

The Knowledge and Awareness about the Effect of Narguile Smoking on Male Reproductive Health and Fertility among College Students at University of Karbala

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ABSTRACT

Objective: This study evaluates medical students' knowledge and awareness about narguile (hooka or shisha) smoking effects on male reproductive health.

Study Design: Descriptive cross-sectional study

Place and Duration of Study: This study was conducted at the General Medicine, Dentistry, and Pharmacy Colleges at University of Kerbala from 1st March 2025 to 1st November 2025.

Methods: A descriptive cross-sectional survey and included 102 male students. The smoking behaviors, knowledge of fertility risks and perceptions of awareness campaigns were assessed.

Results: 56.9% of included students were smokers and 27.5% were cigarette smokers. 76.5% of students were aware of hookah effect on male fertility. Only 52% were aware of its' effect on reproductive hormones, and 57.8% knew that it would affect sperm quality. The peer factor had influenced 40.2% of the smokers, and 87.3% recommended awareness campaigns more; only 17.6% had consulted health care professionals.

Conclusion: As a sizeable number of students knew that hookah smoking reduces male fertility, however, the knowledge gap is considerably high with respect to its' specific effect on male hormones and sperm quality. The high number of smokers among students and the peer pressure, as well as the belief that smoking hookah is safe, show the necessity of health education programs and smoking cessation programs at universities.

Key Words: Awareness, Knowledge, Male fertility, Semen parameters, Reproductive function

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INTRODUCTION

Unlike cigarette smoking, that provides direct tobacco combustion, narguile smoking provides an indirect tobacco heating by burning charcoal and smoke filtration by the water before inhalation by the smoker.¹ Despite the widespread, but incorrect idea that water filtration eliminates the emitted toxic components within smoke, evidences suggest that it does very little to remove some toxic chemicals; nicotine, carbon

monoxide (CO) in addition to carcinogenous compounds.²

As well as, charcoal itself provides other toxicants; heavy metals and polycyclic aromatic hydrocarbons (PAHs).³ Narguile smoking was firstly performed in groups, using a single pipe with family members, friends or guests, as a measure of social connectedness.⁴ Over the years, the narguile culture and practice changed to be popular outside its' original places. In the past few decades, narguile smoking becomes a global revival and being used in particular among young adults and university students. The increasing popularity among them is largely attributed to the peer influence and social nature.^{5,6} Several studies exhibit that the prevalent use of narguile among university students is usually for recreational purposes.^{7,8}

A common misunderstanding about narguile among university students is that the waterpipe smoking is less harmful in comparison to cigarette smoking.^{9,10} Flavored tobacco products such as fruity varieties and mint-based mixes minimize the smoke intensity and suggesting the illusion that it is less harm to health.¹¹ An important factor in both initiation and maintenance of narguile smoking is peer pressure especially first time narguile smokers who are encouraged by friends due to social acceptability within peer groups.¹²

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Moreover, the wide spread pictures and videos of narguile smoking in social media sites made it more popular, young people's trendy hookah lounges and clouds of flavored smoke, give the impression of sophistication and relaxation which made it more attractive to students.¹³ The prevalence and habits of narguile smoking differ markedly between the sexes. Research indicates it is more common among male students than females. Smoking among males is more acceptable socially in several Middle Eastern societies, while female smoking in public is more likely to be stigmatized. However, recent studies indicate that narguile smoking is started to be also popular among young age females, especially those who live in urban areas at which social restrictions become laxer.¹⁴

Emerging researches exhibited that narguile smoking has a significant impact on male reproductive health. Multiple mechanisms have been involved; increased oxidative stress, hormonal imbalances and impaired semen parameters.¹⁵ A study showed that narguile smokers exhibited a 30% reduction in total sperm number with a significant decrease in the number of progressively motile sperm.¹⁶ Together, they exhibit higher levels of sperms with fragmented DNA and damaged chromatin, which usually leads to decrease male fertility and increasing the risk of miscarriage among their female partners.¹⁷

This cumulative effect (oxidative stress, hormonal imbalances, and impaired semen parameters) put narguile smokers at a higher risk of long term sub-fertility problems. Additionally, heavy metals exposure (lead and cadmium) may lead to genetic mutations in sperm which potentially affects their future offsprings.¹⁸

Together, chronic exposure to carcinogenous compounds within smoke among narguile smokers are linked with increased rates of prostatic carcinoma and penile cancers. In addition to their toxic effects, nicotine and carbon monoxide also increase the susceptibility to male genital tract and accessory glands infections (urethritis, epididymitis and prostritis). As well as to sub-fertility, the reduced serum testosterone levels, changes in seminal fluid parameters and poor sperm quality (sperm viability and fertilizing potential) as a result of smoking can predispose to chronic inflammatory diseases of reproductive system.^{19,20} So, due to the wide spread use of narguile in university students and the recognizable adverse effects on male reproductive function and fertility potentials, this study is designed to assess male students in some medical colleges' knowledge and awareness about its' possible adverse effects on male reproductive function.

METHODS

A descriptive cross-sectional survey was conducted at General Medicine, Dentistry, and Pharmacy Colleges at University of Karbala from 1st March 2025 to

1st November 2025 vide letter No. 24-90 dated 5-2-2025. A total of 102 male students from some colleges in Karbala University, from different grades from 1st year to 5th/6th year were included. These faculties were selected because of that their students receive exposure to health-related education that may affect their knowledge and awareness of smoking-related risks. The primary data collection tool was a structured questionnaire, which was carefully designed to assess different dimensions of students' awareness regarding the effects of narguile smoking on male fertility. Demographic information; age, academic level, marital status, and residence; Smoking status, preferred smoking method (cigarettes, hookah, electronic hookah), frequency of smoking, duration of smoking, and experience with peer pressure. Knowledge of how smoking affects male hormones, fertility, and reproductive health and opinions on whether smoking influences fertility, increases the risk of fetal miscarriage, or contributes to birth defects. Awareness of studies on the topic and whether participants had ever consulted a healthcare professional regarding smoking's reproductive health effects were recorded. The data was entered and analyzed through SPSS-25.

RESULTS

The majority of participants were from college of general medicine (60.8%), with the largest academic representation from sixth-year students (30.4%). A significant proportion (91.2%) was single, and 57.8% resided outside Karbala (Table 1). About 56.9% were smokers, while 43.1% were non-smokers. Among those who smoked, the preferred smoking methods were cigarettes (27.5%), followed by hookah (16.7%) and electronic hookah (12.7%), about peer pressure to smoke hookah, 40.2% of respondents admitted they had felt pressured, while 59.8% reported no such experience. Regarding the duration of smoking, most respondents had been smoking for more than five years (17.6%), while 43.1% were non-smokers (Table 2).

A total of 67.6% (n=69) of participants reported that they had previously tried smoking hookah, whereas 32.4% (n=33) indicated that they had never tried it. About 52.0% (n=53) indicated they do not smoke hookah at all. The remaining 48.0% engage in hookah smoking with varying frequency: 13.7% (n=14) smoke sometimes, another 13.7% (n=14) randomly, and 9.8% (n=10) reported daily use (once a day). Other less frequent patterns included once a week (5.9%), three times a day (5.9%), and twice a day (2.9%) [Table 3]. When asked whether they knew that hookah smoking could affect male fertility, 76.5% answered yes, while 23.5% were unaware of this risk. While most students acknowledged the fertility risks, a significant minority (23.5%) lacked awareness of this issue (Table 4).

About 60.8% of participants believed that smoking increases the risk of having children with birth defects,

while 39.2% did not recognize this risk. 70.6% acknowledged that smoking affects male sexual function, but 29.4% remained unaware, 52.0% understood that smoking affects male hormone levels, yet 48.0% were unaware (Table 5).

Table No. 1: Demographic characteristics of participants

Variable	No.	%
Academic level		
First Year	1	1.0
Second Year	10	9.8
Third Year	15	14.7
Fourth Year	19	18.6
Fifth Year	26	25.5
Sixth Year	31	30.4
Department		
General Medicine	62	60.8
Dentistry	27	26.5
Pharmacy	13	12.7
Residence		
Karbala	43	42.2
Other Cities	59	57.8
Marital Status		
Single	93	91.2
Married	9	8.8
Age group (years)		
19-20	19	
22-23	47	
24-26	36	

Table No. 2: Smoking status, methods, peer pressure and smoking duration

Smoking variables	No.	%
Are you smoker?		
Yes	58	56.9
No	44	43.1
Smoking methods		
Cigarettes	28	27.5
Hookah	17	16.7
Electronic Hookah	13	12.7
Felt Peer Pressure to Smoke?		
Yes	41	40.2%
No	61	59.8%
Duration of Smoking (years)		
< 1	7	6.9
1	3	2.9
2	3	2.9
3	10	9.8
4	4	3.9
5	13	12.7
> 5	18	17.6

About 87.3% of participants agreed that more public awareness campaigns are needed to highlight the health risks of hookah smoking. Only 17.6% had ever discussed hookah smoking's effects on fertility with a healthcare professional, while the students' awareness of the presence of chemicals and toxins in hookah smoke and their potential effects on reproductive health. Among the 102 respondents, 70.6% (n=72) answered Yes, indicating awareness of the harmful substances in hookah smoke, while 29.4% (n=30) reported no awareness (Table 6).

Table No. 3: History, experience and frequency of hookah smoking

Variable	No.	%
Did you ever try smoking hookah before?		
Yes	69	67.6
No	33	32.4
How often do you smoke hookah? Sometimes		
I do not smoke	53	52.0
Sometimes	14	13.7
Randomly	14	13.7
Once a day	10	9.8
Once a week	6	5.9
Three times a day	6	5.9
Twice a day	3	2.9

Table No. 4: Knowledge and awareness of hookah smoking's effect on male fertility

Variable	No.	%
Does hookah smoking affect male fertility?		
Yes	78	76.5
No	24	23.5
Do you know that hookah smoking may cause infertility (difficulty conceiving) after marriage?		
Yes	65	63.7
No	37	36.3
Do you know that hookah smoking can reduce semen parameters and sperm quality?		
Yes	59	57.8
No	43	42.2

Table No. 5: Perceptions of health risks

Variable	No.	%
Do you think smoking increases the risk of having children with birth defects?		
Yes	62	60.8
No	40	39.2
Do you think smoking affects male sexual function?		
Yes	72	70.6
No	30	29.4
Do you think smoking impacts male hormones?		
Yes	53	52.0
No	49	48.0

Table No. 6: Public awareness and healthcare discussions

Variable	No.	%
Do you think more public awareness campaigns are needed?		
Yes	89	87.3
No	13	12.7
Have you discussed hookah smoking's effects on fertility with a healthcare professional?		
Yes	18	17.6
No	84	82.4
Are you aware of the chemicals and toxins present in hookah smoke and their potential impact on reproductive health?		
Yes	72	70.6
No	30	29.4

DISCUSSION

This study showed that 56.9% of students were smokers and 43.1% were non-smokers. Among them, the predominant smoking method was cigarette smoking (27.5%), followed by hookah (16.7%) and electronic hookah (12.7%) These indicators imply that, despite not being their first option to consume tobacco, university students still favor hookah smoking as a huge component of consumption. This finding is consistent with prior research which suggests young adult use of hookah is common due to its perceived social acceptability and perceived lower health risk in comparison to cigarettes.²¹ In contrast, scientific evidence suggests that hookah smoke also contains nicotine, carbon monoxide, heavy metals, and carcinogenic substances, which may have severe long-term health effects, including reproductive impairment.²²

Another critical finding was the influence of peer pressure on smoking habits. A substantial 40.2% of students reported experiencing peer pressure to smoke hookah, which highlights the social nature of hookah smoking. Previous studies have confirmed that social gatherings and cultural acceptance contribute to the increasing prevalence of hookah smoking among university students.²³ This underscores the need for targeted awareness campaigns addressing peer influence and educating students on the actual risks associated with hookah smoking.

One challenge identified in this analysis is the lack of information on the impact of hookah smoking on reproductive health. The vast majority (76.5%) of students felt that hookah smoking has an impact on male fertility, yet a concerning 23.5% of students were unaware of that risk. 48.0% of students were unaware that smoking affects the male hormones, while 42.2% were unaware of its potential to reduce sperm quality. This is alarming since scientific studies prove that hookah smoking is associated with reduced testosterone

levels, reduced sperm motility, increased DNA fragmentation, and oxidative stress, all of which contribute to male infertility.²⁴

Such a knowledge gap in current study is alarming, especially in light of the expected higher level of awareness of medical and health sciences students. Studies conducted among university students in Saudi Arabia, Iran and Iraq has shown similar observations²⁵, where the low levels of awareness were due to misconceptions among participants that hookah smoking is less harmful than cigarettes. Overall, these results reveal an urgent need for educational interventions at the university level to correct misconceptions and provide accurate information to students regarding risks related to smoking and reproductive health.

Most of the participants (87.3%) agreed that there is a need for the public awareness about the health hazards of hookah smoking. The high level of agreement suggests students acknowledge the importance of health education but may not be receiving adequate information via existing university offerings. The absence of awareness workshops may suggest why only 17.6% of students ever discussed the effects of hookah smoking on fertility with a healthcare provider. I believe that the lack of engagement with medical professionals indicates either that student's underestimate the risks or that they are not proactively trying to learn about the long-term consequences of smoking. Based on research, public health professionals have been able to demonstrate through university-based awareness campaigns and smoking cessation programs that these guided programs can lessen indices of smoking prevalence, while improving general knowledge as to detrimental effects of smoking.²⁶ Based on the findings of this study, universities should conduct educational workshops, invite health professionals to give guest lectures, and host social media campaigns to offer sex education and encourage healthier lifestyle choices.

This study has important public health implications. Prevalence of smoking among students in Moldova is high and awareness about its reproductive risks is low; therefore, stronger tobacco control policies and targeted education initiatives are needed. Our solution is for universities to offer compulsory health education classes targeted at smoking reproductive repercussions. We also need to provide counselling services for students willing to quit smoking, while correcting myths related with hookah smoking.

More representation of students from other universities and majors should be included in future studies to better understand smoking behavior and awareness and level of interest in quitting. A longitudinal study would also be helpful in assessing knowledge and smoking practices over time, specifically after awareness programs are provided. Furthermore, qualitative

research methods, including focus group discussions and in-depth interviews, could give in-depth understanding of the social and psychological determinants that influence students' smoking practices.

CONCLUSION

As a sizeable number of students knew that hookah smoking reduces male fertility, however, the knowledge gap is considerably high with respect to its' specific effect on male hormones and sperm quality. The high number of smokers among students and the peer pressure, as well as the belief that smoking hookah is safe, show the necessity of health education programs and smoking cessation programs at universities. The public health agenda should be addressing misconceptions, increasing the engagement of students with healthcare professionals and the need for tobacco control measures. Long-term trends in awareness and smoking behaviours should be explored in future studies to provide insight into the impact of interventions in reducing the health risks associated with hookah smoking.

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