RESEARCH COMMUNICATION

Water Pipe (Shisha) Smoking and Associated Factors Among Malaysian University Students

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Abstract

Objective: The objective of this study was to determine the prevalence of waterpipe (shisha) smoking and associated factors among Malaysian university students. Methodology: A total of 200 university students from Management and Science University participated in this study. The survey was conducted by simple random sampling by randomly distributing self-administered questionnaires to the library, cafeterias and classes. The protocol of this study was approved by the ethics committee of Management and Science University. Consent forms were obtained from the students before they answered the questionnaire. Statistical analyses were performed using the Statistical Package for Social Science (SPSS) version 13. with the Student's t-test for comparison of the mean practice and backward multiple linear regression for multivariate analysis. Results: The majority of the subjects were male, single, Malay and from urban areas (61.5%, 94.5%, 66%, 76.5%; respectively). In this study 30% of the study participants were shisha smokers. Regarding knowledge about shisha smoking, the majority (48.5%) mentioned that shisha is less harmful than cigarettes and 55% reported that shisha is less addictive. Univariate analysis showed that age, race, sex and income significantly influenced the practice of smoking shisha among university students (p=0.019, p=0.002, p=0.001, p=0.018; respectively). For multivariate analysis, income and gender demonstated significant influence (both p=0.001). Conclusion: There was a high prevalence of shisha smoking among Malaysian university students and knowledge about the dangers is low. Income and gender significantly influenced the practice of smoking shisha in our population. Banning of smoking including shisha smoking in public places is strongly recommended.

Keywords: Water pipe - Shisha - smoking - university students - Malaysia

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Introduction

Tobacco use is one of the ten leading health indicators for the Healthy People 2010 agenda, and remains to be a major focus in the proposed Healthy People 2020 objectives (U.S Department of Health and Human Services, 2010). The World Health Organization warns that if current smoking patterns continue, it will cause some 10 million deaths yearly by the year 2020 (WHO 2010).

Shisha smoking also known by a variety of names depending on the country such as Narghile, Hubble bubble, Ghoza, and Hookah. The use of shisha is a 400-year-old method of smoking in which tobacco is passed through a water pipe before being inhaled (Shihadeh et al., 2004; Knishkowy and Amitai, 2005; Maziak et al., 2005). Historically speaking, shisha is originly from India (Chattopadhyay, 2000). But some reported that it was first discovered in South Africa, Ethiopia and Persia (The Sacred Narghile). It has been reported that more than 100 million people worldwide smoke waterpipe (shisha) (The Sacred Narghile). It is common in the Arabic countries, China, Turkey, Pakistan, India and Bangladesh (Chattopadhyay, 2000). Shisha is typically smoked in social settings, such as cafes and restaurants, where water pipes are passed from person to person and typical smoking sessions last between 45 and 50 minutes but may continue for several hours (Knishkowy and Amitai, 2005; Maziak et al., 2005).

Generally, shisha consists of head, body, hose and water bowl. The most common type of tobacco used in the shisha is the Maasse (Shihadeh, 2004) which is sweet some added flavor (Zahran et al., 1985; Morsy and Khaled, 2001; Shihadeh 2004). Tobacco is the main component of shisha smoking placed in the head and often covered with aluminum foil on top of which some burning charcoal is placed. Water should fill half the water bowl, submerging a tube through which smoke enters, but not the hose-connected tube through which smoke leaves. Thus, during inhalation the smoke passes the submerged tube into the hose-connected tube, making its way to the smoker. During the process of inhalation as such, bubbles are heard due to the pass of smoke through the water. In this process, toxins in high concentrations could be

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absorbed. This is so due to either smoke itself or the long period spent inhaling it (Maziak et al., 2004).

The hazards of shisha smoking were first identified by Nafae et al. in 1973. Over the last decades, compelling evidence regarding the hazards of waterpipe smoking accumulated in the literature (Knishkowy and Amitai, 2005). Smoking is recognized as a health problem worldwide. Smokers are at an increased risk of developing several serious and potentially fatal diseases such as heart disease, cancer and respiratory illness (US Department of Health and Human Services, 1999). Several studies suggest that smokers may experience more sleep disturbances than nonsmokers (Phillips et al., 1995; Riedel et al., 2004; Rapp et al., 2007). This may relate in part to psychological problems, which is often accompanied by maladaptive behaviors such as smoking. Attempts at cessation are less frequent among smokers with psychological problems. Shisha also 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 diseases (Munckhof et al., 2003). In addition, the results of several studies suggest that shisha has the potential to cause physiological dependence (Maziak et al., 2005).

The World Health Organization pronounced North Africa, East Mediterranean region and South- East Asia to have the highest rate of waterpipe smoking. The practice is also spreading fast among the youth of North America, Brazil and Europe at an alarming rate (WHO 2005). In the United States, evidence suggests a gradual rise in the prevalence of waterpipe smoking among young adults (Marshall et al., 2006; Ward et al., 2006; 2007; CDC, 2007). Despite these harmful effects, however, there has been a recent, alarming increase in the popularity of shisha use, particularly in Arabic countries such as Kuwait, Syria, Egypt, and Lebanon where lifetime rates of shisha smoking range from 20% to 70% (Knishkowy and Amitai, 2005; Maziak et al., 2005).

Several factors may contribute to the rising popularity of shisha use. Shisha is cheap and widely available, facilitating its use among youth and individuals of low socioeconomic status. Shisha 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 shisha use (Maziak et al., 2004; Rice et al., 2006). Many smokers mistakenly believe that shisha is less harmful than other methods of tobacco use.

Few articles have been published about cigarette smoking among university students in Malaysia (Al-Naggar et al., 2011) but there is no research on shisha smoking among Malaysian students. Although we are learning more about water-pipe tobacco smoking among college students, there is little information concerning how common this form of tobacco use is among Malaysian university students. Previous studies showed smoking rates as high as 25% among Lebanese high school students (Varsano et al., 2003; El-Roueiheb et al., 2008) and 22% among a sample of Arab American high school students in the US Midwest (Weglicki et al., 2007). However, we are aware of no published studies reporting water-pipe tobacco smoking prevalence among Malaysian university students. Identifying socio-demographic characteristics associated with waterpipe tobacco smoking in Malaysia may help focus prevention efforts.

Materials and Methods

This cross sectional study was conducted in the period during the academic year 2010/ 2011 in Management and Science University (MSU), Shah Alam, Selangor, Malaysia. A total number of 200 university students were participated in this study recruited from the following faculties: International Medical School (IMS), Faculty of Health and Life Sciences (FHLS), Faculty of Business management and professional studies (FBMP), Faculty of Information Sciences and Engineering (FISE) and School of Pharmacy (SOP). The survey was conducted by random distribution of self-administered questionnaires to all faculties of MSU in the library, cafeterias and classes. Inclusion criteria were Malaysian, aged more than 18 years old. A self-administrated questionnaire was developed by the researchers based on the literature review. The questionnaire consists of three parts; first part contains socio-demographic characteristics such as age, sex, marital status, family monthly income and race. The second part consists of knowledge towards shisha smoking among university students such as shisha's harmful effect compared to cigarettes, and the chemical component of the shisha. The protocol of this study was approved by the ethics committee of Management and Science University. Consent form was obtained from students before they answered the questionnaire. For data analysis, the following descriptive analysis was carried out: frequency, percent, mean, and standard deviation. Thereafter, Student's t-test was used to compare the mean practice among university students. Level of significance

Table 1. Socio-demographic Characteristics of the Study Participants (n=200)

Variables	Categories	Number	Percentage (%)
Gender	Male	123	61.5
	Female	77	38.5
Age	17-19	58	29
	20-22	67	33.5
	23-25	56	28
	26-28	19	9.5
Marital status	Single	189	94.5
	Married	11	5.5
Race	Malay	132	66
	Chinese	16	8
	Indian	33	16.5
	Others	19	9.5
Faculty	FHLS	41	20.5
	FBMP	40	20.0
	FISE	41	20.5
	IMS	40	20.0
	SOP	38	19.0
Income	< 2000	83	41.5
	2000-3999	60	30.0
	4000-5999	13	6.5
	6000-7999	16	8.0
	>8000	28	14.0
Residency	Urban	153	76.5
	Rural	47	23.5

Table 2. Knowledge about Waterpipe (shisha) Smoking Among University Students (n=200)

Variable	Number	Percentage (%)
Harmful effect		
Shisha more harmful than cigarettes	78	39
Shisha is less harmful than cigarettes	97	48.5
don't know	25	12.5
Addiction		
Shisha is more addictive than cigarettes	37	18.5
Shisha is less addictive than cigarettes	132	66
don't know	31	15.5
The water in a shisha, filters many of the toxins out		
Yes	117	58.5
No	83	41.5
There is almost no tar in shisha tobacco smoking.		
Yes	119	59.5
No	81	40.5
There is almost no nicotine in shisha tobacco smoking.		
Yes	107	53.5
No	93	46.5
There is almost no carbon monoxide in shisha tobacco smoking.		
Yes	59	29.5
No	141	70.5
Shisha smoking can increases the risk of cardiovascular and respiratory diseases?		
Yes	155	77.5
No	43	21.5
Disease may cause by shisha smoking		
TB	57	28.5
Heart disease	51	25.5
Lung cancer	55	27.5
Sleep disorder	18	9
Don't know	19	9.5

was set at p <0.05. All data variables were encoded and computerized. Data entry and statistical analysis were performed using the Statistical Package for Social Science (SPSS) version 13. In addition, multivariate analysis was performed: backward multiple linear regression was used.

Results

A total number of 200 university students participated in this study. The majority of them were male, in the age group 20-22 years old, single, Malay, with income less than 2000 Ringgit Malaysia, from urban areas (61.5%, 33.5%, 94.5%, 66%, 41.5, 76.5% ; respectively) (Table 1).

Regarding the knowledge about waterpipe (shisha) smoking among university students, the majority of the participants (48.5%) mentioned that waterpipe (shisha) is less harmful than cigarettes. The majority of the participants (66%) mentioned that waterpipe (shisha) is less addictive than cigarettes. The majority of the participants (58.5%) mentioned that the water in a shisha filters many of the toxins out. The majority of the participants (59.5%) mentioned that there is almost no tar in shisha tobacco smoking. The majority of the participants (53.5%) mentioned that there is almost no nicotine in shisha tobacco smoking. The majority of the participants mentioned (77.5%) that shisha smoking can increase the risk of cardiovascular and respiratory diseases.

Regarding factors associated with waterpipe (shisha) smoking among university students, age, race, sex, and income significantly influenced the practice of smoking among university students (p=0.019, p=0.002, p=0.001, p=0.018; respectively) (Table 3).

Table 3. Factors Associated with Waterpipe (shisha) Smoking Among University Students (n=200)

Variables	Categories	Mean SD	p-value
Age	17-19	2.26±1.163	0.019*
	20-22	1.80±1.034	
	23-25	2.41±1.38	
	26-28	2.47±1.12	
Race	Malay	2.28±1.18	0.002*
	Chinese	2.93±1.38	
	Indian	1.76±1.17	
	Others	1.63±0.80	
Faculty	FHLS	2.02±1.38	0.129*
	FBMB	2.15±1.21	
	FISE	2.49±1.18	
	IMS	1.85±1.12	
	SOP	2.37±1.05	
Gender	Male	2.46±1.15	0.001**
	Female	1.71±1.16	
Marital status	Single	2.14±1.19	0.19**
	Married	2.64±1.36	
Income (RM)	< 2000	2.05±1.11	0.018*
	2000-3999	1.92±1.15	
	4000-5999	2.38±1.38	
	6000-7999	2.63±1.25	
	>8000	2.71±1.30	
Residency	Urban	2.21±1.24	0.45**
	Rural	2.06±1.09	

*ANOVA tes; **t-tes

Table 4. Prediction Model for Factors Associated with Shisha Smoking Among University Students by Multiple Linear Regression

	B	SE	Beta	p-value	
Constant	2.07				
age	≤22 (reference)		ref		
	>22		0.29	0.16	0.11	0.082
Faculty	Medical (reference)		Ref.		
	Non-medical		0.28	0.28	0.11	0.81
Income (RM)	≤ 4000 (reference)		Ref.		
	>4000		0.75	0.75	0.17	0.001
Gender	Male (refer)		Ref.		
	Female		-0.87	0.16	0.35	0.001
Marital status	Single (refrence)		Ref.		
	Married		0.66	0.35	0.12	0.06
Live with family	Yes (reference)		Ref.		
	No		-0.30	0.16	0.12	0.06

P= 0.001, f=10.48, R2=0.24

In multivariate analysis (Table 4), the gender and family monthly income were significantly associated with shisha smoking among university students. Females had on average 0.87 points lower than males (p=0.001). This means that males had higher practice of shisha smoking compared to females. High income students had on average higher points (0.75) as compared to lower income students (p=0.001). This means that students with high family income had higher practice of shisha smoking compared to those with lower monthly family income. However, age, type of faculty, marital status and living

status did not significantly influence the practice of shisha smoking among university students.

Discussion

In this study, the prevalence of shisha smoking was 30% among university students. Lower prevalence was reported in a Jordanian study which reported that 25% of university students used shisha smoking on a daily or weekly basis (Dar-Odeh et al., 2010). Another community based study from Pakistan reported that 13% of the participants were shisha smokers (Nisar et al., 2007). Another study from Pakistan among general population from rural and urban areas reported that 6% of the study participants were shisha smokers (Alam and Alam 1998). Another study reported that the prevalence of shisha smoking among male medical students in Saudi Arabia was 8.6% (Taha et al. 2010). Prevalence of shishah smoking among Arab Americans adolescents was 27% (Rice et al. 2006). Weglicki et al. (2007) reported that the prevalence of shisha smoking among Arab American and non-Arab youths 'smoked shisha in the past 30 days' (22%); and 'regular shisha smokers (15%); respectively. Weglicki et al. (2008) reported that 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. Al-Haddad et al., (2003) showed that 13% of the study participants among Bahrain school students were shisha smokers. Tamim et al., (2007) showed that the prevalence of smoking shisha among school students in Lebanon was 25.6%. Similarly, the prevalence of shisha smoking among students at University of Sharjah, United Arab Emirates (UAE) was 5.6%. While women comprised about 26.2% of shisha smokers (Mandil et al., 2007). Similar findings were reported from US study in which shisha smoking was reported in 30.6% over the past year and over the past 30 days in 9.5% (Primack et al., 2008). A total of 28.3% of university students in American University of Beirut were regular shisha smokers (Chaaya et al., 2004). Another community based study in Egypt also reported prevalence of shisha smoking to be 10.7% (Habib et al. 2001). A similar finding reported by Almutairi (2004) found that 7.3% shisha smokers were among university students in Riyadh.The higher prevalence in this study compared to the previous studies may be due to the idea that Malaysia is one of the best tourist destination. Urgent action needed to ban the shisha smoking in the public places such as restaurants and cafés.

Higher prevalence (41%) of shisa smoking reported by other studies (Nisar et al., 2005, Jawaid et al., 2008) in which about half of the university students in Pakistan have smoked shisha (53.6%). Al-Turki (2006) reported that 44.1% medical students smoked shisha. Varsano et al., (2003) reported that 41% of school students smoke shisha at various frequencies. Jackson and Aveyard (2008) reported that 37.9% students of Birmingham University had tried Shisha. The high prevalence of smoking among university students may be due to a common belief that shisha smoking is less harmful than cigarette smoking (Carroll and Andrew, 2008). Some families consider shisha smoking a modern lifestyle. Intervention to prevent shisha smoking among youth is needed.

In this study, univariate analysis showed that age, sex, race and income significantly influenced the practice of smoking shisha among university students. Multivariate analysis also showed that income and gender significantly influenced the practice of smoking shisha among university students. A similar study reported that gender has significant effects on the prevalence of shisha smoking (Poyrazoglu et al., 2010). Similar findings reported that race significantly influence the practice of shisha smoking. Similar findings showed that there were higher smokers among Pacific Islander students and Asian American students. These results may reflect the history of water-pipe tobacco smoking as the practice has its roots in the Indian subcontinent as well as the Middle East (Chattopadhyay, 2000). Anjum et al., (2008) study showed that the highest percentage of shisha smoking was observed among college students with a higher socioeconomic status. Another study carried out in Ukraine revealed that men of low income category were more likely to initiate tobacco smoking earlier (Andreeva et al., 2007). Male gender, younger age and race were associated with shisha smoking (Eissenberg et al., 2008; Smith-Simone et al., 2008a; Primack et al., 2008; Primack et al., 2010). Maziak et al., (2004) reported that the shisha smoking were more common among older and male students. Residence and economic status of the family and with whom the students live have no significant effect on the prevalence rate (Poyrazoglu et al., 2010).

Regarding the knowledge among the study participants, majority of the participants (48.5%) mentioned that shisha is less harmful than cigarettes. Similarly Maziak et al (2004) reported that 89% of the participants thought that shisha is less harmful than cigarettes. A similar study from Syria reported that 30% of university students were of the opinion that shisha was less harmful than cigarettes (Maziak et al., 2004). There has been a false perception that shisha smoking is safer than cigarette smoking, perhaps because the invention of shisha smoking involves the passage of smoke through water that is presumed to filter the smoke and remove toxic agents (Kandela, 2000; WHO, 2005; DAWN, 2006) reported that 51% of the study participants believed that shisha was less harmful than cigarettes. A study from Egypt reported that 74% of female students believed that shisha smoking was less harmful than cigarette smoking (Labib et al., 2007). The increasing trend of shisha smoking is due to some misconceptions regarding shisha smoking, for example nicotine content in shisha is lower than that in cigarettes and water filters out all the toxic chemicals including tar, carbon monoxide and nicotine (Maziak et al., 2004). However, a new study research reported that the water pipes have three additional deadly risks over cigarette smoking (Ash, 2007); to worsen the situation, new toxins are added to the dangerous smoke when smoking flavoured tobacco over coals. The amount of shisha smoke inhaled exceeds that of one cigarette smoke by 200 times. Despite such fact, shisha smoking gains social acceptance and consequently high levels of secondhand smoke is the result. Varsano et al., (2003) reported that the

majority of the students perceived shisha smoking to be much less harmful than cigarette smoking. Tamim et al. reported similar perceptions by a large population of high school students who considered shisha smoking to be less dangerous than cigarette smoking. Additionally, ever and current shisha users were more likely to perceive shisha tobacco smoking as less harmful than cigarettes (Ward et al., 2007; Smith-Smione et al., 2008).

A total of 55% of the study participants reported that shisha is less addictive than cigarettes. Similar findings reported that smokers do not see themselves as addicts, and the feeling that they can quit whenever they want to is a common perception among shisha users (Ward et al., 2007; Smith-Smione et al., 2008,). Primack et al., (2008) also reported that over 52% of college students sampled believed shisha are less addictive than cigarettes.

The majority of the participants mentioned that the water in shisha filters many of the toxins out, there is almost no tar in shish tobacco smoking and there is almost no nicotine in shisha tobacco smoking. However the majority of the participants mentioned (77.5%) that shisha smoking can increase the risk of cardiovascular and respiratory diseases. Similar findings reported by Maziak et al., (2004) in which shisha smoking can cause respiratory disease, cancer, and cardiovascular disease. This low knowledge among university students needs urgent education about the harmful effects of shisha smoking. Shisha smoke contains many of the same toxicants as cigarette smoke (Shihadeh, 2003; Shihadeh and Saleh, 2005). Not surprisingly, carbon monoxide is found in shisha users' breath (Shafagoj and Mohammed, 2002; Ward et al., 2006; Chaouachi, 2007) and nicotine is found in their blood, (Shafagoj et al., 2002) to the extent that blood nicotine of a daily shisha user is similar to that of an individual who smokes (Maziak et al., 2004) cigarettes per day (Neergaard et al., 2007). Shisha tobacco smoking has been associated with substantial harm, including cancer, cardiovascular disease, decreased pulmonary function, and nicotine dependence (Jabbour et al., 2003; Maziak et al., 2004; Knishkowy et al., 2005; Ward et al., 2006). These false beliefs are bolstered by common misconceptions, such as toxins in shisha are filtered out by water in the shisha pipe; because shisha is fruit-flavored, it is a harmless substance that is acceptable for children; and the nicotine content in shisha is lower than that in cigarettes. In reality, shisha has a nicotine content of 2% to 4%, whereas cigarettes have a nicotine content of 1% to 3% (Kiter et al., 2000; Knishkowy and Amitai, 2005). Carbon monoxide concentrations have been reported to be 0.34% to 1.40% for shisha smoke compared to 0.41% for cigarette smoke (Maziak et al., 2004). Thus, whereas smoking a single cigarette might produce a total of 500 to 600 mL of smoke (Djordjevic et al., 2000) a single water-pipe use episode might produce 50 000 mL of smoke.

The limitations of this study that this study used cross-sectional data, so causality or temporal relationships cannot be inferred from the results. In addition, recall bias is possible, as for this study is a questionnaire-based. Also, these data came from one private institute, and results from surveys of other government university may differ; national studies are clearly merited. The findings of this study provide a crucial starting point for future studies addressing these limitations.

Shisha and shisha tobacco must contain health warnings similar cigarettes. The high prevalence of shisha smoking among university students should raise the awareness of public health and administrative authorities about this problem. It is strongly recommended that shisha tobacco should have the same regulations and laws as cigarette including banning smoking in public places.

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