

RESEARCH ARTICLE

Patterns, Beliefs, Norms and Perceived Harms of Hookah Smoking in North Iran

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Abstract

Introduction: Hookah smoking is considered as a public health threat around the globe. The aim of this study was to investigate the hookah smoking patterns, beliefs, norms and perceived harms in Golestan province of Iran. **Methods:** A cross-sectional study was conducted on 395 hookah smokers using convenience sampling method in 2015. To collect data, Heinz's hookah pattern was utilized. Ordinal regression models were used to explore covariates related to the odds of life time, last-30-day, and current hookah use. **Results:** In general, 357 (90.4%) subjects were male smokers. Most of subjects smoked hookah in café (62.2%) and with friends (75.6%). The majority of them (71.1%) did not consider themselves as a hooked person. Cigarette smoking (OR =.65, 95 % CI .42-.98), low perceived addictiveness of hookah than cigarettes (OR =2.33, 95 % CI 1.45-3.73), Social context of hookah smoking with friends in café (OR =1.14, 95 % CI 1.08-1.2), and number of close friends who smoked hookah (OR =1.38, 95 % CI 1.18-1.61) were effective variables affected the past month use of hookah. **Conclusion:** Development, implementation and assessment of interventions particularly adapted to hookah smoking regarding increase of perceived harm of hookah than cigarette and its probable addiction focusing on close friends appeared to be beneficial.

Keywords: Hookah- perceived harm- patterns of Hookah smoke- attitude

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Introduction

Hookah smoking is an emerging threat for public health across the world. Hookah smoking began initially in India and Pakistan in the 17th century and has been consumed for centuries in the Middle East and North Africa. However, in the past two decades, it has spread to other parts of the world such as Europe and North America and its usage is also dramatically increasing among adolescents and young adults of aforementioned countries (Warren et al., 2009). Maziak survey conducted on adolescent of Middle East countries revealed hookah smoking prevalence as 6-36 % that are overtaking smoking. In addition, hookah smoking was 5 to 17 percent among American adolescents (Maziak, 2011). Nowadays, it is estimated that 100 million people smoke hookah daily (Gatrad et al., 2007).

Studies carried out in Iran also indicate that hookah smoking is on the rise. A survey implemented in Hormozgan province (South of Iran revealed the overall

prevalence of hookah consumption to 36.5 percent, 28.4 and 45.16 % in men and women, respectively. Age, gender, smoking, having a person with hookah smoking in the family and education were important factors affecting the hookah smoking (Ghanbarnejad et al., 2012).

Given the various investigations, adolescents and young adults are more likely inclined in hookah smoking due to reasons such as pleasant smell with a variety of flavors available in the markets, greater social acceptance, less social stigma than cigarette, easy accessibility, misconceptions of health risks of hookah (because smoke refines by passing through water). Therefore, the harmful effects of hookah smoking were not mainly recognized by users or usually were considered less (Maziak, 2008; Akl et al., 2010; Cobb et al., 2010; Maziak, 2010; Raad et al., 2011). A survey conducted in Syria presented that people considered use of hookah as a pleasant experience for spending leisure time without any adverse health effects (Hammal et al., 2008).

Despite the alarming increase in the prevalence of

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hookah, laws and policies in the field of control are incomplete; while, deceptive advertising of aromatic tobacco manufacturers even encourage hookah smoking such that their products are safer than cigarettes. These manufacturers deceive and encourage by writing words such as sanitary and herbal products, or free of tar and nicotine in the labels of their products (Wilson et al., 2009; Nakkash and Khalil, 2010; Noonan, 2010; Vansickel et al., 2011; Maziak, 2012). While reality is something else, because hookah consumers are more exposed to nicotine, carbon monoxide, toxins and heavy metals than cigarette smokers. According to World Health Organization (WHO) report, each hookah session lasts 80-20 minutes that is equivalent to 100 or more cigarettes (WorldHealthOrganization, 2013). Majority of hookah smokers believed that hookah is not addictive and has no harmful effects on health; also, its harmful effects are less than cigarettes (Smith-Simone et al., 2008; Roskin and Aveyard, 2009; Griffiths et al., 2011). Polycyclic aromatic hydrocarbons (PAH) are toxic substances in the hookah that cause cancers including lung, bladder and oral cavity. Volatile aldehydes cause destruction of the lung parenchyma and also increase of the lung cancer and respiratory diseases. Since coal is used for heating and producing smoke in the preparation of hookah, many dangerous toxins in hookah such as carbon monoxide (CO) are more produced and inhaled than cigarettes that causes likely cardiovascular diseases (Sepetdjian et al., 2008; Maziak et al., 2009). A study indicated that inhaled CO in a hookah consumption was 23.9 units per million; while, this rate was 2.7 in cigarettes smokers. In addition, the level of carboxyhemoglobin (COHb) in hookah smokers was 3.9% and 1.3% in cigarettes smokers (three times higher). The average volume of smoke inhaled by hookah and cigarette was accordingly 48.6 liters and 1 liters (Eissenberg and Shihadeh, 2009). Heavy metals such as lead, arsenic, and chromium are other important toxic substances that more inhaled in hookah consumption than cigarette smoking (Katurji et al., 2010), (Monn et al., 2007; Schubert et al., 2011).

Hookah has more severe effects on health than cigarette. Hookah increases systolic and diastolic blood pressure as well as heart rate; also, it destroys the performance of baroreceptor reflex (Maziak et al., 2007; Martinasek et al., 2011). Acute poisonings caused by carbon monoxide in hookah smoking are more reported compared to the cigarette smoking (Wilson et al., 2009). Given the WHO report, common use of hookah smoking causes infectious disease transmission such as lung tuberculosis (TB) (World Health Organization, 2013). Despite the widespread prevalence of hookah use in our society, there are few studies examining beliefs, norms and patterns of hookah smoking (Baheiraei et al., 2012; Dehdari et al., 2012; Ghanbarnejad et al., 2012).

Identify the beliefs, norms and factors of tobacco smoking is the first step in its pathology and planning to deal with this harmful habit. The present study was aimed to test the patterns, beliefs, norms, and perceived harms of hookah smoking among consumers (ever smoked and past month) in northern Iran.

Materials and Methods

Study design and Procedure

A cross-sectional study was conducted on 395 hookah smokers who lived in Golestan province (North of Iran) and smoked at least once a hookah during the last month. This survey was carried out between September and December 2015 year. The subjects were included in the survey from different cities in Golestan province including Gorgan 182 (46.1%), Aq-qala 138 (34.9%), and Maraveh-Tappeh 75 (19%) using in convenience samples. We included 4, 1, and 3 cafes in Gorgan, Aq-qala, and Maraveh-Tappeh, respectively.

The present study protocol was confirmed by the Golestan University of Medical Sciences at Research Review Board (no 940610144) and also at Ethics Committee Board (no IR.Goums.REC.1394.163). After obtaining permission from the owners of traditional cafe, researchers conducted interviews with hookah smokers and filled out questionnaires in front of researchers. Prior to the study, consent form was obtained from the participants.

Study instrument

To collect data, Heinz hookah smoking questionnaire (Heinz et al., 2013) was employed. In addition, other demographic characteristics were explored by a checklist. Heinz hookah smoking questionnaire is consisted of items such as follow: number of hookah smoking in past month, patterns of hookah smoking (such as smoking at home or smoking in the traditional cafe), age of the first use, intend to use in the future, confidence in ability to quit it in the future, perceived dependence on a hookah, attitude toward hookah smoking ban, and perceived harms of hookah smoking compared to the cigarette smoking.

Questions of hookah smoking pattern include 8 items in the form of 4- point Likert scale (never=0, rarely=1, sometimes=2, and always=3). The reliability assessed by internal consistency with Cronbach's alpha was acceptable ($\alpha = 0.705$). Perceived harm of hookah includes 10 items (the correct answers= 1 and the false and I don't know= 0). Perceived harm of hookah indicated acceptable psychometric properties with Chronbach's alpha = 0.835. Attitude toward hookah smoking ban comprises 3 items to which samples respond using a 4- point Likert scale (completely disagree=1, disagree=2, agree=3, and completely agree=4). This measure has shown acceptable psychometric properties with Chronbach's alpha = 0.552. Other items of the questionnaire were reported by the frequency.

Participants

People who smoked hookah at least once in the past month were included in the study.

Data analysis

Descriptive statistics (frequency, mean and standard deviation) were assessed for demographic characteristics. To calculate normality of data, Shapiro-Wilk test was used. Ordinal regression was run to measure the hookah smoking during the life, hookah smoking in the past

month, and the current smoking patterns. To achieve the ordinal regression model, variables such as age of first use of the hookah, smokers or non-smokers, perceived harms of smoking, person belief about addiction to hookah, gender, hookah smoking patterns, attitudes towards hookah smoking ban, perceived harms about hookah smoking, the number of close friends smoked hookah in past month, and the number of friends who confirmed hookah smoking were entered as covariates. Significant level was considered significant as <0.05.

Results

General Findings

The mean age of subjects was 25.93±6.54 years. In general, 357 (90.4%) subjects were male smokers. Most of subjects smoked hookah in café (62.2%) and with friends (75.6%). In overall, 281 (71.1 %) of participants did not consider themselves as an addicted to hookah, and 160 (40.5%) had great confidence to quit hookah. According to

stages of change of hookah smoking, 203 (52.4%) samples were in the pre-contemplation stage and did not prone to quit hookah (Table 1). Also, 47.6% of participants were simultaneously smoked cigarettes and hookah. Moreover, 44.1 % believed that hookah smoking cannot reduce the risks of cigarette smoking (Table 1). Findings revealed that 57 % of five close friends smoked hookah in their lifetime, 39.2 % also smoked at least once a hookah in past month, and 41.5 % approved hookah, as well. Given the results, most of participants smoked hookah in traditional cafes and with their friends (Table 2).

A remarkable number of people had a negative attitude towards the prohibition of smoking hookah in traditional cafes (Table 3). Results of perceived harms of hookah smoking reported in table 4 compared with cigarettes smoking risks. At present, 188 (47.6%) of the subjects smoked cigarette. Mann-Whitney test showed that the frequency of hookah smoking among smokers was significantly higher than non-smokers during the lifetime (p = 0.002). But in the recent months, the number

Table 1. Frequency of Some Hookah Smoking Variables in Participants

Start age of smoking	N (%)					
	14 years and >	15-16years	17-18years	19-20years	21-22years	23 years and <
Hookah smoking in past month	0 time 59 (14.9)	1-2 times 51(12.9)	3-5 times 45 (11.4)	6-9 times 29 (7.3)	10-15 times 54 (13.7)	16-20 times 157 (39.7)
Continuation of hookah smoking pattern	< 6 months 45 (11.4)	6months to 1 year 35 (8.9)	1-2 years 46 (11.6)	2-3 years 66 (16.7)	3-4 years 27 (6.8)	> 4 years 175 (44.3)
Hookah smoking during the lifetime	1 time 17 (4.3)	2-5 times 41 (10.4)	6-26 times 49 (12.4)	26-50 times 35 (8.9)	>50 times 253 (64.1)	
The current hookah smoking pattern	At least once a year, but no each month 63 (15.9)	At least once a month 88 (22.3)	At least once a week 94 (23.8)	At least once a day 150 (38)		
Hookah smoking in the next five years	Will be decreased 192 (48.6)	Will not be changed 161 (40.8)	Will be increased 42 (10.6)			
Self- confidence to leave hookah	Never 100 (25.3)	Somewhat 135 (34.2)	Very much 160 (40.5)			
Stage of change of hookah smoking	Pre-contemplation 203 (52.4)	Contemplation 143 (36.2)	preparation 49 (12.4)			
Belief to be addicted	Yes 114 (28.9)	No 281 (71.1)				
The current cigarette smoking	Yes 118 (47.6)	No 281 (52.4)				
Cigarette smoking in the next year	Definitely I will not smoke 148 (37.5)	Probably I will not smoke 93 (23.5)	Probably I will smoke 93 (23.5)	Definitely I will smoke 61 (15.4)		
Reduction of cigarette smoking risks following use of hookah	It will not reduces 174 (44.1)	It will slightly reduces 86 (21.7)	It will moderately reduces 87 (22)	It will greatly reduces 48 (12.2)		

Table 2. Frequency of Hookah Use Contexts

	Never		Seldom		Sometimes		Always	
	Number	percent	Number	percent	Number	percent	Number	percent
Alone	148	37.5	105	26.6	107	27.1	35	8.9
With friends	29	7.3	67	17.0	121	30.6	178	45.1
With romantic partner	196	49.6	85	21.5	73	18.5	41	10.4
With family	229	58.0	77	19.5	67	17.0	22	5.6
In a cafe	52	13.2	97	24.6	119	30.1	127	32.1
At home	170	43.0	93	23.5	93	23.5	39	9.9
Friend's home	76	19.2	118	29.9	168	42.5	33	8.4

Table 3. Frequency of Attitude Towards Hookah Smoking

	Completely disagree		Somewhat disagree		Somewhat agree		Completely agree	
	Number	percent	Number	percent	Number	percent	Number	percent
Ban on hookah smoking for people under 18 years	83	21	63	15.9	63	15.2	186	47.1
Ban on hookah smoking in cafes	189	47.8	65	16.5	67	17	74	18.7
Ban on cigarette smoking in cafes	121	30.6	55	13.9	65	16.5	154	39

of hookah smoking was remarkably different among smokers compared to non-smokers ($p = 0.101$). In terms of the history of hookah, cigarette smokers consumed hookah for a longer period compared to non-smokers ($p = 0.03$). Also, smokers had started the use of hookah at younger ages compared to those who had not ($p < 0.001$).

Life time hookah smoking results

As presented in Table 5, health risks reduction of switching from cigarette to hookah (OR =2.12, 95 % CI 1.24-3.61) , male gender (OR =2.15, 95 % CI

(1.09-4.26) , social context of hookah smoking with fiends in café (OR =1.08, 95 % CI 1.01-1.14), having negative attitude towards ban on cigarette and hookah smoking (OR =1.15, 95 % CI (1.05- 1.26), and number of close friends who smoked hookah (OR =1.49, 95 % CI 1.27-1.77) had significantly higher odds of life time hookah smoking. In the other side, people who considered less harms of hookah than cigarette had 2.12 times more chances of smoking hookah compared with those did not consider. Additionally people who knew that risks of hookah smoking were slightly less than cigarette

Table 4. Smoking Hookah Versus Cigarette

	Less		Equal		More		I don't know	
	Number	percent	Number	percent	Number	percent	Number	percent
Likelihood to cause addiction of hookah than cigarette	119	30.1	87	22.0	118	29.9	71	18.0
Carcinogenic effects of hookah than cigarettes	39	9.9	57	14.4	196	49.6	103	26.1
More harmful effects of hookah than cigarettes	57	14.4	66	16.7	190	48.1	82	20.8
Long term harmful effects of hookah than cigarette	58	14.7	64	16.2	181	45.8	92	23.3
More social acceptance of hookah than cigarette	43	10.9	65	16.5	221	55.9	66	16.7
A higher dose of nicotine in hookah than smoking	60	15.2	44	11.1	189	47.8	102	25.8
More tars in hookah than cigarette	34	8.6	36	9.1	157	39.7	168	42.5
Too much exposure to carcinogens in hookah smokers than cigarette smokers	41	10.4	53	13.4	189	47.8	112	28.4
More harmful effects of exposure to hookah smoke than cigarette	73	18.5	67	17.0	149	37.7	106	26.8
More harmful effects of hookah for fetus during pregnancy than cigarette	25	6.3	45	11.4	198	50.1	126	31.9

Table 5. Results of Ordinal Regression for Hookah Smoking in Lifetime

		EXP(β)	Confidence interval	Significant level
Health risks reduction of switching from cigarette to hookah	Not decreases	2.12	(1.24-3.61)	0.006
	Decreases slightly	2.8	(1.51-5.51)	0.001
	reduces significantly	1		
Gender	Male	2.15	(1.09-4.26)	0.026
	Female	1		
Social context of hookah smoking		1.08	(1.01-1.14)	0.013
Negative attitude towards ban on cigarette and hookah smoking		1.15	(1.05- 1.26)	0.001
Number of close friends who smoked hookah		1.49	(1.27-1.77)	<0.001

Table 6. Results of Ordinal Regression for Hookah Smoking in Past Month

		EXP(β)	Confidence interval	Significant level
Low perceived harms	Not decreases	0.85	(0.54-1.35)	0.508
	Slightly Decrease	1.87	(1.07-3.24)	0.026
	Significantly decreases	1.00		
Cigarette smoking	Yes	0.65	(0.42- 0.98)	0.044
	No (base group)	1.00		
low perceived addictiveness of hookah than cigarettes	Yes	2.33	(1.45-3.73)	<0.001
	No (base group)	1.00		
Social context of hookah smoking		1.14	(1.08-1.2)	<0.001
Number of close friends who smoked hookah		1.38	(1.18-1.61)	<0.001

smoking were 2.8 times more likely inclined in smoking hookah compared with those considered the same harm for hookah and cigarette smoking. According to chance of hookah smoking, men were 2.15 times more tended to smoke hookah in their lifetime compared with women.

Past month smoking results

Cigarette smoking (OR =0.65, 95 % CI 0.42-0.98), low perceived addictiveness of hookah than cigarettes (OR =2.33, 95 % CI 1.45-3.73 Social context of hookah smoking with friends in café (OR =1.14, 95 % CI 1.08-1.2), and number of close friends who smoked hookah (OR =1.38, 95 % CI 1.18-1.61) were effective variables affected the past month use of hookah (Table 6). The perceived risks (p=0.059) and negative attitude towards ban on smoking as well as hookah in traditional cafes (p=0.072) had significant effects on the recent use of hookah; however, these effects were not statistically remarkable (Table 6).

Discussion

At present, 55 % of hookah smokers believed that harms of hookah were less than cigarette that is in line with those of previous studies (Smith et al., 2007; Eissenberg et al., 2008; Primack et al., 2008). The current survey showed that the hookah was more socially acceptable than cigarette such that more than half of people assessed social acceptance of hookah more than cigarette which is in relevance with other investigations. Besides, most of participants were opposed to hookah smoking ban

in traditional cafes that its reasons must be searched in patterns of hookah consumption by smokers. Findings were also reported that hookah was mostly smoked by friends and in traditional cafes, and approved by their close friends. Given the Theory of Planned Behavior (TPB), social support provided by friends and hookah enjoyable consumption may lead likely in continuing hookah smoking (Glanz et al., 2008).

Majority of participants (71.1%) did not consider themselves as addicted to hookah, and nearly half of people (48.6 %) hypothesized that their hookah use will be decreased during the next five years. Moreover, three-quarters of participants were confident that they can quit hookah if they want that is similar to Heinz et al. results (Heinz et al., 2013).

Most of subjects were not intended to quit hookah because they did not consider themselves addicted to hookah, and believed even in their ability to quit it that is in accordance with Smith-Simone et al., (2008) and Ward et al., (2007), Works. Since the amount of nicotine in hookah is at least equal or more than cigarette, and also due to addictiveness of nicotine, people knowledge must be increased in these fields and necessary policies and actions must be done to prevent nicotine addiction. This result is even more important when half of people smoked hookah with cigarette, simultaneously; on the other hand, the vast majority of them were in the primary stages of hookah cessation and were not adequately ready to quit.

Two-thirds of consumers started hookah smoking before age 19 years. Importantly, whatever the start age of

hookah is lower nicotine dependency caused by hookah increases, and consequently is harder to quit. Furthermore, nicotine has serious effects on brain at the earlier ages (Caponnetto and Polosa, 2008). Although the prevalence of tobacco use is decreased in some developed countries such as Sweden and the United States, but according to the “hardening hypothesis”, addicts failed to quit due to severe dependence to nicotine (Hughes and Brandon, 2003; Warner and Burns, 2003). That may occurs among hookah smokers exposing usually more nicotine compared with cigarette smokers. Therefore, public must necessarily be provided by information in terms of hookah and its severe addiction.

According to present results, number of hookah smoking in lifetime was significantly higher for smokers than non-smokers. A survey conducted in Turkey revealed that hookah smoking among students who smoked cigarette was 9 times higher than non-smokers students who smoked hookah (Poyrazoğlu et al., 2010). Also, in Syria, smoker students smoked hookah 10 times higher than non-smokers students (Almerie et al., 2008). A study implemented in Tabriz city (Iran) among students, hookah smoked 5.96 times higher in smokers than non-smokers (Mohammad Poorasl et al., 2014). In general, it can be said that cigarette is a gateway to smoke hookah and vice versa, because both of them contain nicotine and create dependence to nicotine (Weglicki et al., 2008).

Ordinal regression model proposed that hookah smoking was 2.15 times higher among men than women across the whole life that is not in line with other works. It can be justified that the current protocol carried out among different age groups, also convenient sampling method was used, and then fewer hookah smoker women were included in the study. In most studies, age groups of teens, young adults and students were investigated; women and girls have naturally greater freedom and also are more related to society in these ages. However, Ghanbarnejad et al., (2012), study conducted in Hormozgan province in Iran among adults reported that the prevalence of hookah smoking was significantly higher among women than men. Similar to the present study, Mohammadpoorasl et al., (2014) survey showed that male students smoked hookah 2.05 times higher than female students.

Patterns of smoking that were usually associated with friends and in traditional cafes increased chance of hookah smoking that is well-documented in other studies. Dar-Odeh et al., (2010) survey stated that 87 % of Jordanian students smoked hookah with their friends. Labib et al., (2007) study in Egypt cited that 56.6 % of subjects encouraged by their friends to smoke hookah and cigarette. Numerous studies indicated the important effect of friends for starting hookah, and most of consumers smoked for the first time with their friends in cafes (Alzyoud et al., 2013; Mohammad Poorasl et al., 2014). However, the role of family and smoking with family is pointed out in some studies, especially in Arabic countries (Amin et al., 2010; Alzohairy, 2012; Amin et al., 2012). In a review article conducted by Akl et al., (2013) in 58 studies concluded that hookah use considered cultural identity among families in Arabic countries which even observed among Arabs in the West countries. Their survey

also presented the main reasons for hookah as follow socialization, relaxation, enjoyment and recreation. Peer pressure, fashion and curiosity were other reasons among students, as well.

According to “hookah smoking in past month”, this variable was associated with other effective variables included reduce the risks of smoking; not consider themselves addicted to hookah, hookah consumption patterns, and number of close friends who smoked hookah in their lifetime. This means that those believed in reducing of cigarette smoking harms when using hookah had 1.87 times more chance to smoke hookah in past month. Subjects who smoked relative to those who did not, were 0.65 times more inclined to smoke hookah that is in relevance with other results. This inconsistency can be result of the fact that participants may supplied their nicotine through cigarette smoking and they use hookah, rarely. Because both of them consider generally as the source of nicotine in nicotine-dependent individuals and can also act as alternatives for each other.

People who not considered themselves addicted to hookah 2.33 times more smoked than others. In our study, 71.1 % of subjects did not consider themselves addicted to hookah compared to 91 % and 67.8 % in Poyrazoglu et al., (2010) and Amin et al., (2012) studies, accordingly. In a study done in Saudi Arabia students, 65.9 % believed that hookah is not addictive (Amin et al., 2010). A common belief among most people is that hookah smokers often do not consider themselves addicted and also believe that they can quit at any time (Ward et al., 2007; Smith-Simone et al., 2008). In addition, a review study showed that most hookah smokers less estimated the addiction of hookah smoking than cigarette smoking and they also thought that can quit whenever they want (Akl et al., 2013).

At present, people that their more close friends smoked hookah 1.49 times more prone to smoke hookah in their lifetime. Alzyoud et al., (2013) survey conducted on Jordanian students stated that by increasing 1 out of 5 intimate friends, the chances of hookah smoking was increased 1.4 times in past month, and probability of smoking was increased 1.1 times by receiving a suggestion from a friend. As aforementioned, in most countries especially in Arabic countries, hookahs smoking with friends and in group forms are common.

The fact that the present study conducted using convenient sampling method, cross-sectional and low sample of women smokers may limit the generalizability of the results beyond this survey.

In conclusion, the results of the current study indicated that hookah smoking with friends in traditional cafes, low perceived addictiveness of hookah, low perceived harm, being male gender and, negative attitude towards ban on cigarette and hookah smoking were the facilitators of ever and past 30- day hookah smoking. These variables must be considered for preventing and control of hookah smoking. In addition, education about severe addiction of hookah and health deteriorating appeared to be useful.

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Conflict of Interest
None

Foot Notes

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Authors' Contribution

Rahman Berdi Ozouni-Davaji and Abdurrahman Charkazi: Study concept and design; acquisition of data: Farshid Hajili-Davaji, Ayoub Elahi; analysis and interpretation of data: Bagher Pahlavanzadeh, Yousef, Navisa Sadat Seydghasemi; drafting of the manuscript: Kamal Mirkarimi and Mitra Moodi; critical revision of the manuscript for important intellectual content: Gholamreza Sharifirad and Yousef Dadban-Shahamat

References

Akl EA, Gaddam S, Gunukula SK, et al (2010). The effects of waterpipe tobacco smoking on health outcomes: a systematic review. *Int J Epidemiol*, **39**, 834-57.

Akl EA, Jawad M, Lam WY, et al (2013). Motives, beliefs and attitudes towards waterpipe tobacco smoking: a systematic review. *Harm Reduct J*, **10**, 1.

Almerie MQ, Matar H, Salam M, et al (2008). Cigarettes and waterpipe smoking among medical students in Syria: a cross-sectional study. *Int J Tub Lung Dis*, **12**, 1085-91.

Alzohairy MA (2012). Water Pipe smoking among Qassim university male students: Prevalence and beliefs. *Intl J Health Sciences*, **6**, 45-52

Alzyoud S, Weglicki LS, Kheirallah KA, et al (2013). Waterpipe smoking among middle and high school Jordanian students: patterns and predictors. *Int J Env Res Pub Health*, **10**, 7068-82.

Amin TT, Amr M, Zaza BO, et al (2010). Harm perception, attitudes and predictors of waterpipe (shisha) smoking among secondary school adolescents in Al-Hassa, Saudi Arabia. *Asian Pac J Cancer Prev*, **11**, 293-301.

Amin TT, Amr MAM, Zaza BO, et al (2012). Predictors of waterpipe smoking among secondary school adolescents in Al Hassa, Saudi Arabia. *Int J Behav Med*, **19**, 324-35.

Baheiraei A, Mirghafourvand M, Nedjat S, et al (2012). Prevalence of water pipe use and its correlates in Iranian women of reproductive age in Tehran: a population-based study. *Med Princ Pract*, **21**, 340-4.

Caponnetto P, Polosa R (2008). Common predictors of smoking cessation in clinical practice. *Respir Med*, **102**, 1182-92.

Cobb C, Ward KD, Maziak W, et al (2010). Waterpipe tobacco smoking: an emerging health crisis in the United States. *Am J Health Behav*, **34**, 275-85.

Dar-Odeh NS, Bakri FG, Al-Omiri MK, et al (2010). Narghile (water pipe) smoking among university students in Jordan: prevalence, pattern and beliefs. *Harm Reduct J*, **7**, 1.

Dehdari T, Jafari A, Joveyni H (2012). Students' perspectives in Tehran university of medical sciences about factors affecting smoking hookah. *Razi J Med Sci*, **19**, 17-24.

Eissenberg T, Shihadeh A (2009). Waterpipe tobacco and cigarette smoking: direct comparison of toxicant exposure. *Am J Prev Med*, **37**, 518-23.

Eissenberg T, Ward KD, Smith-Simone S, et al (2008). Waterpipe

tobacco smoking on a US College campus: prevalence and correlates. *J Adolesc Health*, **42**, 526-9.

Gatrad R, Gatrad A, Sheikh A (2007). Hookah smoking. *BMJ Br Med J*, **335**, 20.

Ghanbarnejad A, Aghamolaei T, Ghafari HR, et al (2012). Hookah smoking and associated factors in rural region of hormozgan, Iran. *Zahedan J Res Med Sci*, **14**, 111-3.

Glanz K, Rimer BK, Viswanath K (2008). Health behavior and health education: theory, research, and practice, John Wiley and Sons.

Griffiths MA, Harmon TR, Gilly MC (2011). Hubble bubble trouble: the need for education about and regulation of hookah smoking. *J Pub Pol Mark*, **30**, 119-32.

Hammal F, Mock J, Ward K, et al (2008). A pleasure among friends: how narghile (waterpipe) smoking differs from cigarette smoking in Syria. *Tob Control*, **17**, 3-10.

Heinz AJ, Giedgowd GE, Crane NA, et al (2013). A comprehensive examination of hookah smoking in college students: use patterns and contexts, social norms and attitudes, harm perception, psychological correlates and co-occurring substance use. *Addict Behav*, **38**, 2751-60.

Hughes JR, Brandon TH (2003). A softer view of hardening. *Nicotine Tobacco Res*, **5**, 961-2.

Katurji M, Daher N, Sheheitli H, et al (2010). Direct measurement of toxicants inhaled by water pipe users in the natural environment using a real-time in situ sampling technique. *Inhalation Toxicol*, **22**, 1101-9.

Labib N, Radwan G, Mikhail N, et al (2007). Comparison of cigarette and water pipe smoking among female university students in Egypt. *Nicotine Tobacco Res*, **9**, 591-6.

Martinasek MP, McDermott RJ, Martini L (2011). Waterpipe (hookah) tobacco smoking among youth. *Curr Probl Pediatr Adolesc Health Care*, **41**, 34-57.

Maziak W (2008). The waterpipe: time for action. *Addiction*, **103**, 1763-7.

Maziak W (2010). Commentary: The waterpipe-a global epidemic or a passing fad. *I Int J Epidemiol*, **39**, 857-9.

Maziak W (2011). The global epidemic of waterpipe smoking. *Addict Behav*, **36**, 1-5.

Maziak W (2012). The Waterpipe: A new global threat to CV health?. *Glob Heart*, **7**, 179-81.

Maziak W, Rastam S, Ibrahim I, et al (2009). CO exposure, puff topography, and subjective effects in waterpipe tobacco smokers. *Nicotine Tobacco Res*, **11**, 806-11.

Maziak W, Ward KD, Eissenberg T (2007). Interventions for waterpipe smoking cessation. The Cochrane Library.

MohammadPooras A, Abbasi Ghahramanloo A, Allahverdi-pour H, et al (2014). Prevalence of hookah smoking in relation to religiosity and familial support in college students of Tabriz, northwest of Iran. *J Res Health Sci*, **14**, 268-71.

Monn C, Kindler P, Meile A, et al (2007). Ultrafine particle emissions from waterpipes. *Tob Control*, **16**, 390-3.

Nakkash R, Khalil J (2010). Health warning labelling practices on narghile (shisha, hookah) waterpipe tobacco products and related accessories. *Tob Control*, **19**, 235-9.

Noonan D (2010). Exemptions for hookah bars in clean indoor air legislation: a public health concern. *Public Health Nurs*, **27**, 49-53.

Poyrazoğlu S, Şarlı Ş, Gencer Z, et al (2010). Waterpipe (narghile) smoking among medical and non-medical university students in Turkey. *Ups J Med Sci*, **115**, 210-6.

Primack BA, Sidani J, Agarwal AA, et al (2008). Prevalence of and associations with waterpipe tobacco smoking among US university students. *Ann Behav Med*, **36**, 81-6.

Raad D, Gaddam S, Schunemann HJ, et al (2011). Effects of water-pipe smoking on lung function: a systematic review and meta-analysis. *CHEST J*, **139**, 764-74.

- Roskin J, Aveyard P (2009). Canadian and English students' beliefs about waterpipe smoking: a qualitative study. *BMC Public Health*, **9**, 1.
- Schubert J, Hahn J, Dettbarn G, et al (2011). Mainstream smoke of the waterpipe: does this environmental matrix reveal as significant source of toxic compounds?. *Toxicol Lett*, **205**, 279-84.
- Sepetdjian E, Shihadeh A, Saliba NA (2008). Measurement of 16 polycyclic aromatic hydrocarbons in narghile waterpipe tobacco smoke. *Food Chem Toxicol*, **46**, 1582-90.
- Smith-Simone S, Maziak W, Ward KD, et al (2008). Waterpipe tobacco smoking: knowledge, attitudes, beliefs, and behavior in two US samples. *Nicotine Tobacco Res*, **10**, 393-8.
- Smith SY, Curbow B, Stillman FA (2007). Harm perception of nicotine products in college freshmen. *N Nicotine Tobacco Res*, **9**, 977-82.
- Vansickel AR, Shihadeh A, Eissenberg T (2011). Waterpipe tobacco products: nicotine labelling versus nicotine delivery. *Tob Control*, 2010.042416.
- Ward KD, Eissenberg T, Gray JN, et al (2007). Characteristics of US waterpipe users: a preliminary report. *Nicotine Tobacco Res*, **9**, 1339-46.
- Warner KE, Burns DM (2003). Hardening and the hard-core smoker: concepts, evidence, and implications. *Nicotine Tobacco Res*, **5**, 37-48.
- Warren CW, Lea V, Lee J, et al (2009). Change in tobacco use among 13—15 year olds between 1999 and 2008: findings from the global youth Tobacco survey. *Glob Health Promot*, **16**, 38-90.
- Weglicki LS, Templin TN, Rice VH, et al (2008). Comparison of cigarette and water-pipe smoking by Arab and Non-Arab-American youth. *Am J Prev Med*, **35**, 334-9.
- Wilson N, Weerasekera D, Peace J, et al (2009). Misperceptions of "light" cigarettes abound: national survey data. *BMC Public Health*, **9**, 1.
- World Health Organization (2013). Report on the global tobacco epidemic: enforcing bans on tobacco advertising, promotion and sponsorship, World Health Organization.