

## ORIGINAL ARTICLE

# The acute effects of Waterpipe smoking on the cardiovascular and respiratory systems

R.B. SHAIKH, N. VIJAYARAGHAVAN, A.S. SULAIMAN, S. KAZI, M.S. MOHAMMED SHAFI  
Gulf Medical College, Ajman, United Arab Emirates

## Key words

Waterpipe • Smoking • Cardiovascular • Respiratory • Health • Ajman

## Summary

**Objective.** To assess the acute effects of smoking in Waterpipe (WP) smokers in Ajman, United Arab Emirates (UAE).

**Context.** 202 male volunteers aged > 17 years were included. Blood pressure, heart rate and respiratory rate values of each participant, before and after a 30 minute smoking session, were measured and compared. Standardized questionnaires were also answered.

**Results.** Mean increases in systolic blood pressure ( $16 \pm 1$  mmHg), diastolic blood pressure ( $2 \pm 0.7$  mmHg), heart rate ( $6.30 \pm 0.60$  bpm) and respiratory rate ( $2 \pm 2$  breathes/min) were observed ( $p < 0.001$ ). 92% of smokers believed Waterpipe smoking (WPS) to be harmful to health and 77% of smokers took

up WPS for reasons of leisure. Results from the questionnaire revealed a significant relationship between smokers' beliefs of WPS and attempts to quit smoking ie. smokers who believed waterpipe to be harmful were more likely to try to quit. Education had influence on smokers ideas on WPS. 69% of smokers who claimed hookah is harmful had university qualification and further 23% has highschool qualification.

**Conclusions.** Smoking Waterpipe has significant effects on both the cardiovascular and respiratory system. Waterpipe smokers despite sound knowledge, show little concern towards health. Education plays an important role and creates awareness about the hazards of smoking practices, including Waterpipe.

## Aims and objectives

To assess the effects of Waterpipe smoking (WPS) on the cardiovascular and pulmonary system in the local community of Ajman.

- The study the effects of WPS on the two vital systems by measuring the blood pressure, pulse rate as well as respiratory rate before and after the Waterpipe smoking session in order to record the inference increase.
- To explore the attitude towards WPS in the community by using a questionnaire focusing on ones beliefs regarding this type of smoking as well as the frequency.

## Introduction

The suggested origins of Waterpipe smoking (also known as Hookah) dated back as far as 1500 a.C., when Dr Hakim Abul Fath, during the reign of Emperor Akbar, invented the apparatus in the attempt to create a harmless smoking alternative [1, 2]. The ancient belief of tobacco smoke rendered harmless when passed through the heated water of the apparatus has stood through the times and stemmed the common belief amongst Waterpipe smokers that WPS does not affect health [1, 3]. Once considered an activity restricted solely to poor elderly people of East Mediterranean, has in recent years rapidly become a fashionable past time commonly practiced by

young adults and adolescents, with its popularity spreading to countries outside the Middle East region [1, 3, 4]. Research in the past have documented credible evidence that WPS is detrimental to health, with associations to Chronic Obstructive Pulmonary disease, heart disease, hypertension, abortions in women and cancers including lung, esophageal, gastric & bladder [1, 3-9]. Other studies have also connected WPS to otitis media [10], gum disease [11], cancers of the lip and buccal [3, 12] and transmission of infections including Tuberculosis & Hepatitis C [3]. The World Health Organization has recently released information documenting WPS as a harmful form of smoking and has even proclaimed WPS to generate more smoke and carbon monoxide more than cigarettes [1]. Even more alarming, studies have discovered hookah tobacco to contain dangerously high levels of toxic metals, such chromium, lead and arsenic, which can predispose to cancer and multi-organ disease [9, 13]. In United Arab Emirates, WPS is popular past time, particularly amongst the states of Dubai and Ajman. It is source of major social amusement amongst youths. To date, no research of WPS has been conducted in UAE.

In spite of research revealing the health hazards of WPS, public awareness and knowledge about this practice is still rather limited. Studies on Waterpipe smoking that investigate in depth about the harmlessness of WPS, would be of great benefit to countries such as United Arab Emirates, where the activity is quite prevalent. Such research would be of great use to policy makers

as a tool for education, particularly for adolescents and young children who are prone to rebellion and engage in such harmful practices.

The purpose of our study is investigate whether or not Waterpipe smoking has the similar potential as cigarettes to induce substantial effects of the cardiovascular and respiratory systems, owing to the nicotine content in the tobacco. Nicotine is a powerful alkaloid found in tobacco which acts by passing through the blood brain barrier and binding to nicotinic receptors in the central nervous system [14-16]. Via these receptors, nicotine promotes catecholamine (adrenaline) release which in turn stimulates the heart to contract more and the blood vessels to constrict, thus causing acute rises to heart rate and arterial blood pressure. These effects, which may be observed after just a 30 minute smoking session, are temporary and return to normal within 20 minutes following withdrawal of the cigarette. In chronic smokers, excess sympathetic stimulation promotes continuous rises in heart rate and cardiac output can cause flow turbulence which may cause damage to the lining of blood vessels. This may set off platelet aggregation, causing narrowing of blood vessels and may result in hypertension and arteriosclerosis. Excess cardiac output can overload the heart and give rise to arrhythmias and even cardiac failure. Nicotine may induce, via stimulation of parasympathetic ganglia in the bronchi, constriction of the airways, leading to shortness of breath and tachypnoea (increase respiratory rate) [14]. It is also important to note that via action of nicotinic receptors, Nicotine induces addiction in smokers [14, 17, 18]. Studies in the past have shown waterpipe smoking to be linked to addiction.

Based on these principles, we will be using measurements of respiratory rate, heart rate and blood pressure to assess whether the nicotine content of WPS is substantial enough to act and cause acute effects on cardiovascular and respiratory system, similar to that of other tobacco products. A questionnaire will also be used to assess the awareness and attitudes of the waterpipe smokers.

## Study design

A descriptive cross sectional study was conducted in Ajman during the month of December in the year 2005. The research was carried out from 7.00 pm till midnight in five different, randomly selected cafes.

Operational Definition: Waterpipe smoking caused an increase in the blood pressure (BP), which was measured by a mercury sphygmomanometer, and increase in the pulse rate, which was measured by the palpation method, and also an increase in the respiratory rate, which was measured by observing the chest movements or checking the abdominal movements or by a stethoscope.

## Methods and materials

To measure the cardiovascular changes following acute exposure, we used heart rate and blood pressure. These are physiological parameters that are quite easy to measure and inexpensive. Studies have shown heart rate and BP to be quite reliable indicators of cardiovascular activity [5]. Respiratory rate is a physiological parameter of lung function, both acute and chronic. These measures are simple to execute and relatively inexpensive.

The materials used in this study were a mercury sphygmomanometer a standard stethoscope, a stopwatch and a standardized questionnaire.

The first step of the procedure involved taking written consent from the manager via a form which introduced the researchers and clearly stated the purpose of the study. Waiters and other workers were also informed to avoid any unnecessary confrontations. We introduced ourselves to the participants, before permission from them to take part in the study, while reassuring confidentiality. This enabled us to gain the trust of the volunteers, 202 male participants volunteered in this study carried out in 5 different Waterpipe cafes in Ajman, United Arab Emirates. After fully explaining the procedure and aim of the study to the volunteers, oral consent was gathered from each of them. Most of the participants were habitual Waterpipe smokers, while some were new. Before smoking, each participant filled out a standardized questionnaire.

Blood pressure, heart rate and respiratory rate were taken before and after a smoking session of 30-45 minutes (max. 60 minutes). The 2 values were then compared for any changes (increase, decrease or no change).

Mercury Sphygmomanometers were used, rather than automated instruments, to avoid high chance of errors. They were seated for five minutes then the 'before readings' were taken, the volunteers remained seated throughout the study period [6]. To measure blood pressure, the cuff firmly was placed on the volunteer's right arm, 2 finger-breadths above the cubital fossa. The sphygmomanometer was placed on a horizontal surface approximately at heart level of the volunteer, with the mercury column facing the researcher. Inflation of cuff took place until the pulse disappeared. The cuff was then deflated then inflated above the level of pulse disappearance. While deflating of the cuff, the researcher auscultated for the appearance and disappearance of Koratkoff sounds, noting down the mercury level of sphygmomanometer (Systolic and Diastolic Blood Pressure respectively). Pulse rate was measured by placing three fingers on the right wrist over the radial artery, using the middle finger is to check for the pulsations, while the index and ring finger stabilizes the artery. The respiratory rate was checked by observing chest movements during 1 minute, while the palpating for pulse rate to eliminate the volunteer's awareness of the activity ie. People tend to breathe more or less when they are aware that someone is measuring the respiratory rate and this can produce false results [19].

## METHODS OF SAMPLING

We observed a variety of cafés in Ajman which sold Hookah as a main item. Based on our observations, we then selected the 5 cafes, which accommodated the largest number of WP smokers. Once the cafes were selected, we spent time monitoring for the regular smoking customers of the cafes, before “randomly” asking smokers whether or not they’d be interested in participating in the study. These volunteers would be representative of the non-elderly population of Waterpipe smokers in Ajman.

## QUESTIONNAIRE

It was a combination of both self-administered and interview type of questionnaire. The self-administered type saved time and reduced the chances of bias, it also encourages the participant to participate and give neutral responses to sensitive questions.

The interview type avoided the problem of illiteracy. Missing information and inappropriate responses could therefore be avoided.

Before proceeding to the conduction of the study, an exclusion and inclusion criteria had to be designed to decide who will be included and exclude from the study. Careful selection of the volunteers was essential to avoid bias and inaccurate results.

## EXCLUSION CRITERIA

- Females not included as few woman in UAE take up WPS. Furthermore, of those who do, only a very small number of women smoke in public Hookah cafes, as the Arab society tends to view smoking amongst women as a sort of “taboo”. Finally, majority of women in UAE are conservative and less likely to take part in research, particularly if organized by men.
- Participants under age 17 years, since the legal age for Waterpipe smoking in United Arab Emirates is above age 17.
- People who smoked cigarettes at the time of the Waterpipe smoking session.
- People who had already started the session and smoked for more than 5 minutes;
  - effect of nicotine can take effect after 5-7 minutes.
- People who had their last Waterpipe smoking session less than 20 minutes before the beginning of a new smoking session;
  - effect of nicotine wears off after 20 minutes.

## INCLUSION CRITERIA

- Males above the age of 18 years were included.
- Volunteers from Ajman Cafes, as Waterpipe smoking in Ajman is more frequent than the other parts of Emirates, and location wise participants are much more accessible.
- Volunteers in bachelor oriented cafes rather than family restaurants. People who visit family restaurants do so with intention of spending time with their families, rather for the purpose of smoking. There-

fore not only would it be difficult attain substantial samples of WPS for the project, it would also be inappropriate to risk disrupt the pleasurable family times of customers for the purpose of the research.

- Participants, who only used Waterpipe, and not cigarettes, cigars or other tobacco products.
- Those who have not ingested coffee or tea prior to the smoking, since caffeine can also significantly increase blood pressure and pulse rate, and thus affected the reliability of the results.

## Results and discussion

### FINDINGS

Data was collected by measuring the changes in systolic blood pressure, diastolic blood pressure, heart rate and respiratory rate, before and after a smoking session of 45 minutes. The questionnaire conducted focused on 8 areas of interest: age range of participants, frequency of smoking per week, age started smoking, proportion of those who believe WPS is harmful, diseases perceived to be associated with WPS, proportion of those who tried to quit WPS, reasons for visiting Waterpipe cafes, reasons for preferring WPS over cigarettes and educational status with relation to belief of WPS being harmless.

### CHANGES AFTER 45 MINUTE SMOKING SESSION

The results, from the measurements of the study, revealed that after a Shisha smoking session of approximately 45 minutes, all cardiovascular (Heart rate and Blood Pressure) and respiratory system (respiratory rate) indices showed a significant increase. The mean and standard deviation before and after a smoking session were as follows Systolic blood pressure was (125.97 + 13.98 and 141.63 + 10.21); diastolic blood pressure (84.38 + 9.81 and 86.4 + 9.73); pulse rate (77.21 + 9.01 and 83.55 + 10.06); respiratory rate (17.79 + 3.93 and 19.85 + 4.20). On average, systolic Blood Pressure increased by 15.70 ± 0.950 mmHg (Ranging: 14.70-16.70 mmHg), diastolic Blood Pressure increased by 2.02 ± 0.684 (Ranging: 1.30-2.80 mmHg), heart rate increased by 6.337 ± 0.643 beats per minute (Ranging: 6-7 beats/min) and respiratory rate increases by 2.06 ± 0.269 breathes per minute (Ranging: 1.8-2.30 breath/min ie. about 2 breath/min). A paired t-test conducted, had confirmed the observed changes to be highly significant ( $p < 0.001$  and  $p < 0.05$  – 2-tailed).

In one study, conducted by the University of Jordan on 18 healthy participants, a Waterpipe smoking session of approximately 45 minutes caused acute increases in heart rate, systolic and diastolic blood pressure, which in turn greatly supported the results of our study. Comparatively however, the results gather from the Jordanian Study differed to certain degree, showing on average an increase in systolic blood pressure by 6.7 ± 2.5 mmHg, diastolic blood pressure by 4.4 ± 1.6 mmHg and heart rate 16 ± 2.4 beats per minutes. These differ-

Tab. I. Measurements before and after Waterpipe smoking.								
	Paired Differences					T	Df	Sig. (2-tailed)
	Mean	Std. Deviation	Std. Error Mean	95% Confidence Interval of the Difference				
				Lower	Upper			
Diastolic Blood Pressure before - Diastolic Blood Pressure after	2.0198	9.71533	.68357	3.3677	.67192	2.955	201	.004
Heart rate before smoking WPS - Heart rate after WPS	6.337	9.145	.643	7.605	5.068	9.848	201	.000
Respiratory rate before WPS smoking - Respiratory rate after WPS	2.059	3.818	.269	2.589	1.530	7.667	201	.000
Systolic Blood pressure Before WPS - Systolic Blood Pressure after WPS	15.658	13.507	.950	17.532	13.785	16.477	201	.000

ences in results may have occurred due to differences in population sample size, variations in the health of the participants and difference in the style of techniques used to perform the measurements, between the two studies. Nevertheless, the pattern of increase observed in results in both the Jordanian study and our study were the same [6].

Thus from this we generate the hypothesis that, assuming all confounding variables (eg. coffee, tea, stress etc.) are eliminated smoking Waterpipe over a period of 45 minutes can cause acute increases in heart rate, blood pressure and respiratory rate, owing most probably to the content of the hookah tobacco, namely nicotine. This in turn supports the idea of WPS having substantial effects on the cardiovascular system and pulmonary system.

Based on results illustrated on Table II, majority of smokers in the study were aged 25-40. There seems to be a prevalence of waterpipe smoking amongst young adults. The mean age of smokers in this study was calculated to be 33.16 years old. A similar result was observed in one Egyptian study conducted on shisha smokers, where mean age of the participants was 33.20 years old [7]. It was apparent that most smoked at a

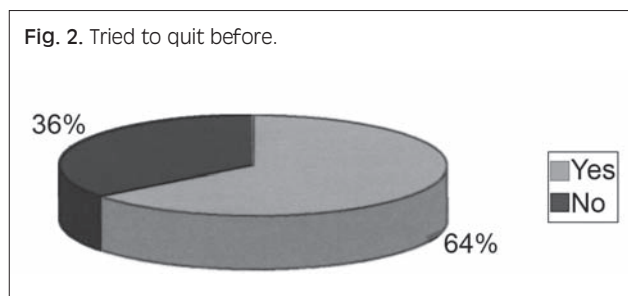
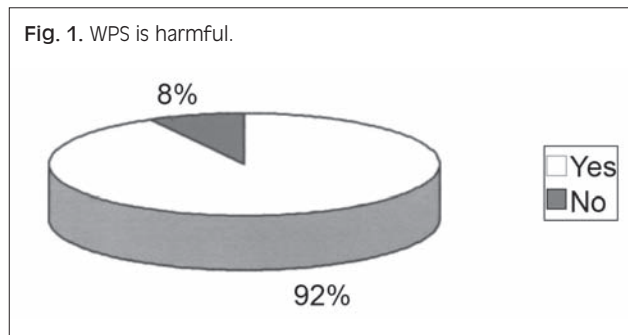
frequency of more than 3 times a week (accounting for about 40%). With preponderance of waterpipe smokers taking up the activity at rather high frequencies, the result maybe indicative of the addictive potential that is associated with WPS. Most participants began WPS at the age range of 18-25 years. This further reinforces the idea of this practice being popular amongst youths. The significantly lower number of people taking up the activity during their adolescence (ie. < 18 years old – only 17% of Waterpipe smokers) is most probably a result of introduced laws which prohibit the provision of WPS facilities to people below the age of 18.

#### PROPORTION OF THOSE WHO BELIEVE WPS IS HARMFUL

According to the results in Figure 1, 92% of participants (186 Waterpipe smokers) believe that Hookah smoking is harmful. This shows that most smokers have a sound knowledge and awareness of the harm associated with WPS. Only 8% of participants (16 Waterpipe smokers) believe that Shisha smoking is harmless, in which majority of people in this group was in the age range of 20-30 years old (young adults). This result is much less compared to that of a 2004 Israeli study, conducted on a group of university students, in

Tab. II. Age initiated WPS, frequency of smoking a week and age range of the smokers.												
	Age started			Frequency of smoking (per week)					Age Range (years)			
	< 18	18-25	> 25	1	2	3	> 3	Rare	17-25	25-40	40-55	> 55
Freq	35	84	83	55	37	23	80	7	40	126	33	3
%	17	42	41	27	18	11	40	4	19.8	62.4	16.3	1.5





which 50% of students believed in the harmlessness of hookah (with the remaining 50% believing WPS to be harmful). This difference in results maybe indicative of an increased degree of awareness amongst waterpipe smokers (about the health risks of WPS), over the last current years.

#### PROPORTION OF THOSE WHO TRIED TO QUIT WPS

From the results above, it can be observed that 64% of Waterpipe smokers (130 participants) had tried to quit WPS before. This clearly supports the concept that the activity has the potential to cause addiction and dependence amongst smokers (probably due to the nicotine content in the tobacco) [4].

#### REASONS FOR VISITING WATERPIPE CAFES

The most common reasons for visiting Waterpipe/Hookah cafes in all age groups are, to spend time with friends (75% or 154 participants) and to group smoke with friends (38% or 75 participants). These results are similar to those found in the Egyptian study, which showed "Spending time with friends" (77% of participants) as being the most common reason for visiting Hookah cafes [7]. Such results stipulate the strong association between WPS and social amusement. Other

minor reasons for visiting Shisha cafes include to meet new people (7.9%), waiting for someone (15.8%), difficulty in preparation of Waterpipe at home (8.9%) and playing cards/backgammon (23%). Participants who visit Hookah cafes for reasons of family safety and protection (24%) are more commonly seen in the older adult age groups (ie. 20-30 years and older). Value of family safety with relation to WPS is least seen amongst the younger age groups (ie. less than 20 years). A possible explanation for this, may relate to the fact that young adults or adolescents tend to be more rebellious and immature, and thus have a lesser sense of responsibility over their families. On the other hand, older adults often play more important roles in providing for their families and hence bare a greater sense of responsibility over their safety. This result is well supported in the Egyptian study, which showed that older adults (26 years old and older) tended to value family safety with regard to Waterpipe smoking more than the younger adults (18-25 years old) [7].

Habit, as a reason for choosing Waterpipe over others, accounts for 20% of participants. This result merely reinforces the idea that this practice carries the potential to cause addiction and dependence.

#### CORRELATIONS TO BELIEFS OF WPS HARMFULNESS

Results from the survey revealed a relationship between attempts to quit smoking and their belief in the harmfulness of WPS ( $p < 0.05$ ). Of the smokers who believed WPS to be harmful, 69% of them made attempts to quit. A chi-square test was used to confirm this relationship. Understandably majority of smokers (81%), who did not believe that WPS was harmful, made no attempt to quit. Interestingly 18% of those who did not believe WPS to be harmful did attempt quitting in the past. Certainly people's desire to quit is influenced by their opinions of WPS on health. Education also appeared to have an association with ideas on WPS ( $p < 0.05$ ). Of those who believed WPS to be harmful, 69% had a university degree and a further 23% had a highschool degree. Education appears to have a strong influence to smokers good awareness and understanding of WPS and its effects on health. Opinions of waterpipe being harmless did not seem to be due to lack of education, with 100% having a minimum highschool education. Ideas of WPS had little significant correlation with age of smoker, frequency of smoking or age of the smoker ( $p > 0.05$ ). This result projects the importance of education, as it creates better awareness and encourages people to take action in the form of quitting harmful

Tab. III. Correlations to beliefs of WPS harmfulness.

	Quit attempts		Age started			Frequency of smoking per weeks					Education			Age of smoker				
	Yes	No	< 18	18-25	> 25	1	2	3	> 3	Rare	R/W	H.S.	Uni	17-25	25-40	40-55	> 55	
Belief WPS Is harmful	Yes	128	58	33	77	76	49	35	21	75	6	14	44	128	34	119	30	3
	No	3	13	2	7	7	6	2	2	5	1	0	9	7	6	7	3	0
	Total	131	71	35	84	83	55	37	23	80	7	14	53	135	40	126	33	3

R/W = Read/Write; H.S. = Highschool; Uni = University

behaviors (eg. WPS) and take up more healthy alternative activities (eg. Exercise).

## Conclusion

With support from past studies, the results from our research compromise the idea that the Waterpipe smoking is safe or for that matter safer than cigarettes. Results revealed that Waterpipe does have the potential to induce effects on the cardiovascular and respiratory, via action of Nicotine. Awareness and knowledge amongst smokers appeared fairly sound, with 92% of smokers saying WPS is harmful. 64% of smokers had made attempts to quite hookah smoking, which indicates that a decent portion do show concern of their health. However 31% (58 smokers) of smokers, who believed WPS to be harmful, did not take actions to quit, suggesting possibly that things such as social life and fun are of more priority to them than health. As mentioned before,

education had significant influence of smoker's desire to quit, which furthermore emphasizes the importance of education.

Education on Hookah smoking should target youth population, as they are the ones more likely to take up the activity and more receptive to newly taught information. Children should be taught about the importance of avoiding such harmful activity. Prevention is the key. Teachings should also focus on how to quit smoking properly, informing that switching to supposed low nicotine alternatives (eg. Hookah) is not an effective to quit smoking and in fact maybe more harmful to health as it causes smokers to take deeper breaths and thus take in large quantities of harmful constituents [17, 20, 21]. Finally education on WPS should be broadcasted worldwide through television, media etc, as this may help curtail the rate of spread of this activity to other countries and also encourage policy makers to implement stricter laws of smoking.

## References

- [1] World Health Organization Study group of Tobacco Regulation. *Waterpipe Tobacco Smoking: Health effects, Research Needs and Recommended Actions by Regulators*. Tobacco Regulation Advisory Note 2005, p. 1-12.
- [2] Chattopadhyay A. *Emperor Akbar as a healer and his eminent physicians*. Bulletin of the Indian Institute of History of Medicine (Hyderabad) 2000;30:154.
- [3] Knishkowsky B, Amitai Y. *Water-Pipe (Narghile) Smoking: An Emerging Health Risk Behaviour*. Pediatrics 2005;116:113-9.
- [4] Maziak W, Ward KD. *Tobacco smoking using a waterpipe: A re-emerging strain in a global epidemic*. Tobacco Control 2004;12:327-33.
- [5] Hadidi AK, Mohammed FI. *Nicotine content in tobacco used in hubble-bubble smoking*. Saudi Med J 2004;25:912-5.
- [6] Shafagoj AY, Mohammed FI. *Levels of maximum end-expiratory carbon monoxide and certain cardiovascular parameters following hubble-bubble smoking*. Saudi Med J 2002;23:953-8.
- [7] Israel E, El-Setouhy M, Shahinaz G, Ali Aoun ES, Mohamed MK. *Water Pipe (Shisha) smoking in cafes of Egypt*. J Egyptian Soc Parasitol 2003;33:1073-85.
- [8] Aydin A, Kiter G, Durak H. *Water-pipe smoking effects on pulmonary permeability using technetium-99m DTPA inhalation scintigraphy*. Ann Nuclear Med 2004;19:285-9.
- [9] Shihadeh A. *Investigation of mainstream smoke aerosol of the argileh waterpipe*. Food Chem Toxicol 2003;41:143-52.
- [10] Effat KG. *Otosopic appearances and tympanometric changes in narghile smokers*. Egyptian J Otolaryngol 2001;18:261-70.
- [11] Natto S, Baljoon M. *Tobacco smoking and periodontal health in a Saudi Arabian Population*. J Periodontol 2005;76:1919-26.
- [12] El-Hakim IE, Uthman MA. *Squamous cell carcinoma and keratoacanthoma of the lower lip associated with "Goza" and "Shisha" smoking*. Int J Dermatol 1999;38:108-10.
- [13] Lui CF. *Toxicity of metals: basic toxicology*. 2<sup>nd</sup> Ed. Fundamentals, Target Organs & Risk Assessment, Hemisphere Publishing Corporation 1991, p. 298.
- [14] Tobacco Advisory group of Royal College of Physicians. *Physical and pharmacological effects on nicotine*. Nicotine in Britain, Royal College of Physicians of London (Report) 2002.
- [15] Kumar V, Abba AK. *Environmental toxins. Robbins & Cotran Pathologic Basis of Disease*. 7<sup>th</sup> Ed. Elsevier Saunders 2005, p. 419-34.
- [16] Smith CM, Reynard AM. *Nicotine and organ system response: textbook of pharmacology*. WB Saunders Company 1992, p. 121.
- [17] Fauci AS. *Nicotine: Harrison's Principles of Internal Medicine*. 14<sup>th</sup> Ed. McGraw-Hill Companies Inc. 1998, p. 2518.
- [18] Hardman JG. *Nicotine: Good & Oilman's - The Pharmacology Basis of Therapeutics*. 10<sup>th</sup> Ed. McGraw-Hill Companies Inc. 2001, p. 208-9.
- [19] Munro JF, Campbell IW. *Macleod's Clinical Examination Edinburgh*. 10<sup>th</sup> Ed. Churchill Livingstone 2000.
- [20] Tobacco under the microscope (tobacco brochure). *The Doctors' Manifesto for Global tobacco Control*. Tobacco Control Resource Centre 2002.
- [21] *Help stop smoking*. Environmental Health Perspect J Forum 1999;107.

■ Received on December 12, 2007. Accepted on March 26, 2008.

■ Correspondence: Dr Rizwana Burhanuddin Shaikh, MBBS, MD, Gulf Medical College, Ajman, United Arab Emirates - Tel. +971 6 7431333 - E-mail: riz\_bsk@hotmail.com

## Study of the shisha smoking

Dear participant,

We are a group of students in the 4<sup>th</sup> year of Gulf Medical College (GMC). We are conducting a community based study about the immediate effects of shisha smoking on blood pressure, heart rate and respiratory rate as well as the knowledge and practices regarding shisha smoking. We need your help to complete this study by filling in this questionnaire (survey). We assure you that the information that you give will be treated with strict confidentiality and no personal information will be included. The questionnaire will take approximately 10 minutes of your time. You have the right to participate in this study or refuse and you can withdraw at any time.

1. Age \_\_\_\_\_
2. Nationality  
 Citizen  Non-Citizen
3. Marital status  
 Single  Married  Divorced  Widowed
4. Educational status  
 Read and write  High school  University
5. When did you start shisha smoking?  
 < 18 years old  18-25 years old  > 26 years old
6. How many times/week you do shisha smoking?  
 1 time  2 times  3 times  More \_\_\_\_\_ specify
7. How long is the time you spend in shisha smoking?  
 < 1 hour  > 1 hour
8. Do you have shisha at home?  
 Yes  No
9. Did you ever try to quit smoking?  
 Yes  No
10. Do think shisha smoking is harmful?  
 Yes  No
11. Do you think smoking other types (cigarettes, pipes) is harmful?  
 Yes  No
12. Do you think any of the following diseases could be caused by shisha smoking? (You can choose more than one answer)  
 Lung cancer  Bronchial asthma  
 Heart disease  Yellow teeth  
 Impotence  Transmit diseases
13. What is/are the reason(s) for visiting shisha café? (You can choose more than one answer)  
 Don't have shisha at home  Not easy to prepare at home  
 Group smoking  Family safety  
 Meeting new people  Spending time with friends  
 Waiting for someone  Playing cards, backgammon  
 To stay away from problems
14. What is/are the reason(s) for preferring shisha over cigarettes? (You can choose more than one answer)  
 Habit  Decrease smoking hours  
 Less harmful  More pleasure  
 Nice smell  Fashion  
 Spending leisure time  Enjoy company
15. Do you have any of the following chronic diseases? (You can choose more than one answer)  
 Chest disease  Diabetes mellitus  
 Hypertension  Kidney disease  
 Heart disease  Liver disease

### FOR ACADEMIC USE ONLY

#### Results of investigations

Name & place of café: \_\_\_\_\_

Bp before smoking shisha: \_\_\_\_\_ mm/Hg

HR before smoking shisha: \_\_\_\_\_ beats/min

RR before smoking shisha: \_\_\_\_\_ breaths/min

Bp after smoking shisha: \_\_\_\_\_ mm/Hg

HR after smoking shisha: \_\_\_\_\_ beats/min

RR after smoking shisha: \_\_\_\_\_ breaths/min