe, or smokeless tobacco. Due to a large number of behavioral and environmental factors, college students are at risk of adopting novel and often harmful health behaviors[8]. The United States Substance Abuse and Mental Health Services Administration reports showed that young adults aged between 18-25 years had the highest rates of tobacco (cigarettes, cigars, pipe tobacco, smokeless tobacco, chewing tobacco and snuff) consumption, ranging between (45.3%) in 2002 to (41.6%) in 2009 in comparison to older adults aged >26 years (29.9 %) in 2002 to (27.3%) in 2009[9].

One of the foreseen causes of the threat is because there are many forms of tobacco products available in the market for consumers. In recent years, there was a significant reduction in the numbers of cigarettes smoked in some western countries. However, this reduction was associated with an increase in consuming other forms of tobacco. One of the forms that are gaining popularity especially among college-age students is water pipe smoking. Waterpipe is an eastern tobacco pipe with a long, flexible tube that pulls the smoke through water contained in a vessel [10]. Water pipe originated in Persia and spread across Asia to reach India and toward the west to reach Egypt. Nowadays there are an estimated 100 million daily active users all over the world[11]. Reasons contributing to the global increase of water pipe include the introduction of 'Maassel', the booming cafe culture, the growth of the Internet and social media, and the lack of waterpipe regulations and policies [12].

While the knowledge regarding predictors of tobacco products, for example cigarettes, is abundant, little is known about the determining factors of waterpipe use.

Aim of Study

This study aimed to identify predictors of waterpipe smoking among male students in Jazan University.

Subjects and Methods

Definition of Terms

- ***Tobacco consumption:*** The use of tobacco products in different forms, such as cigarettes, cigars, pipes, waterpipe or smokeless tobacco products [13].
- ***Smoking:*** Tobacco smoking is the inhaling and exhalation of the fumes of burning tobacco which contain nicotine[9].
- ***Lifetime cigarette smoking:*** Students responses' that they ever smoked a cigarette, even 1 or 2 puffs [14].
- ***Current use of tobacco products other than cigarettes:*** Students' responses that they used tobacco products other than cigarettes [14].
- ***Current use of waterpipe:*** Smoking tobacco in a waterpipe during the past 30 days, even one or two puffs [15, 16].
- ***Current Smoker:*** A student who smoked at least one cigarette a day within the past 30 days [16, 17].

This study followed a cross-sectional research design at the University of Jazan, Jazan, Saudi Arabia, which is a public university with 45,810 students.

The study population included undergraduate male students aged between 18 and 25 years enrolled at Jazan University, Jazan, Saudi Arabia.

Sample size and sampling technique

Using the G-power 3.1 statistical software, the study included 409 participants, for a two-tail analysis, using logistic regression with a 0.05 α-level, a 0.10 β-level (90% power), and a 1.5 odds ratio.

Colleges in Jazan University were stratified into two groups according to type of studies, as follows:

- Social sciences: Arts, Education, Language and Translation, Law and Political Sciences, Administrative Sciences, and Islamic Studies; and
- Non-social sciences: Science, Computer Science, Medicine, Dentistry, Nursing, Pharmacy and Applied Medical Sciences.

Following a simple random sample, three colleges were randomly selected from each of the two groups. From each selected college, multiple clusters of different classes were selected, and the entire selected class was surveyed.

Data Collection Tools

The study included a self-administrated questionnaire in a simple Arabic Language, which was tested and validated. It consists of 26 questions, within 3 domains, i.e., demographic and socioeconomic characteristics of participants, tobacco use history, and factors associated with waterpipe use.

Pilot Study
A pilot study was conducted to test the clarity of the study questions; the time needed to complete the questionnaire, and to improve the quality and efficiency of the survey. Data collected within the pilot study were not included in the final analysis.

Data Management
Data were collected during the Academic Year 2020-2021. Responses were coded into an Excel worksheet. Statistical analysis was conducted using the Statistical Package for Social Sciences (IBM, SPSS version 26). Descriptive statistics (frequencies and percentages) were calculated. To test hypothesis, chi-square and the Fisher Exact tests were applied. A multivariate logistic regression analysis was applied to identify factors associated with waterpipe use. All tests were two-sided. A p-value less than 0.05 was considered as statistically significant.

Ethical Considerations
Participation of university students in this study was completely voluntary. They were informed that they can withdraw at any time. An informed consent was obtained from all subjects prior to their participation. No incentives or rewards were given to participants. The survey was approved by Jazan University IRB. There is no conflict of interest and all costs for conducting this study were fully carried out by the researcher.

Results

Table 1: Socio-demographics of participant students at Jazan University (n=409)

Socio-demographic characteristics	No.	%
Age (in years)		
• 18-25	327	80.0
• >25	82	20.0
Social status		
• Single	350	85.6
• Married	59	14.4
High school		
• Governmental	384	93.9
• Private	25	6.1
Monthly income (SR)		
• <1000	205	50.1
• 1000-2000	85	20.8
• 2000-3000	20	4.9
• >3000	99	24.2

Table 1 shows that 409 university students took part in this survey. Most students (85.6%) were single. Age group of most students (80%) was 18-25 years. Most students (93.9%) were graduated from governmental high schools. Approximately half of students (50.1%) had <1000 SR monthly income.

Figure 1 shows that 56.5% of male students in Jazan university smoked waterpipe.

Figure 1: Prevalence of waterpipe smoking among male students in Jazan University

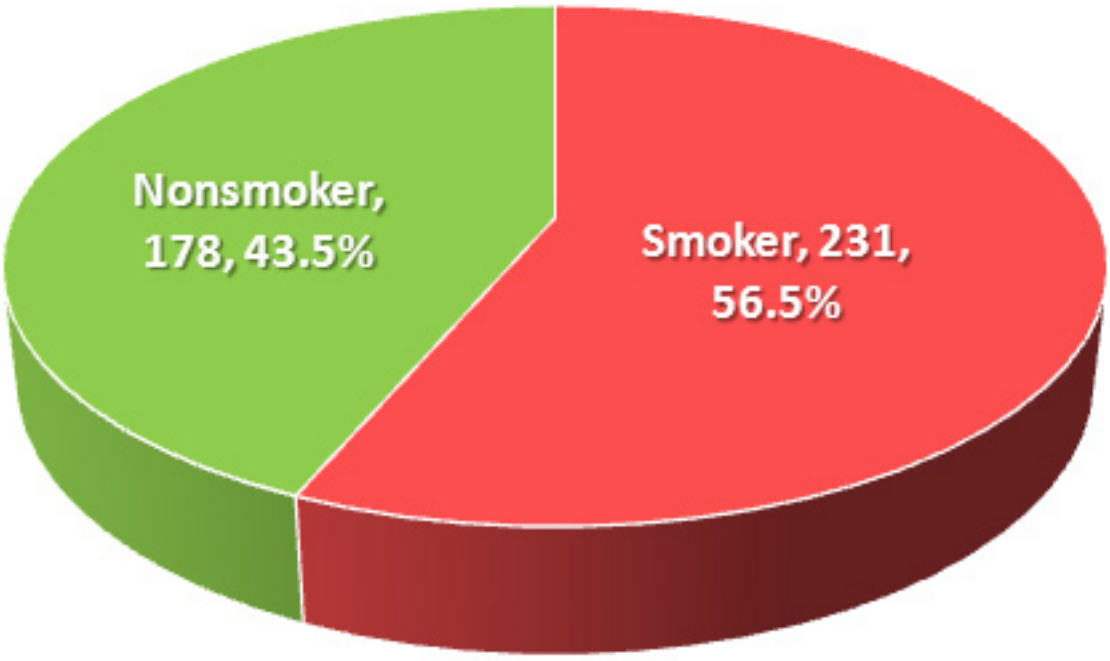

Table 2: Socio-demographics of the Jazan University students in relation to waterpipe smoking (n=409)

Socio-demographic characteristics	Waterpipe Smoking		P value
	Yes (n=231)	No (n=178)	
Age (in years)			
• 18-25	172 (74.5%)	155 (87.1%)	0.023‡
• >25	59 (25.5%)	23 (12.9%)	
Social status			
• Single	193 (83.5%)	157 (88.2%)	
• Married	38 (16.5%)	21 (11.8%)	0.461‡
High school			
• Governmental	211 (91.3%)	173 (97.2%)	<0.001‡
• Private	20 (8.7%)	5 (2.8%)	
Monthly income (SR)			
• <1000	100 (43.3%)	105 (59.0%)	
• 1000-2000	58 (25.1%)	27 (15.2%)	0.004†
• 2000-3000	9 (3.9%)	11 (6.2%)	
• >3000	64 (27.7%)	35 (19.7%)	

‡ Fisher Exact test † Chi square test

Table 2 shows a significant association between age and smoking waterpipe (p =0.02), with 74.5% of waterpipe smokers being 18-25 years old. Most waterpipe smokers were graduated from governmental high school (91.3%) rather than graduated from private high school ((91.3% and 8.7%, respectively, p=0.02). Less than half of waterpipe smokers reported receiving <1000 SR monthly income compared to waterpipe smokers (43.3% and 59%, respectively, p=0.004).

Table 3. Factors associated with waterpipe smoking (n=409)

Factors associated with waterpipe smoking	Waterpipe Smoking		P value
	Yes (n=231)	No (n=178)	
Having a father who smokes waterpipe			
• Yes	39 (16.9%)	23 (12.9%)	
• No	155 (67.1%)	142 (79.8%)	
• No, he quit smoking last year	3 (1.3%)	1 (0.6%)	0.023†
• No, he quit smoking a long time ago	34 (14.7%)	12 (6.7%)	
Having a mother who smokes waterpipe			
• Yes	7 (3.0%)	3 (1.7%)	
• No	223 (96.5%)	175 (98.3%)	0.461†
• No, she quit smoking a long time ago	1 (0.4%)	0 (0.0%)	
Having siblings who smoke waterpipe			
• Yes	106 (45.9%)	48 (27%)	
• No	104 (45.0%)	122 (68.5%)	<0.001†
• No, they quit smoking last year	7 (3.0%)	3 (1.7%)	
• No, they quit smoking a long time ago	14 (6.1%)	5 (2.8%)	
Having friends who smoke waterpipe			
• Yes	206 (89.2%)	96 (53.9%)	
• No	14 (6.1%)	74 (41.6%)	
• No, they quit smoking last year	7 (3.0%)	6 (3.4%)	<0.001†
• No, they quit smoking a long time ago	4 (1.7%)	2 (1.1%)	
Number of friends who smoke waterpipe			
• None	17 (7.4%)	61 (34.3)	
• One	12 (5.2%)	23 (12.9%)	
• Two	22 (9.5%)	19 (10.7%)	
• Three	28 (12.1%)	11 (6.2%)	<0.001†
• More than three	145 (62.8%)	52 (29.2%)	
• I don't have friends	7 (3.0%)	12 (6.7%)	

† Chi square test

Table 3 shows that fewer waterpipe smokers reported that they have fathers who smoke waterpipe (16.9%, p<0.001), and siblings who smoke waterpipe (45.9%, p<0.001), while 89.2% of waterpipe smokers reported that they have friends who smoke waterpipe (p<0.001). Most students who smoke waterpipe (87.4%) reported that they have more than one friend who smokes waterpipe (p<0.001).

Table 4. Tobacco and cigarette use in relation to smoking waterpipe (n=409)

Tobacco and Cigarette smoking	Waterpipe Smoking		P value
	Yes (n=231)	No (n=178)	
Frequency of daily cigarettes smoked			
• 0	76 (32.9%)	135 (75.8%)	
• 1	41 (17.7%)	29 (16.3%)	<0.001†
• 2-3	38 (16.5%)	9 (5.1%)	
• >4	76 (32.9%)	5 (2.8%)	
Frequency of tobacco smoking daily			
• 0	169 (73.2%)	174 (97.8)	
• 1	38 (16.5%)	2 (1.1%)	<0.001†
• 2-3	8 (3.8%)	0 (0.0%)	
• >4	16 (6.9%)	2 (1.1%)	

Table 4 shows that waterpipe non-smokers stated that they had never smoked cigarettes or tobacco (75.8% and 97.8%, respectively) with p<0.001 for both.

Table 5 shows the results of multiple logistic regression analysis for predictors of waterpipe smoking among Jazan University students in Saudi Arabia, which included variables with a significant level in bivariate analysis. The risk of waterpipe smoking decreased with governmental high school graduates (OR=0.21; 95% CI: 0.056-0.78), and those who had no friends who smoke waterpipe (OR=0.07; 95 CI: 0.007-0.76). Additionally, the risk of waterpipe smoking was approximately three times higher among students who smoked waterpipe during the last month (OR=3.04; 95% CI: 1.47–6.31), and 8 times higher among those who smoked waterpipe during the last week (OR=1.64; 95% CI: 1.64–41.4), and the risk of waterpipe smoking decreased for students who never smoked cigarettes and those who smoked cigarettes at most once during their life (OR=0.42; 95% CI: 0.013–0.13 and OR=0.12; 95% CI: 0.073-1.24, respectively).

Table 5. Multiple logistic regression for predictors of waterpipe smoking

Variables	OR (95% CI)	P-value
Age (in years)		
• 18-25	0.41 (0.16-1.07)	0.070
• >25	1	
High school		
• Governmental	0.21 (0.056-0.78)	0.020
• Private	1	
Monthly income (SR)		
• <1000	1.46 (0.58-3.67)	0.420
• 1000-2000	1.62 (0.71-4.92)	0.390
• 2000-3000	0.80 (0.29-4.51)	0.800
• >3000	1	
Having a father who smokes waterpipe		
• Yes	1.55 (0.37-6.46)	0.540
• No	0.9 (0.27-3.01)	0.870
• No, he quit smoking last year	0.48 (0.034-9.78)	0.640
• No, he quit smoking a long time ago	1	
Having siblings who smoke waterpipe		
• Yes	0.56 (0.11-2.74)	0.480
• No	0.48 (0.10-2.34)	0.360
• No, they quit smoking last year	1.05 (0.09-11.5)	0.960
• No, they quit smoking a long time ago	1	
Having friends who smoke waterpipe		
• Yes	0.48 (0.05-4.67)	0.530
• No	0.07 (0.007-0.76)	0.020
• No, they quit smoking last year	0.91 (0.06-12.78)	0.940
• No, they quit smoking a long time ago	1	
Number of friends who smoke waterpipe		
• None	1.61 (0.15-2.7)	0.610
• One	1.47 (0.087-2.06)	0.690
• Two	1.62 (0.12-2.73)	0.810
• Three	3.66 (0.31-7.26)	0.210
• More than three	2.01 (0.23-3.53)	0.430
• I don't have friends	1	
Number of times using waterpipe during the last month	3.04 (1.47-6.31)	0.003
Number of times using waterpipe during the last week	8.25 (1.64-41.4)	0.010
Number of times using waterpipe during the last day	0.12 (0.04-0.37)	<0.001
Number of times smoking cigarettes		
• 0	0.42 (0.013-0.13)	<0.001
• 1	0.12 (0.037-0.44)	0.001
• 2-3	0.30 (0.073-1.24)	0.097
• >4	1	

Discussion

Waterpipe smoking is a significant public health concern. Recently, waterpipe and cigarette smoking have shown an unprecedented increase worldwide [18].

Findings of the present study showed that, among 409 students, 56.5% were waterpipe smokers, and 97.2% of non-waterpipe smokers were graduates from governmental high school. Being graduates from a governmental high school was shown to be a significant predictor of not smoking waterpipe. Students aged 18-25 years were more likely to smoke waterpipe than those aged over 25 years. Furthermore, this study revealed that receiving low monthly income was associated with decreased risk of waterpipe smoking.

These findings support those reported by a similar study of 1,932 students at a Jordanian University, that students with the highest income had higher odds of being current cigarette and waterpipe tobacco smokers [19].

Our results revealed that not having friends who smoke waterpipe was a significant predictor of not smoking waterpipe. On the other hand, increased number of friends who smoke waterpipe was associated with a significant risk for waterpipe smoking. In this study, fathers and siblings who smoke waterpipe was shown to be significantly associated with smoking waterpipe among university students.

This finding is in accordance with that of a study on 600 Jordanian adults which reported that waterpipe smoking by siblings is an important factor in predicting waterpipe smoking [20]. This can be explained by that waterpipe smoking may become a part of the family's social events, which may encourage the waterpipe smoking habit and affect any preventive efforts. Moreover, smoking cigarettes has also been reported to play an important role in predicting waterpipe smoking.

Students who smoked cigarettes more than once had a higher risk of smoking waterpipe. A similar study that included Lebanese university students showed that smoking cigarettes was found to be a predictor of waterpipe smoking [21].

The percentage of waterpipe smokers during the last month was 62.8%, and 60.2% in the last week. In this study, smoking waterpipe within the past month and within the past week was shown to be a significant predictor of waterpipe smoking.

Most students reported that if they have friends who smoke waterpipe they will try to stop them and tell them about the harms of smoking waterpipe. These findings support the expansion of educational programs addressing the risks of waterpipe smoking to students in all communities, especially schools, universities, and families. In addition, these programs can increase the awareness level of waterpipe risks, among university students to address any misinformation and misconceptions. Knowledge can positively influence their understanding of the dangers of alternative waterpipe products. Furthermore, it is highly recommended to encourage the existing smoking cessation clinics to include waterpipe smoking among their activities to help quit smoking.

Conclusion

The main factors associated with waterpipe smoking among university students include age, high school type, monthly income, and having a father, siblings or friends who smoke waterpipe. Furthermore, students who smoke cigarettes or tobacco or who have friends who smoke waterpipe are significantly more prone to engage in waterpipe smoking.

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