

# Awareness and Knowledge of Smoking-Related Cancers Among University Students in Jordan

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**Abstract Background:** Jordan, a Middle Eastern country, has a high prevalence rate of smoking. However, little research was done to evaluate knowledge of smoking-related cancers in the region. **Objective:** To assess knowledge of smoking-related cancers among Jordanian university students. **Design:** Cross-sectional study conducted in July, 2013, using a self-administered online questionnaire. The questionnaire was sent to students from University of Jordan. **Results:** The final sample consisted of 230 students. The majority of participants (98.7%) were aware that smoking has harmful health effects and (95.7%) agreed that smoking causes cancer. Most of the participants agreed that smoking causes lung cancer (97.8%), oral cancer (83.0%), laryngeal cancer (82.6%), pharyngeal cancer (80.0%), and esophageal cancer (63.0%), while less than half of the participant thought that smoking causes AML (46.1%), stomach cancer (36.1%), kidney cancer (32.6%), cervical cancer (19.6%), pancreatic cancer (19.1%), and bladder cancer (14.8%). Females showed more knowledge about smoking-related cancers than males ( $p < 0.05$ ) but there was no significant difference between smokers and non-smokers. **Conclusion:** These findings show that most of the students know that lung cancer is caused by smoking. However, there is a lower knowledge of other smoking-related cancers. Our study suggests that more efforts should be done to increase the awareness of the adverse health hazards of smoking especially that are related to cancer.

**Keywords:** smoking, awareness, knowledge, smoking-related cancers, university students, Jordan

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## 1. Introduction

Cigarette smoking is considered to be the single most important factor responsible for the high prevalence of cancer and for death related to cancer [1]. At least, 4000 chemical compounds are found in a cigarette, of which 60 are known carcinogens [2]. Ninety percent of lung cancer cases have been directly attributed to cigarette smoking. Cigarette smoking also been considered to be a cause of laryngeal, oropharyngeal, and hypopharyngeal cancers. In addition, it has been shown to increase the risk of leukemia, sinonasal cancer, nasopharyngeal cancer, and esophageal cancer. Smoking was also established as a risk factor for stomach cancer, pancreatic cancer, transitional cell carcinoma of the bladder, ureter, and renal pelvis, as well as the cancers of the uterine cervix and kidney [1,3].

Smoking cigarettes is expected to be one of the causes of an anticipated 181% increase in cancer mortality in the Middle East by the year 2020, in comparison to a 26% expected increase in the developed countries [4]. Jordan, a Middle Eastern country, has high prevalence rates of smoking as it ranked the fourth highest Arab country in smoking rates [5]. Some reports showed that smoking among the adult population in Jordan is estimated to be around 51% for males and 8% for females, which is

unacceptably high especially for males [6]. A study conducted in 2002 showed that 50.2% of university student males and 6.5% among females are smokers [7]. More recent studies reported smoking rates of 33% [8] and 29% [9] among Jordanian university students. Thus smoking is a serious public health problem in Jordan.

The aim of this study is to assess the knowledge of smoking-related cancers among university students in Jordan. Those educated students are important targets for behavioral changes as models for others in their environment and as potential society decision makers in the future [10].

## 2. Methodology

This is a cross-sectional study that was conducted in July, 2013 among students attending University of Jordan that is situated in Amman, the capital city of Jordan.

An online self-administered questionnaire was sent randomly to 500 university students. Participants were recruited from University of Jordan pages on the social network website Facebook ([www.facebook.com](http://www.facebook.com)). Facebook was selected because it is the most popular social networking website used among university students [11,12]. The link of the questionnaire was sent through

private messages to the students with a detailed explanation about the study.

The questionnaire was developed in Arabic. It was piloted on a group of university students to ensure clarity of the questions. Minor alterations in wording some questions were made. Data collected during the pilot study were not included in the study. The average time need to complete the questionnaire was around five minutes.

The questionnaire comprised three sections. The first section included basic socio-demographics variables such as age, gender, faculty, and smoking status.

The second section assessed awareness and knowledge regarding harmful effects of smoking on health. Questions used to assess awareness of the participants asked whether smoking has harmful effects on health, and whether it causes cancer. The cancer types selected in the questionnaire were based on a list from the Centers for Disease Control and Prevention official website (CDC, 2013). Questions used to assess knowledge of participants regarding specific cancers asked separately whether smoking was a cause of the following cancers or not: Blood cancer like acute myelogenous leukemia (AML), bladder cancer, cervical cancer, esophageal cancer, kidney cancer, lung cancer, oral cancer, pharyngeal cancer, laryngeal cancer, pancreatic cancer, and gastric cancer. Response categories were: "Yes", "No", "Don't know". Each correct answer for the smoking-related cancers was given 1 point. A summation for the 11 items gives a total score of 11. A possible minimum score is 0 and a maximum score is 11. A higher score indicates a greater knowledge.

The third section comprised two questions: Do you believe that you have enough knowledge about smoking-related cancers? Do you want to know more about smoking-related cancers? Response categories to the questions in this section were: "Yes", "No", "Don't know".

Statistical Package for Social Sciences (SPSS) version 19.0 was used for statistical analysis. Simple frequencies and percentages were used to express qualitative (categorical) variables. Chi-square test was used to compare frequencies when applicable. For quantitative variables, means and standard deviations were used. T-test was used to compare knowledge scores among groups. A p-value of < 0.05 was considered significant.

### 3. Results

A total of 247 university students responded to the questionnaire. Seventeen students from health and medical faculties (Medicine, Nursing, and Dentistry faculties) were excluded as we thought they may affect the results due to their medical background. A final total of 230 were included and had their results compared.

**Table 1. General Characteristic of the Participants**

Characteristic		
Gender	Male, n (%)	90 (39.1)
	Female, n (%)	140 (60.9)
Age, mean (SD)	20.7(1.6)	
Smoking status	Current smoker, n (%)	35 (15.2)
	Non-smoker, n (%)	195 (84.8)

General characteristics of the participants are described in Table 1. Mean age of the participants was 20.7 (SD: 1.6). More than half of the participants were females

(60.9%). Most of the participants were non-smokers (84.8%).

The majority of participants (98.7%) were aware that smoking has harmful effects on general health and 95.7% agreed that smoking causes cancer.

Regarding knowledge of cancers caused by smoking, most of the participants agreed that smoking causes lung cancer (97.8%), oral cancers (83.0%), laryngeal cancers (82.6%), pharyngeal cancers (80.0%), and esophageal cancer (63.0%). While less than half of the participants agreed that smoking causes AML (46.1%), stomach cancer (36.1%), kidney cancers (32.6%), cervical cancer (19.6%), pancreatic cancer (19.1%), and bladder cancer (14.8%). Knowledge of smoking-related cancers according to age and gender are illustrated in Table 2.

**Table 2. Percentage of Correct Answers for each Smoking-Related Cancer According to Smoking Status and Gender**

Cancer	Smoking Status (%)			Gender (%)			Total (%)
	Smoker	non-smoker	p-value*	Male	female	P-value*	
Bladder	11.4	15.4	0.06	13.3	15.7	0.73	14.8
Pancreas	11.4	20.5	<.05	15.6	21.4	<.05	19.1
Cervix	14.3	20.5	0.67	16.7	21.4	0.47	19.6
Kidney	17.1	35.4	<.05	27.8	35.7	0.26	32.6
Stomach	31.4	36.9	0.06	28.9	40.7	<.05	36.1
AML	45.7	46.2	<.05	48.9	44.3	<.05	46.1
Esophagus	48.6	65.6	<.05	52.2	70.0	<.05	63.0
Pharynx	77.1	80.5	<.05	71.1	85.7	<.05	80.0
Larynx	80.0	83.1	0.40	77.8	85.7	0.23	82.6
Oral	82.9	83.1	<.05	76.7	87.1	0.12	83.0
Lung	94.3	98.5	<.05	95.6	99.3	0.13	97.8

\*The two groups were compared using Chi-square test.

On the knowledge score that was calculated for each participant to assess their knowledge, females had a higher score than males (6.07 versus 5.25,  $p < 0.05$ ). Although non smokers had a higher score than smokers, it was not statistically significant (5.14 versus 5.86,  $p > 0.05$ ). Table 3.

**Table 3. Comparison between the Mean Scores of Knowledge between Males and Females, and between Smokers and Non-Smokers**

Variable	Category	Mean (SD)	p-value*
Gender	Male	5.24(2.75)	<.05
	Female	6.07(2.32)	
Smoker	Current smoker	5.14 (2.63)	0.12
	Non-smoker	5.86 (2.50)	

\*The two groups were compared using t-test.

Less than half of the participants (33.5%) felt that they had enough knowledge about smoking-related cancers. Most of the participants (78.7%) wanted to know more about smoking-related cancers.

### 4. Discussion

To our knowledge, this is the first study in the region to investigate the knowledge of university students about smoking-related cancers. Few studies that were conducted in Jordan discussed the knowledge of university students about smoking health risks and lung cancer was the only cancer that was studied [7,13].

The majority of participants (98.7%) recognized that smoking has adverse effects on health and that it is causes

to cancer (95.7%), but a smaller proportion recognized the actual types of cancer. A recent study found that 84% of Pakistani women reported that smoking has a harmful effect on their health and only 14% of them agreed that smoking can cause cancer [14]. Another study from northern Sudan reported that 96% of the participants agreed that smoking can cause cancer [15].

Our study found that knowledge of smoking-related cancers was high with regard to lung cancer (97.8%), but lower for other cancers. Most of the participants agreed that smoking is a cause of lung cancer (97.8%) which is higher than that found among Malaysian university students (87.4%) [16]. In another study from Malaysia, 91.3% of the study participants mentioned that cigarette smoking is a risk factor for lung cancer [17]. In another study from China, 77.5% of the participants knew that smoking causes lung cancer [18]. This might be attributed to the important role of pictorial warnings about lung cancer on cigarette packages in Jordan [19] and due to the role of media and health education campaign in emphasizing the adverse effects of smoking on the lungs.

More than half of the participants recognized the association between aerodigestive tract cancers and smoking. The rate of awareness among university students concerning smoking and oral cancer was 83%. A higher rate was found among undergraduate medical and nursing students in a private university in Malaysia (95.5%) [20], whereas lower rates of awareness of head and neck cancers were found among adult American smokers (67.8%) [21], and among adults in southern Iran (73.6%) [22].

Less than half of the participants recognized smoking as a risk for blood, stomach, kidney, cervical, pancreatic, and bladder cancers. These results indicate that the depth of knowledge on smoking health hazards is inadequate among university students. The poor knowledge about the association between smoking and these types of cancer is consistent with other studies [21,23,24,25,26]. For example, a study conducted in 2002 among Asian Americans found that participants awareness of the association between bladder, pancreatic, cervical and kidney cancers and smoking ranged between 49.2% and 56.8% [25]. Another US study found that 36% of patients visiting the urology clinic recognized smoking as a risk factor for bladder cancer compared to only 14.8% in our study [23]. Taking cervical cancer as another example, one study found that 31.8% of Indian female university students agreed that smoking can cause cervical cancer compared to 19.6% in our study [26].

Most prior studies have found that females had higher knowledge scores than males regarding various health hazards of smoking [21,25]. In our study, females were found to have significantly higher scores than males regarding the association between smoking and various types of cancer. This is consistent with another study conducted in Jordan, where female university students were more aware of the harmful effects of smoking than males [7].

Contrary to other studies, there was no significant difference in knowledge scores between current smokers and current non-smokers [7,18,27,28]. A prior study among university students in Jordan, with 28.6% of their sample being current smokers, found that non-smokers were more aware of the harmful effects of smoking [7].

This discrepancy between the results may be due to the small number of smokers in our study, so further studies with larger sample are recommended.

An interesting point is that most of the participants felt that they do not have enough knowledge about smoking-related cancers and most of the participants (78.7%) reported willingness to know more about smoking-related cancers. This might be a good indicator that programs directed toward increasing awareness about health hazards of smoking will be effective among university students.

These findings suggest that there is a need for public education about less known harmful effects of smoking in order to help lower both smoking prevalence and smoking-related cancers. Studies have demonstrated that increased knowledge about tobacco smoking is a preventive factor for initiating smoking, and results in lower rates of tobacco consumption among population [14,29]. Targeting health behaviors of university students can be of great value, as college years can be viewed as a "window of opportunity" for preventing initiation or to encourage early quitting [10]. Thus, a higher level of awareness among university students should be achieved by anti-smoking programs using various modalities including anti-smoking posters, campaigns and lectures.

At the national level, warning labels on cigarette packages are an important source for information about the health risks of smoking and the different types of cancer related to smoking. Research has shown that smokers living in societies where these labels are mandated by the government reported higher health knowledge [30]. Thus their use is recommended to increase awareness of smoking-related cancers. In addition, mass media campaigns directed against smoking can decrease the prevalence of smoking by reducing rates of smoking initiation in young people as well as increasing the rates of quitting [31,32]. Therefore, more efforts should be taken through mass media, including TV, radio, newspapers, as well as social networking websites such as Facebook to provide information about the danger of tobacco smoking especially in relation to cancer. Health care professionals have a similar responsibility to increase the awareness regarding various health risks associated with smoking including different types of cancer.

In summary, our study extends the literature by investigating university students' knowledge about smoking-related cancers. Although knowledge among participants that lung cancer can be caused by smoking was high, knowledge about other cancers caused by smoking was lower. Our data suggest that public need to be better informed about smoking-related cancers other than lung cancer.

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