

Is Smoking Shisha Safer than Cigarettes: Comparison of Health Effects of Shisha and Cigarette Smoking among Young Adults in Kuwait

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Key Words

Tobacco use · Shisha smoking · Cigarette smoking · College students · Kuwait

Abstract

Objective: The aim of this study was to compare the health effects of shisha smoking with cigarette smoking among male college students in Kuwait. **Subjects and Methods:** This cross-sectional study was conducted on 525 male students in Kuwait from September to October 2013. A pre-tested questionnaire was used for information on demographics and health complaints. Peak expiratory flow rate (PEFR) was measured using a portable peak flow meter. The outcome variables of health status were compared between smoking shisha, cigarettes, or both, and nonsmoking. **Results:** The prevalence of current smoking was 243 of the 525 students (46%); of them, 52 (10%) were shisha smokers, 69 were (13%) cigarette smokers and 122 (23%) were both shisha and cigarette smokers. There were significantly fewer shisha smokers than cigarette smokers with symptoms of persistent cough (4 vs. 13% or 2/52 vs. 15/69; $p = 0.007$), chest pain (4 vs. 23% or 2/52 vs. 16/69; $p = 0.004$)

and rapid heart rate (12 vs. 28% or 6/52 vs. 19/69; $p = 0.04$). Other complaints, including asthma, respiratory infections, shortness of breath, high blood pressure, increased blood sugar levels and sleep disturbances were similar in the 2 groups. Values of PEFR for shisha smokers and cigarette smokers were not significantly different. **Conclusion:** This study produced evidence suggesting that shisha smoking is not safer than cigarette smoking except with regard to complaints such as cough, chest pain and rapid heart rate, and that people who smoke both experience worse health effects in terms of frequent symptoms of respiratory infections, persistent cough, rapid heartbeat and sleep disturbances.

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Introduction

Cigarette smoking is one of the biggest public health threats and it kills approximately 6 million people a year [1]. The number of deaths due to smoking-related diseases is expected to reach 8.3 million by 2030, a substantial increase in the burden from 4.8 million in 2006 [2].

Unfortunately, 73% of these smokers live in developing countries [3].

The overall prevalence of cigarette smoking is very high (57%) among young adult males in Kuwait [4]. Shisha (also referred to as hookah, waterpipe, narghile, qalyan or hubble-bubble) is also popular, and has been a traditional method of smoking in the Middle East, the Indian subcontinent and worldwide for several decades [5–7]. The tobacco used in shisha smoking is mainly of three types: ‘Muessel’ (30% tobacco and 70% honey or molasses plus glycerol and flavorings), the most commonly used type by the Kuwaiti population, the traditional ‘Agami’ (Persian unflavored) pure, dark paste of tobacco and ‘Jurak’, an intermediate form used generally in India [5]. Different flavors of dried fruit are available, with grape, apple, watermelon, salloum, mint and many others being used for the Jurak style of shisha. The waterpipe heats the tobacco using charcoal, filters the smoke in a bowl of water and then directs it to a rubber pipe for inhalation [8].

In the general population including Kuwaitis, a widespread belief exists that changing from cigarettes to shisha minimizes the hazards of smoking [4]. This perception is based on the fact that shisha uses a process in which the vapor or smoke is passed through a water basin, often glass-based, before being inhaled by the user [8–10]. In fact, tobacco leaf combustion yields both gaseous and particulate components such as carbon monoxide, nitrosamine, acetaldehyde, volatile hydrocarbons, formaldehyde and hydrogen cyanide, all of which have been proven toxic [10]. Tobacco smoke is known to contain about 4,800 different chemicals, 69 of which are carcinogens, but it is not certain whether smoking shisha produces similar harmful chemicals because the composition of different forms of shisha varies [6]. However, there is evidence of a substantial rise of carcinoembryonic antigen among heavy shisha (hookah) smokers [10]. A typical session of shisha smoking lasts 20–80 min, with shisha smokers taking up to 200 puffs. In contrast, cigarette smoking typically takes about 5–8 min with 8–12 puffs. These facts may raise the possibility of higher levels of second-hand smoke with shisha smoking compared to cigarette smoking [11]. Despite substantial knowledge about the health consequences of shisha and cigarette smoking, in Kuwait, the rate of smoking is high, but data are scanty. Al Mutairi et al. [4] reported that smoking shisha did not reduce the effects of tobacco exposure and its potential harmful metabolites on health. The aim of this study was to compare the health effects of smoking shisha and cigarettes in the young male population in Kuwait.

Subjects and Methods

Study Population

This cross-sectional study was conducted from September to October of 2013. Male university students ($n = 525$) between the age of 16 and 32 years were recruited after obtaining their written informed consent. The study sites included 8 Faculties at the Kuwait University, Medicine, Allied Health Sciences, Pharmacy, Dentistry, Engineering and Petroleum, Science, Arts and Education, and also 3 private universities, the Gulf University for Science and Technology, the American University of Kuwait and the Australian College of Kuwait, so the study sample was a fair representation of the population. The sample size was estimated using 80% power and 95% confidence of the study. Females were excluded from the study in order to reduce the chance of the underreporting of smoking in this population, possibly because of the social stigma attached to women smoking in Arab countries [12]. The study protocol was approved by the ethics committee of the university and the Ministry of Health in Kuwait.

Data Collection

A convenience sampling method was used to select participants from Kuwait University and the 3 private universities. A 6-member team was divided into 3 groups to collect data from the university campuses. A sample of 525 students was selected on a first-come, first-served basis.

A pretested questionnaire included 25 structured questions that provided data on demographics, current and past smoking status, types of smoking, any self-reported health complaints, sleep patterns and lifestyle. The pretest was conducted among 20 randomly selected people of the same age group. The purposes of this pretest were to assess the time required to answer the questions and for the measurements and to modify the nature of questions for easy reading and clarity. The questionnaire was prepared first in English, translated into Arabic and then translated from Arabic back into English. It took each participant approximately 5–7 min to complete the questionnaire.

Height was measured to the nearest 0.1 cm using a portable stadiometer (Seca, Germany). Weight was measured in the upright position to the nearest 0.1 kg using a body composition monitor (TANITA SC-330, Japan). Body mass index was calculated.

Lung function was measured using a peak expiratory flow rate (PEFR) meter (Model No. 4300, Catalog No. 43602 NHS, Vitalograph, Ennis, Ireland). A disposable and detachable mouthpiece for the instrument was used for each participant so as to avoid contamination. All measurements were done between 8 a.m. and 2 p.m. The standard guidelines [13] were followed for the use of peak flow meters. Three PEFRs were measured for each participant and the highest was accepted.

Case Definition

Cigarette smoking was classified as light (<1 pack per day), moderate (1–2 packs per day) or heavy (>3 packs per day).

Shisha smoking was classified as light (1 head per sitting), moderate (2 heads per sitting) or heavy (≥ 3 heads per sitting).

Statistical Analysis

Data were entered and analyzed using the Statistical Package for Social Sciences (IBM SPSS Statistics v23). Descriptive data were summarized as mean and standard deviation (SD) with a 95% con-

Table 1. Sociodemographic characteristics of 525 university students in Kuwait

Characteristic	
Age, years	20.69±2.063
Place of study	
Public university	350 (66.5)
Private university	177 (33.6)
Marital status	
Single	491 (93.2)
Married	36 (6.8)
Nationality	
Kuwaiti	412 (78.3)
Non-Kuwaiti	114 (21.7)
Monthly family income, KWD	
<500	25 (4.8)
500–<1,000	45 (8.6)
1,000–<1,500	105 (20.1)
1,500–2,000	106 (20.3)
≥2,000	241 (46.2)
Father's education	
Less than high school	58 (11.0)
High school	84 (15.9)
Diploma	74 (14.0)
Bachelor's or higher degree	311 (59.0)
Mother's education	
Less than high school	59 (11.2)
High school	118 (22.4)
Diploma	104 (19.7)
Bachelor's or higher degree	246 (46.7)

Values are expressed as n (%) of subjects, except for their age in years, which is expressed as mean ± SD. KWD 1 = USD 3.3.

confidence interval (CI) for continuous variables and proportions for categorical variables. The outcome variables were compared between shisha smokers, cigarette smokers and nonsmokers, and also between types of smoking, with the Student t test or ANOVA for continuous variables and the χ^2 test for categorical variables. A p value ≤ 0.05 was used as the level of significance.

Results

The distribution of demographic features of the study subjects is shown in table 1. The mean age of the study population was 20.7 + 2.1 years. Of the 525 participants, 347 (76%) had a monthly income of KWD 1,500 or more. Most of the parents had a Bachelor's degree or higher education, i.e. 311 fathers (59%) and 245 mothers (47%).

Table 2. Smoking habits of the university students in Kuwait

Characteristic	n (%)
Smoking status	
Current	243 (46.3)
Previous	32 (6.1)
Smoking location	
Indoors	161 (66.8)
Outdoors	209 (86.7)
Age at which they started smoking	
7–12 years	13 (5.4)
13–19 years	152 (63.1)
20–23 years	76 (31.5)
Types of smoking	
Nonsmoker	282 (53.7)
Cigarettes only	69 (13.1)
Shisha only	52 (9.9)
Both cigarettes and shisha	122 (23.2)
Amount of cigarette smoking	
Light (<1 pack per day)	73 (38.6)
Moderate (1–2 packs per day)	102 (54.0)
Heavy (>3 packs per day)	14 (7.4)
Frequency of shisha smoking per week	
<1 time	82 (47.1)
1–2 times	43 (24.7)
3–5 times	27 (15.5)
Daily	22 (12.6)
Amount of shisha smoking	
Light (1 head per sitting)	136 (78.2)
Moderate (2 heads per sitting)	31 (17.8)
Heavy (≥ 3 heads per sitting)	7 (4.0)
Flavor of shisha preferred	
Grape	79 (45.9)
Apple	49 (28.7)
Watermelon	18 (10.5)
Salloum (tobacco)	17 (9.9)
Mixed-flavor with mint	27 (15.7)
People around who smoke	
Family	55 (11.2)
Friends	281 (57.3)
Both	154 (31.4)

Prevalence of Smoking

Of the 525 students, 243 (46%) were current smokers (shisha and/or cigarettes), 32 (6%) were previous smokers and 282 (54%) were nonsmokers (table 2). Among the smokers, 209 (87%) preferred smoking outdoors and 152 (63%) had started smoking between 13 and 19 years of age, with 13 (5%) having begun smoking at the younger age of 7–12 years.

Table 3. Relationship between health status and type of smoking

Health status	Nonsmokers (n = 282)	Type of smoking			p value ^a
		cigarettes only (n = 69)	shisha only (n = 52)	shisha and cigarettes (n = 122)	
Asthma	31 (11.1)	7 (10.1)	4 (7.7)	12 (9.9)	0.76
Frequent respiratory infections	7 (2.5)	4 (5.8)	1 (1.9)	10 (8.3)	0.39
Persistent cough	18 (6.5)	15 (21.7)	2 (3.8)	33 (27.3)	0.007
Shortness of breath	30 (10.7)	17 (24.6)	8 (15.4)	29 (24.0)	0.26
Chest pain	11 (3.9)	16 (23.2)	2 (3.8)	25 (20.7)	0.004
Rapid heart rate	22 (7.9)	19 (27.5)	6 (11.5)	37 (30.6)	0.04
High blood pressure	15 (5.4)	2 (2.9)	3 (5.8)	10 (8.3)	0.65
High blood sugar	9 (3.2)	0 (0.0)	2 (3.8)	2 (1.7)	0.18

Values are expressed as n (%).

^a The χ^2 test, cigarette smokers versus shisha smokers.

Table 4. Relation between sleeping pattern and types of smoking

	Nonsmokers (n = 282)	Cigarettes only (n = 69)	Shisha only (n = 52)	Shisha and cigarettes (n = 122)	p value ^a
Hours of sleep					0.24
<3	2 (0.7)	0 (0.0)	1 (2.0)	1 (0.8)	
3–6	80 (29.1)	16 (23.2)	12 (23.5)	25 (20.7)	
6–8	159 (57.8)	33 (47.8)	29 (56.9)	69 (57.0)	
>8	34 (12.4)	20 (29.0)	9 (17.6)	26 (21.5)	
Sleep disturbances	59 (21.5)	15 (21.7)	16 (31.4)	44 (36.4)	0.29
Breathing problems during sleep	20 (7.2)	13 (18.8)	7 (14.0)	22 (18.2)	0.62

Values are expressed as n (%) of subjects.

^a The χ^2 test, cigarette smokers versus shisha smokers.

Fifty-two (10%) smoked shisha, 69 (13%) smoked cigarettes and 122 (23%) smoked both shisha and cigarettes. Of the 189 cigarette smokers, 102 (54%) were moderate smokers. Of the 174 shisha users who provided information, 82 (47%) smoked shisha less than once a week and 136 (78%) were light smokers. Grape was the preferred flavor of 79 students (46%), followed by apple (n = 49) and the mixed flavor with mint (n = 27).

Relationship between Smoking and Health Status

The most common self-reported medical conditions among smokers were frequent respiratory infections, persistent cough, shortness of breath, chest pain and fast heartbeat, with all of these being significantly more frequent in smokers (shisha and/or cigarette) than in nonsmokers (table 3). Fewer shisha smokers than cigarette smokers complained of persistent cough (2/52 vs. 15/69

or 3.8 vs. 21.7%; p = 0.007), chest pain (2/52 vs. 16/69 or 3.8 vs. 23.2%; p = 0.004) and rapid heart rate (6/52 vs. 19/69 or 11.5 vs. 27.5%; p = 0.04). Other complaints, including asthma, frequent respiratory infections, shortness of breath, high blood pressure, a high blood sugar level and sleep disturbances were similar in these 2 groups. Frequent respiratory infections, persistent cough, chest pain, rapid heart rate, high blood pressure, high blood sugar (table 3) and sleep disturbances (table 4) were symptoms that were more frequently observed among those who smoked both shisha and cigarettes than among those who smoked only one or the other.

Peak Expiratory Flow Rate and Smoking

The distribution of the PEFV values among the study subjects was normal. The PEFV values were significantly lower among smokers (shisha and/or cigarette) than non-

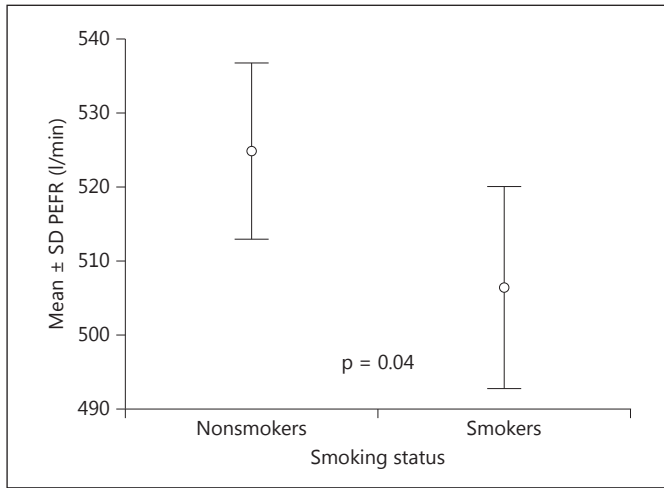


Fig. 1. Mean PEFR values of 243 smokers and 281 nonsmokers (506.3 ± 106 vs. 524.9 ± 100 liters/min, respectively; $p = 0.04$).

smokers (506 ± 106 vs. 525 ± 100 liters/min, respectively; $p = 0.04$; fig. 1). Those who only smoked shisha showed slightly lower PEFR than those who only smoked cigarettes (494.0 ± 102.0 vs. 522.8 ± 115.0 ; $p = 0.16$), although the data were not statistically significant. When stratified by height, PEFR values were decreased in shisha smokers compared to in cigarette-smokers for all categories of height, but the differences were not statistically significant (fig. 2).

Discussion

In this study, the overall prevalence of current smoking (shisha and cigarette) was high among the young adult students at universities in Kuwait. The prevalence of shisha smoking, cigarette smoking and combined shisha and cigarette smoking was 10, 13 and 23%, respectively. Equally important was the finding that some students began smoking at a very early age (although this number was small), confirming the finding of Khader and Alsadi [14] in Jordan, who reported the start of smoking at a young age.

When comparing the overall prevalence of smoking among male university students in Kuwait, the rates were similarly high in other countries in the Gulf region, such as Lebanon and Jordan [14], but were higher than in Syria [15] and Saudi Arabia [16]. In an earlier study in Kuwait [17], the prevalence of smoking (shisha or cigarettes) in the general population (i.e. both men and women) was much higher than what we observed in this study. This discrepancy could be attributable to the differences in the

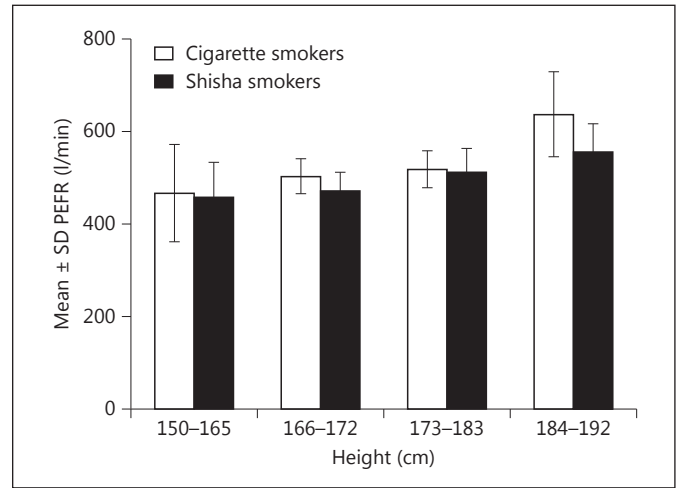


Fig. 2. Comparison between PEFR values of cigarette smokers and shisha smokers with varying body heights.

target population, and their social, cultural and economic conditions.

The mean lower PEFR values of smokers compared to nonsmokers indicated a poor lung function in smokers. In our study, the PEFR values were not statistically different between shisha and cigarette smokers, although shisha smokers did have a slightly lower PEFR. Consistent with our study results, previous studies showed that smoking reduces PEFR values [18, 19]. In our study, PEFR increased with height, and it remained low among shisha smokers in all height categories. This is because PEFR depends on height and physical fitness. These results were similar to a Nigerian study in which PEFR values increased linearly with height, weight and chest circumference in healthy adults [20]. In our study, PEFR was measured between morning and early afternoon, when the variability of PEFR values is supposed to be minimal [21]. A phenomenon worth mentioning here is the 'training effect', whereby the measurement of PEFR tends to be lower the first time the test is performed compared to when the observer is trained and has used the instrument a couple of times [21]. To minimize interpersonal variations in our study, PEFR was performed by only a few individuals who had been properly trained and had used the instrument several times before they applied it to the study subjects.

A previous study in England [22] measured PEFR in a cohort of 195 boys upon admission to a detention center, followed by a second reading performed when they left the center 8 weeks later; they were not allowed to smoke during their time there. The study found an initial significant inverse relationship between the amount of cigarette

smoking and the mean PEFV values. Upon measurement of the PEFV at the end of the 8-week period, most of the subjects, except for the heavy smokers, showed a return of the mean PEFV to normal values. This reduction, though not suggesting a causal relationship between reduced PEFV values and smoking, does indicate that lung function can revert to normal after quitting smoking.

This study is unique because it is the first study to show results comparing the health effects of cigarette smoking and shisha smoking in Kuwait. Secondly, it shows variations in PEFV, a test of lung function, with different types of smoking and different body heights. Since it was a cross-sectional study, we could only address the association of the changes of PEFV with health status and smoking, but could not establish any causal relationships. Another limitation was that we did not collect any information on potential confounders, such as second-hand smoking and smog. However, we have generated some new information on the health effects of shisha smoking and cigarette smoking, both of which should be addressed in order to educate young people about the risks of smoking.

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Conclusions

In this study, the overall prevalence of current smoking was high. We demonstrated a clear association of several respiratory and cardiovascular health problems with shisha and cigarette smoking as well as an increased rate of some of the health problems observed among those who only smoked cigarettes and those who smoked both shisha and cigarettes. As the smoking of shisha and cigarettes is a culturally prevalent habit in Kuwait, we recommend that educators, health planners and social scientists should work together to initiate community interventions to reduce the prevalence of smoking in this country.

Acknowledgement

We thank Ajitha Suresh for helping with data analysis and Manal Al-Kandari for assisting with project development.