

## Shisha Smoking: Knowledge and Perception among Male Medical University Students in Dammam City, Saudi Arabia

Amr Ahmed Sabra\*, Attia Z. Taha\*\*

**Abstract: Background:** There is growing evidence that tobacco use other than cigarettes is spreading across all world regions. Few reports have been published about shisha smoking among university students. It is important that medical students, the future medical practitioners, have adequate knowledge of smoking-related diseases and skills in smoking cessation. **Aim of the study:** Was to assess the level of knowledge about shisha smoking and to identify behaviors and perceptions concerning shisha smoking among male medical students at University of Dammam, Eastern Province, Saudi Arabia. **Methods:** This was a cross-sectional study conducted at University of Dammam, among male medical students of the three Colleges namely, Medicine, Applied Medical Sciences, and Dentistry. A total of 371 students were included in the study. Data were collected through an interviewer-administered questionnaire pertaining to the following: socio-demographic characteristics, prevalence of shisha smoking, knowledge about hazardous effects of shisha and students' perceptions concerning reasons of initiation, continuation and future plans of shisha smoking. Descriptive statistics and Chi-square test were used for statistical analysis. **Results:** The majority of students were Saudis (98.8%) and single (97.8%). The overall knowledge score about the adverse health consequences of shisha smoking showed that 21.6% had poor knowledge and 78.4% had good knowledge. The students of college of Medicine (85.3%) had better knowledge than Applied Medical Sciences (71.6%) and Dentistry (60.8%) college students, ( $P < 0.001$ ). Poor knowledge about shisha smoking was found among 28.0% of first level students in comparison with 18.2% and 15.7% second and third level students consecutively, ( $P = < 0.05$ ). About 57.4% of shisha smokers were thinking of quitting smoking, while the remaining 42.6% were not thinking or had no future plans to quit smoking. **Conclusion:** There is unsatisfactory level of knowledge about shisha smoking hazards among male university students in medical colleges with poor intention to quit smoking. Thus medical schools should design, teach and implement training of medical students about smoking and its related diseases to provide future medical practitioners with the knowledge and skills they need to effectively intervene with smokers as well as to have positive perceptions about their future role as medical practitioners.

**Key words:** Shisha, Knowledge, Perception, University Students, Saudi Arabia

### INTRODUCTION:

Tobacco consumption continues to be the world. The tobacco epidemic is still the leading preventable cause of death in expanding, especially in less developed

---

\*Primary Health Care Specialty, High Institute of Public Health, Alexandria University, Egypt

\*\*Department of Family and Community Medicine, College of Medicine, University of Dammam, Saudi Arabia

countries.<sup>(1)</sup> There is growing evidence that tobacco use other than cigarettes is spreading across all world regions.<sup>(2,3)</sup> It has been claimed that more than 100 million people worldwide smoke shisha daily.<sup>(4,5)</sup> Shisha is known by a number of different names, including Narghile, Argileh, Goza, Hookah, and Hubble bubble.<sup>(4,5)</sup>

Shisha smoking has been attributed to the perception that shisha is less dangerous than cigarette smoking, its easy availability, and low cost.<sup>(5,6)</sup> It is usually a social activity, engaged in by peer groups and families, and often practiced in special cafes.<sup>(5,6)</sup> In the Eastern Mediterranean Region, shisha smoking is enjoying a great rise in popularity and becoming a behavioral norm, especially for women.<sup>(7)</sup>

There is no enough epidemiological data regarding shisha smoking in Kingdom of Saudi Arabia (KSA). A study conducted among male King Faisal university students, eastern province showed a 10.1% prevalence of shisha smoking.<sup>(8)</sup>

Another study conducted among undergraduate male students at the King Saud university in Riyadh city, KSA, showed that 29.8% of the students were smokers (13.8% cigarette smokers, 7.3% shisha smokers, and 27% cigarette and shisha smokers).<sup>(9)</sup> Shisha and forms of tobacco smoking other than cigarettes were the most commonly used (8.7%) among female university students in Jeddah city in the western region of KSA.<sup>(10)</sup>

Although data regarding the hazards and health effects of water pipe use is not well-established, there is growing evidence of the adverse health consequences of water pipe use, pointing towards it being as harmful as cigarettes if not even more.<sup>(7)</sup> The most important causes of smoking-related mortality include atherosclerotic vascular disease, lung cancer, and chronic obstructive pulmonary disease.<sup>(11,12)</sup> In addition, smoking is a major cause of non-fatal diseases including

osteoporosis, skin wrinkling, peptic ulcer, and reproductive disorders.<sup>(12)</sup> Shisha smoking is associated with additional risk of infection related to smoking practice including tuberculosis.<sup>(13)</sup>

More than 90% of all adult smokers begin smoking while in their teens, or earlier, and more than half become regular, daily smokers before they reach the age of 19.<sup>(1)</sup> Most of the studies about shisha smoking have been conducted among adults; only few reports have been published about university students.<sup>(13)</sup>

It is important that medical students, the future medical practitioners, have adequate knowledge of smoking-related diseases and skills in smoking cessation. They should encourage their patients to quit smoking.<sup>(14)</sup>

The aim of the present study was to assess the level of knowledge about shisha smoking and to identify perception concerning shisha smoking among male medical students at University of

Dammma, previously known as King Faisal University (KFU), in Dammam city, Eastern Province, KSA.

## **SUBJECTS AND METHODS**

### **I-STATISTICAL DESIGN:**

This was a cross-sectional study conducted at University of Dammma, Eastern Province, KSA during the year 2008. The target population consisted of all male students (levels 1 to 3) of the three Colleges namely, Medicine, Applied Medical Sciences, and Dentistry with a total number of 572 students registered for the academic year 2008-2009. Other levels (levels 4 to 6) were excluded from the study because they usually study at hospitals or other places outside the university campus and were not accessible during the time of the study. The study was approved by the College of Medicine authorities. Confidentiality of the information was strictly adhered to by assuring the participants that no any personal details would be distributed and

that data would be used for research purposes only.

The study sample was calculated by the "Computer package EPI INFO version 6" according to the total number of the male students of the three colleges with an estimated average prevalence of shisha smoking of 10.1% <sup>(8)</sup>, and at a confidence level of 95%. Thus, an estimated sample size of 491 students was included in the study using simple random sampling technique. A total of 371 students answered the questionnaires with a response rate of 75.6% and were distributed as follows: Medicine (225), Applied Medical Sciences (95), and Dentistry (51). All Saudi and non-Saudi students were included in the study. A pilot study was conducted to test the validity and the logistics of administering the questionnaire. Students selected in the pilot study were excluded.

## II-TECHNICAL DESIGN:

Data collection was accomplished

through a self-administered questionnaire constructed by the investigators. All the questions were close-ended and the questionnaire consisted of four main parts:

1. Student' socio-demographic characteristics: college, academic year, nationality, marital status, fathers' and mothers' education, fathers' and mothers' occupation, smokers in residency place, smoking parents, family monthly income, and smoking status.
2. Questions to assess the knowledge about the hazardous effects of shisha on health and their sources of information about shisha.
3. Questions about students' perceptions concerning reasons of initiation, continuation and future plans of shisha smoking.

For the knowledge questions a scoring system was used giving a value of one to each correct answer and a value of zero to the wrong or don't know answers. The total

knowledge score was divided into two equal categories: Poor knowledge and Good knowledge.

### III-STATISTICAL ANALYSIS:

Data collected were checked for accuracy and completeness and were coded and entered into the Statistical Package for Social Sciences (SPSS) software version 16. Descriptive statistics for all studied variables and Chi-square test were used and a P-value level of <0.05 was considered significant throughout the study.

### RESULTS:

Table 1 shows the socio-demographic characteristics of the university students. It was noticed that 60.7% of the students were from College of Medicine, 42.3% in their first academic year, and the majority were Saudis and single (98.8% and 97.8% respectively). About 49.1% and 31.3% of the students' fathers and mothers had university or higher education, respectively. It was observed that 84.4% of the

university students were non-smokers. The overall percentage of shisha smoking was 12.6% (8.6% shisha only and 4% smoke both shisha and cigarettes).

The overall knowledge score about the adverse health consequences of shisha smoking among university students showed that 21.6% had poor knowledge and 78.4% had good knowledge (Figure 1).

University Student's knowledge about the effects of shisha smoking on health showed that 47.2% and 14.8% of them had wrongly mentioned that shisha smoking leads to psychiatric diseases and increases the level of concentration and thinking, respectively. Moreover, 7.5% and 9.4% of the students had wrongly mentioned that shisha had no effect on health at all and it leads to increased appetite, respectively. About one-quarter (24.3%) of the university students had wrongly mentioned that shisha smoking can't transmit communicable diseases. On the other hand, 46.6% of the students mentioned

that shisha smoking can lead to both increased levels of LDL-cholesterol and heart burn, while 42.6% of the students didn't know that it may lead to peptic ulceration. The majority of university students had correctly mentioned that shisha smoking can lead to lung cancer, atherosclerosis and coronary heart disease, and chronic respiratory diseases (90.0%, 87.3%, and 82.2% respectively) (Table 2).

Table 3 demonstrates the association between socio-demographic factors and knowledge level of university students. It was observed that poor knowledge about shisha smoking was found among 39.2% of Dentistry college students, 28.4% among students of Applied Medical Sciences college, and 14.7% of students of college of Medicine, with a statistically significant difference between different colleges ( $P < 0.001$ ). Poor knowledge about shisha smoking was found among 28.0% of first level students in comparison with

18.2% and 15.7% second and third level students consecutively with a statistically significant difference between the three class levels ( $P = < 0.05$ ). About 82.1% of non-shisha smokers had good knowledge about shisha and moreover 53.2% of shisha smokers had also good knowledge with a high statistically significant difference between them ( $P < 0.001$ ).

By studying the correlation between knowledge level of university students concerning shisha smoking with other socio-demographic characteristics (nationality, marital status, monthly income, smokers in residency place, smoking father and mother, fathers' and mothers' education, and mothers' occupation), no statistical significant association was found.

Regarding sources of money spent on shisha smoking, monthly college allowances given to students by the university was mentioned by 65.9% of smokers followed by own pocket money given by parents (61.7%). When students

were asked about the self-benefits of shisha smoking, 57.4% mentioned that relaxation and decrease of stress and entertainment and spending happy times as the two common benefits. About one-third of students mentioned that participation with friends in discussion was an important self-benefit of shisha smoking (Table 4).

Table 5 shows the students perceptions concerning shisha smoking. Curiosity was mentioned by 55.3% of shisha smokers followed by filling leisure time (44.7%) as the main reasons of shisha smoking for the first time. Also 44.7% and 23.4% of shisha smokers mentioned that they don't care and they need to explore new things, respectively, as the main reasons for continuation of shisha smoking. More than half (57.4%) of shisha smokers mentioned that they are thinking of quitting shisha smoking, while 21.3% mentioned that they both are not thinking of quitting and have no future plans regarding quitting. More

than half of the parents (53.2%) of shisha smokers knew that their son is smoking but only 42.6% of parents advised them to quit smoking.

Regarding the sources of information about shisha smoking among university students, it was noticed that television was mentioned as the main source (68.2%), followed by internet (57.1%), and friends (52.6%), while primary health care centers were mentioned by only 20.8% of the students.

#### **DISCUSSION:**

The socio-demographic characteristics of the studied population reflected the pattern of university students in KSA as the majority of students were Saudis and single. The high level of education of students' parents and the high family income indicated the high socioeconomic status of the studied population.

The present study showed that the overall knowledge score about the adverse health consequences of shisha smoking

among male medical university students was unsatisfactory, where 21.6% had poor knowledge and 78.4% had good knowledge. About 86.3% of students in this study mentioned that shisha smoking was harmful to health, 90% and 82.2% knew that lung cancer and chronic respiratory diseases, respectively were related to smoking. This is in agreement with many other studies.<sup>(15,16,17,18)</sup> Kawakami,<sup>(15)</sup> in his study about the awareness of the harmful effects of smoking among Japanese medical students, had mentioned that most respondents thought smoking was harmful to health, 97% knew lung cancer was related to smoking and knowledge of smoking-related diseases (pulmonary emphysema, coronary heart disease, peptic ulcer, and neonatal death) were generally less than 50%. Moreover, Maziak *et al* study among university students in Syria mentioned that respiratory disease was the most commonly cited health effect of narghile smoking.<sup>(16)</sup> A study conducted

among 4<sup>th</sup> and 5<sup>th</sup> year medical students in faculty of medicine, Alexandria university, Egypt found that the awareness of harmful effects of smoking and knowledge about the causal role of tobacco in the development of specific diseases were deficient.<sup>(17)</sup> Another study conducted in the college of Applied Medical Science, King Saud university, reported that 73% of the students were aware of the health hazards of smoking.<sup>(18)</sup>

It is expected that teaching medical students about smoking and smoking-related diseases is better among college of Medicine than other colleges. This was shown in the present study where the students of college of Medicine (85.3%) had better knowledge than Applied Medical Sciences (71.6%) and Dentistry (60.8%) college students, ( $P < 0.001$ ).

An Australian study about smoking behaviour and attitudes among medical students reported that knowledge about the causal role of smoking in the development

of specific diseases improved significantly from year 1 to year 5 ( $P < 0.001$ ). Nevertheless, in year 5 there remained a lack of knowledge about the relationship of smoking and some diseases.<sup>(19)</sup> Moreover in the Japanese study,<sup>(15)</sup> knowledge of smoking-related diseases increased by the 5th year. The present study indicated that good knowledge about shisha smoking was found among 72.0% of first level students in comparison with 81.8% and 84.3% second and third year students consecutively.

A study conducted among undergraduate male students at King Saud University in Riyadh city, KSA,<sup>(9)</sup> showed that students who were more knowledgeable about the dangers of smoking were 8% less likely to smoke than students who were more knowledgeable. Also the present study showed that, about 82.1% of non-shisha smokers had good knowledge about shisha and 53.2% of shisha smokers had also good knowledge.

The high amount of money spent on shisha smoking from students' college allowance and from money given by parents reflected the high socioeconomic status of university students. This result was similar to other studies which showed that the majority of shisha smokers belong to high income group.<sup>(20, 21)</sup> The availability of a large amount of money is probably a great motive for students to start and continue smoking with peers and friends. This finding was in agreement with Al-Damegh et al study among male secondary students which showed that the more pocket money received by the students, the higher was the prevalence of smoking.<sup>(22)</sup>

A study conducted in Pakistan concerned with shisha smoking among adolescents reported that 33% of shisha smokers mentioned that they are having more friends and discussing different issues while smoking shisha.<sup>(20)</sup> In the present study students think that smoking

shisha would give them a sense of stress relief and entertainment. Part of this belief is the lack of knowledge and awareness about the harmful effects of shisha smoking. Another motive for them to smoke is that smoking shisha is starting to become a socially acceptable behavior among some families and the community. This is in agreement with the Syrian study which showed that shisha smoking is an appealing way to spend leisure time socializing with friends.<sup>(16)</sup>

The present study showed more than half (55.3%) of students initiated shisha smoking for the first time to explore what is it, to fill their leisure time (44.7%) and to relax after study or examination (40.4%). This result was similar to Al Turki study done to explore smoking habits among medical students in central Saudi Arabia.<sup>(23)</sup> Our result was also consistent with other studies.<sup>(16,20,24)</sup>

An important finding was that 19.1% of smokers started smoking to imitate

smoking father, relatives and friends. This result was similar to other studies which showed that a high proportion of shisha smokers were having friends who smoke shisha and were coming from a household where a greater number of nargiles were smoked daily.<sup>(25,26)</sup> Al-Mohamed et al study on the pattern and prevalence of smoking among students at King Faisal University, KSA, showed in a multivariate model that having parents and other family members who smoked was a risk factor for smoking (OR = 2.52; 95% CI = 1.89-3.36); while having all or most close friends as smokers was an even greater risk (OR = 6.86; 95% CI = 5.14-9.16).<sup>(27)</sup>

The reasons for continuation of shisha smoking were not that different from the reasons for initiation of smoking. When asked about the reasons for continuation of shisha smoking, a high proportion of smokers (44.7%) replied that they don't care. This reflects the disorientation and lack of decision-making by younger

students. This might possibly be due to inadequate parental and family concerns and advice and inadequate mass media and community health education.

More than half of shisha smokers (57.4%) were thinking of quitting smoking, while the remaining 42.6% were not thinking or had no future plans to quit smoking. This result was similar to many other studies when smokers were asked about their desire to stop smoking.<sup>(23,28,29)</sup> In a Syrian study,<sup>(28)</sup> quit attitude of café customers showed that the majority (86.5%) believe that they can quit waterpipe any time, but only a minority (28.4%) are interested in quitting. Another study among university students,<sup>(29)</sup> indicated that more than half of current smokers (56%) believed they could quit cigarettes and 75.2% were interested in quitting. In a study of smoking habits of Saudi male medical students, 57.1% of current smokers were motivated to stop smoking and 42.9% were not motivated.<sup>(23)</sup>

More than half of the parents (53.2%) of shisha smokers knew that their son is smoking. This finding might point to the fact that shisha is becoming an acceptable social behavior.<sup>(6,7)</sup> Although 42.6% of shisha smokers had their parents advised them to quit smoking, yet they were still current smokers. Possible explanations for smokers not to quit might be that students had poor knowledge and awareness about the health hazards of shisha smoking and that the influence and pressure of peers and friends was too strong not to quit smoking.

The fact that television was the main source of information about shisha smoking was consistent with Taha study,<sup>(30)</sup> which showed that television was the main source of information about health and disease as reported by both male and female students. Also, media influence was considered to be the major source of information on the health consequences of smoking among students in College of

Applied Medical Science, KSA.<sup>(18)</sup> In the present study the least source of information was primary health care centers. This might reflect inadequate health education by the health team, low utilization of the center's services by younger people or inadequate involvement of the center in community health programs.

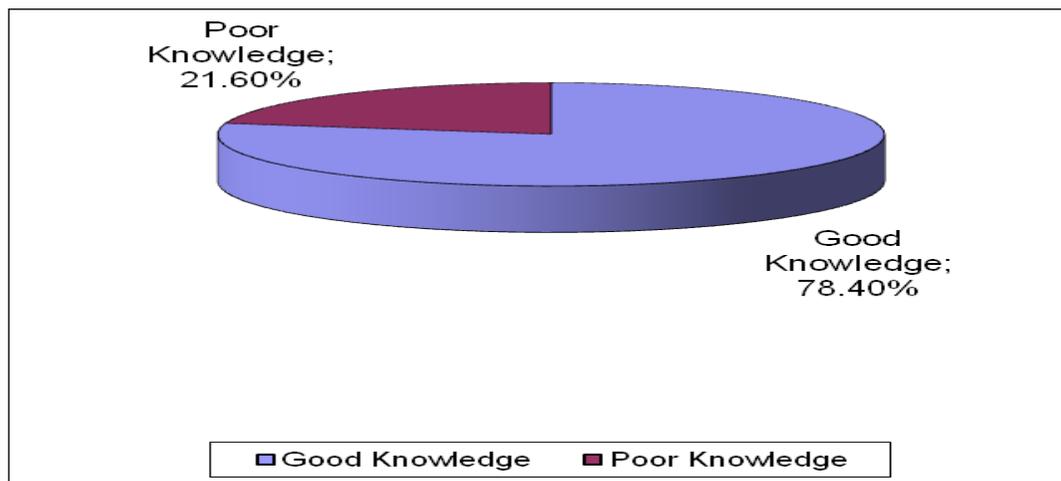
#### **CONCLUSIONS AND RECOMMENDATIONS:**

In conclusion., this study showed unsatisfactory level of knowledge about shisha smoking and its related health hazards among male university students in medical colleges at University of Dammam. It also revealed the reasons for initiation and continuation of shisha

smoking. Moreover the students' intention to perform smoking cessation in the future seemed to be unsatisfactory. Thus it is recommended that medical schools should design, teach and implement training of medical students about smoking, smoking-related diseases and a patient-centered smoking cessation intervention. These measures are important to provide future medical practitioners with the knowledge and skills they need to effectively intervene with smokers as well as to have positive perceptions about their future role as medical practitioners. These should be coupled with interventions to raise the public awareness of smoking cessation in general with specific emphasis on shisha.

**Table 1: Socio-demographic characteristics and smoking status of the university students**

Socio-demographic characteristics	University students (n=371)	
	No.	%
<b>College:</b>		
Medicine	225	60.7
Applied Medical Sciences	95	25.6
Dentistry	51	13.7
<b>Academic Year:</b>		
First year	157	42.3
Second year	99	26.7
Third year	115	31.0
<b>Nationality:</b>		
Saudi	367	98.9
Non-Saudi	4	1.1
<b>Marital Status:</b>		
Single	363	97.8
Married	8	2.2
<b>Father's education:</b>		
Illiterate or read and write	34	9.2
Primary	24	6.4
Intermediate	33	8.9
Secondary & Diploma	93	25.1
University & higher education	182	49.1
Refused to answer	5	1.3
<b>Mother's education:</b>		
Illiterate or read and write	74	19.9
Primary	41	11.1
Intermediate	46	12.4
Secondary & Diploma	86	23.2
University & higher education	116	31.3
Refused to answer	8	2.1
<b>Fathers' occupation:</b>		
Oil company employee	93	25.1
University staff, physicians	127	34.2
Military, National Guard	24	6.5
Civil service	50	13.5
Unemployed	14	3.8
Retired	63	15.9
<b>Total Family income/ month in Saudi Riyals:</b>		
< 3000 S.R.	27	7.3
3000-< 6000 S.R.	35	9.4
≥ 6000 S.R.	292	78.7
Refused to answer	17	4.6
<b>Smoking status:</b>		
Non Smokers	313	84.4
Shisha only	32	8.6
Cigarettes only	11	3.0
Both Shisha and cigarettes	15	4.0



**Figure 1: Distribution of university students according to their level of knowledge about the adverse health consequences of shisha smoking**

**Table 2: Knowledge of university students about the hazardous effects of shisha on health**

Knowledge items	Total (n=371)					
	Yes		No		Don't know	
	No.	%	No.	%	No.	%
No health effects at all*	28	7.5	320	86.3	23	6.2
Lung cancer	334	90.0	8	2.2	29	7.8
Chronic respiratory diseases	305	82.2	8	2.2	58	15.6
Triggering attacks in asthmatic patients	271	73.0	11	3.0	89	24.0
Increased absorption of carbon monoxide	295	79.5	5	1.4	71	19.1
Increased oxygen inhalation*	27	7.3	260	70.1	84	22.6
Atherosclerosis and coronary heart diseases	324	87.3	9	2.5	38	10.2
Increased LDL-Cholesterol	173	46.6	8	2.2	190	51.2
Heart burn	173	46.6	12	3.3	186	50.1
Peptic ulcer	197	53.1	16	4.3	158	42.6
Increased appetite*	35	9.4	193	52.0	143	38.6
Dental deformities	317	85.4	11	3.0	43	11.6
Transmission of communicable diseases	161	43.4	90	24.3	120	32.3
Neonatal death	291	78.4	9	2.5	71	19.1
Increased level of concentration & thinking*	55	14.8	224	60.4	92	24.8
Psychiatric diseases*	175	47.2	47	12.7	149	40.1

\* Indicates wrong answers

**Table 3: Association between socio-demographic factors and knowledge level of university students about shisha smoking**

Variables	Knowledge level				Total (n=371)		$\chi^2$ -test (P-Value)
	Poor Knowledge		Good Knowledge				
	No.	%	No.	%	No.	%	
<b>College:</b>							
Medicine	33	14.7	192	85.3	225	100.0	18.36
Applied Medical Sciences	27	28.4	68	71.6	95	100.0	( 0.00)
Dentistry	20	39.2	31	60.8	51	100.0	
<b>Class level:</b>							
First	44	28.0	113	72.0	157	100.0	6.921
Second	18	18.2	81	81.8	99	100.0	(0.031)
Third	18	15.7	97	84.3	115	100.0	
<b>Shisha smoking status:</b>							
Shisha smokers	22	46.8	25	53.2	47	100.0	20.27
Non-shisha smokers	58	17.9	266	82.1	324	100.0	(0.00)
<b>Fathers' occupation:</b>							
Oil company employees	22	23.7	71	67.3	93	100.0	
University staff, physicians	26	20.5	101	79.5	127	100.0	
Military, National Guard	2	8.3	22	91.7	24	100.0	18.33
Civil service	8	16.0	42	84.0	50	100.0	(0.011)
Unemployed	8	57.1	6	42.9	14	100.0	
Retired	14	22.2	49	77.8	63	100.0	

**Table 4: Sources of money spent and self- reported benefits of shisha smoking among smokers**

Characteristics	University students <sup>#</sup> (n=47)	
	No.	%
<b>Sources of money spent on shisha smoking:*</b>		
Monthly college allowance to students	31	65.9
Own pocket money given by parents	29	61.7
Brothers and sisters	2	4.2
Friends	2	4.2
Other sources	4	8.5
<b>Self-benefits of shisha smoking: *</b>		
Relaxation and decrease of stress	27	57.4
Entertainment and spending a happy time	27	57.4
Participation with friends in discussion	16	34.0
Concentration during studying	5	10.6
Feeling as a grown-up man	5	10.6
Forgetting family problems	3	6.4
Sleeping	3	6.4
Independence from parents	2	4.2

\* Response categories were not totally exclusive

<sup>#</sup> Total number of shisha smokers was 47

**Table 5: Students and parents perceptions concerning shisha smoking**

Characteristics	University students <sup>#</sup> (n=47)	
	No.	%
<b>Reasons of shisha smoking for the first time:*</b>		
Curiosity	26	55.3
Fill my leisure time	21	44.7
Relax after study or examination	19	40.4
Relax and decrease stress	12	25.5
Imitate smoking father, relatives and friends	9	19.1
Share with friends	7	14.9
Forget family problems	5	10.6
Feel as a grown-up man	4	8.5
<b>Reasons for continuation of shisha smoking:*</b>		
Doesn't care	21	44.7
Desire to explore new things	11	23.4
Stress and life problems	9	19.1
Desire to have status among friends & society	7	14.9
Not convinced with hazards	6	12.8
<b>Future plans concerning shisha smoking:</b>		
Thinking of quitting	27	57.4
Not thinking of quitting	10	21.3
No future plans	10	21.3
<b>Parents know that their son is smoking shisha</b>	25	53.2
<b>Parents advise their son to quit shisha smoking</b>	20	42.6

\* Response categories were not totally exclusive

<sup>#</sup> Total number of shisha smokers was 47

## REFERENCES:

1. WHO. The role of health professionals in tobacco control. Geneva: WHO; 2005.
2. Warren CW, Jones NR, Eriksen MP, Asma S; Global Tobacco Surveillance System (GTSS) collaborative group. Patterns of global tobacco use in young people and implications for future chronic disease burden in adults. *Lancet*. 2006;367:749-53.
3. Global Tobacco Surveillance System Collaborating Group. Global Tobacco Surveillance System (GTSS): purpose, production, and potential. *J Sch Health*. 2005;75(1):15-24
4. WHO. Advisory Note: Waterpipe tobacco smoking: Health effects, research needs and recommended actions by regulators. WHO Study Group on Tobacco Product Regulation(TobReg).Geneva: WHO; 2005.
5. Wolfram RM, Chehne F, Oguogho A, Sinzinger H. Narghile (water pipe) smoking influences platelet function and (iso-)eicosanoids. *Life Sci*. 2003;74:47-53.
6. Kandela P. Nargile smoking keeps Arabs in Wonderland. *Lancet*. 2000; 356:1175.
7. Maziak W, Ward KD, Soweid RA, Eissenberg T. Tobacco smoking using a waterpipe: a reemerging strain in a global epidemic. *Tobacco Control*.2004;13:327-33.
8. Sabra AA, Taha AZ, Al-Sebiyani AM, Al-Kurashi NY, Al-Zubier AG. Coronary heart disease risk factors: prevalence and behavior among male university students in Dammam City, Saudi Arabia. *J Egypt Public Health Assoc*. 2007; 82(1-2):21-42.
8. Almutairi KM. Predicting smoking

- behavior among male Saudi Arabian college students. (Dissertation). The University of Nebraska. Lincoln; 2004.
9. Merdad LA, Al-Zahrani MS, Farsi JM. Smoking habits among Saudi female university students: prevalence, influencing factors and risk awareness. *Ann Saudi Med.* 2007; 27(5):366-9.
  10. Ezzati M, Lopez AD. Estimates of global mortality attributable to smoking in 2000. *Lancet.* 2003; 362:847.
  11. Bergen AW, Caporaso N. Cigarette smoking. *J Natl Cancer Inst.* 1999; 91:1365.
  12. Knishkowsky B, Amitai Y. Water-Pipe (Narghile) Smoking: An Emerging Health Risk Behavior. *Pediatrics.* 2005; 116:113-9.
  13. Richmond R. Teaching medical students about tobacco. *Thorax.* 1999; 54(1):70-8.
  14. Kawakami M. Awareness of the harmful effects of smoking and views on smoking cessation intervention among Japanese medical students. *Intern Med.* 2000;39(9):720-6.
  15. Maziak W, Eissenberg T, Rastam S, Hammal F, Asfar T, Bachir MF, et al. Beliefs and attitudes related to narghile (waterpipe) smoking among university students in Syria. *Ann Epidemiol.* 2004;14(9):646-54.
  16. Mostafa SR, Shokeir NF. Smoking-related behaviour and attitudes among medical students in Alexandria. *J Egypt Public Health Assoc.* 2002;77(1-2):1-28.
  17. Hasim TJ. Smoking habits of students in College of Applied Medical Science, Saudi Arabia. *Saudi Med J.* 2000;21(1):76-80.
  18. Richmond RL, Kehoe L. Smoking behaviour and attitudes among Australian medical students. *Med Educ.* 1997;31(3):169-76.
  19. Anjum Q, Ahmed F, Ashfaq T. Knowledge, attitude and perception of water pipe smoking (Shisha) among adolescents aged 14-19 years. *J Pak Med Assoc.* 2008;58(6):312-7.
  20. Tamim H, Terro A, Kassem H, Ghazi A, Khamis TA, Hay MM, et al. Tobacco use by university students, Lebanon, 2001. *Addiction.* 2003;98(7):933-9.
  21. Al-Damegh SA, Saleh MA, al-Alfi MA, al-Hoqail IA. Cigarette smoking behavior among male secondary school students in the central region of Saudi Arabia. *Saudi Med J.* 2004;25:215-9.
  22. Al-Turki YA. Smoking habits among medical students in Central Saudi Arabia. *Saudi Med J.* 2006;27(5):700-3.
  23. Abolfotouh MA, Abdl Aziz M, Alakija W, Al-Safy A, Khattab MS, Mirdad S, et al. Smoking habits of King Saud University students in Abha, Saudi Arabia. *Ann Saudi Med.* 1998;18(3):212-6.
  24. Maziak W, Fouad FM, Asfar T, Hammal F, Bachir EM, Rastam S, et al. Prevalence and characteristics of narghile smoking among university students in Syria. *Int J Tuberc Lung Dis.* 2004;8(7):882-9.
  25. Mohammed HR, Newman IM, Tayeh R. Sheesha Smoking among a Sample of Future Teachers in Kuwait. *Kuwait Medical Journal.* 2006;38(2):107-13.
  26. Al-Mohamed HI, Amin TT. Pattern and prevalence of smoking among students at King Faisal University, Al Hassa, Saudi Arabia. *East Mediterr Health J.* 2010;16(1):56-64.
  27. Asfar T, Ward KD, Eissenberg T, Maziak W. Comparison of patterns of use, beliefs, and attitudes related to waterpipe between beginning and established smokers. *BMC Public Health.* 2005;5:19. (cited 2007 Jan 5). Available from: <http://www.biomedcentral.com/1471-2458/5/19>.
  28. Maziak W, Hammal F, Rastam S, Asfar T, Eissenberg T, Bachir ME, et al. Characteristics of cigarette smoking and quitting among university students in Syria. *Prev Med.* 2004;39(2):330-6.
  29. Taha AZ. Self-reported knowledge and pattern of physical activity among school students in Al Khobar, Saudi Arabia. *East Mediterr Health J.* 2008;14(2):344-55.