BioRes Scientia
Value your Research

Research Article   **Open Access**

Knowledge, Attitude and Practice about E-cigarettes among University Students: A Comparative Study between Afghanistan, The Netherlands and Turkey

Mansoorullah Muradi[1]*, Lima Oria[2], Tariq Aziz Azizi[1]

[1]*Bachelor of Science in Public Health, Kabul University of Medical Sciences, Kabul, Afghanistan.*
[2]*International School of Medicine, Istanbul Medipol University, Turkey.*
*Corresponding author: Mansoorullah Muradi.

Abstract

Background: The rise in electronic cigarette (e-cigarette) use among young adults has raised significant public health concerns. Initially introduced as a harm-reduction tool, e-cigarettes have increasingly become a popular alternative to traditional smoking. However, misconceptions about their safety, social acceptability, and long-term health effects persist among university students.

Objective: The aim of this study was to find out the knowledge, attitude, and practice about E-Cigarettes among University Students in Afghanistan, the Netherlands, and Turkey.

Methods: This study adopts an analytical cross-sectional design and employs a foundational approach by administering an online questionnaire. The study uses a quantitative methodology to explore university students' knowledge, attitudes, and perceptions regarding e-cigarettes. Data collection was facilitated through a survey distributed via Google Forms, and statistical analysis was performed using SPSS 26 to identify significant associations.

Results: The findings revealed that 54.2% of students reported using e-cigarettes, with a higher prevalence among those with close friends or family members who smoked. Knowledge about e-cigarettes was generally low, with 56.2% demonstrating poor understanding, particularly regarding the health risks and regulatory status of e-cigarettes. Attitudes were largely negative, with 73.4% expressing concerns about vaping, though 62.7% believed it was more socially acceptable than traditional smoking. Peer influence was a major factor, as 74.6% of e-cigarette users had close friends who also vaped. A significant association was found between smoking tobacco and e-cigarette use (p = 0.00), indicating a trend of dual-use rather than e-cigarettes serving as a quitting tool.

Conclusion: The study highlights a critical gap in e-cigarette knowledge and a strong influence of social and environmental factors on vaping behaviors. Despite negative attitudes toward vaping, its perceived social acceptability remains high. Public health interventions should focus on targeted educational campaigns, peer-led awareness programs, and regulatory measures to address misconceptions and reduce e-cigarette use among young adults.

Keywords: knowledge; attitude; practice; e-cigarette; Afghanistan; Netherlands; Turkey

Introduction

Vaping, a form of electronic smoking, has gained significant global popularity, particularly among young adults. In the U.S., over 40 million individuals use vaping products, with 5 million using e-cigarettes specifically. From 2012 to 2016, e-cigarette use in the UK increased by 60%, while in North America, usage has risen sharply since 2014, with 20% of adults aged 18–26 reporting use and daily use estimated at 3.7% [1]. Similar trends have emerged in Canada (13.2% increase in 2015) and Mexico, where use rose by over 50% in one year despite a 2013 ban. In the EU, adult use rose by 5% between 2012 and 2014 [1].

Though promoted as a harm-reduction tool, e-cigarettes are increasingly scrutinized by global health authorities. The WHO and UN warn that e-cigarettes may contribute to the global tobacco-related burden, which already causes over 8 million deaths annually [2,3]. These devices deliver nicotine via aerosolized vapor using a battery, heating coil, and a liquid containing nicotine, glycerin, propylene glycol, and flavorings [4-6]. Modern devices deliver high nicotine concentrations, posing addiction risks, especially for youth [9,10].

Beyond nicotine, e-cigarette aerosols contain harmful substances including formaldehyde, acetaldehyde, and heavy metals (lead, chromium), which are inhaled into the lungs [4,5,10]. Chronic exposure has been associated with respiratory diseases such as COPD and bronchitis, as well as increased risks of myocardial

infarction, stroke, and neurological impairments due to nicotine's effects on brain development [6,8,10].

Several studies have identified knowledge gaps and misconceptions about e-cigarettes. For instance, only 10.3% of Austrian university students viewed e-cigarettes as cessation tools [9]. In Cairo, 83.7% were aware of e-cigarettes, but 32.4% had used them despite understanding associated risks [10]. In China, only 42.6% knew these devices contain nicotine [4], and in Saudi Arabia, 27.7% of health science students reported regular use-exceeding the rate of traditional smoking [6,5].

Given the rising use of e-cigarettes and associated misconceptions, particularly among university students, this study aims to assess knowledge, attitudes, and practices regarding e-cigarette use across institutions in Afghanistan, the Netherlands, and Turkey.

Methods

Research Design and Sampling

This analytical cross-sectional study employed a structured online questionnaire to assess university students' knowledge, attitudes, and practices (KAP) regarding e-cigarette use. A quantitative approach was applied, and data were collected via Google Forms.

The research was conducted at three universities: Kabul University (Afghanistan), NHL Stenden University (Netherlands), and Istanbul Medipol University (Turkey), with a combined student population of 93,125 across medical and non-medical faculties.

Data collection occurred over eight weeks, from early November to the end of December 2024. A quota sampling method was used. Using Epi Info (v3.5.2.0), the sample size was calculated as 383 based on a 5% margin of error, 95% confidence level, and 50% response distribution. Adjusting for a 10% non-response rate, the final sample was set at 413 students, distributed proportionally: Kabul (98), NHL Stenden (208), and Medipol (107).

Participants included male and female students from various faculties. All selected individuals completed the questionnaire, achieving the target sample size.

The questionnaire, adapted from PubMed-based tools [11][12], included four sections:

1. Demographics - Frequency and percentage analysis;
2. Knowledge - 15 true/false items; scores ≥75% (≥11 correct answers) indicated good knowledge;
3. Attitudes - 13 agree/disagree items; scores ≥75% (≥9 positive responses) indicated positive attitude;
4. Practices - 13 items assessing use patterns, frequency, and behavior; current users scored as '0', non/former users as '1'.

Data were processed in SPSS v26. All entries were verified before analysis. Results were reported descriptively.

Ethical Consideration

The proposal of research, along with the questionnaire, was submitted to the public health faculty's Institutional Review Board prior to the distribution of the questionnaire and interview, and the IRB was obtained from the public health faculty research committee. An informed consent letter was obtained from each participant prior to their participation. We have never written the names of participants, the process of study conducted regarding the obtained IRB and university policies, and all the ethical issues have been considered according to the Declaration of Helsinki.

Results

Demographic characteristics

A total of 413 university students participated in the study, including 210 males (50.8%), 200 females (48.4%), and 3 individuals (0.7%) who preferred not to disclose their gender. Of these, 295 (71.8%) were non-medical students and 118 (28.2%) were from medical faculties. Most respondents were aged 20 years. Tobacco use was most prevalent among Dutch students (61.5%, n = 123), followed by Afghan (26.5%, n = 53) and Turkish students (12.0%, n = 24). Cohabitation with smokers was reported by 60.0% of Dutch students (n = 132), compared to 21.8% of Afghans and 18.2% of Turkish students. Additionally, 60.4% of Dutch students reported having a family member who used e-cigarettes.

Paternal education was highest among those with tertiary education (63.2%), while 21.8% of mothers had completed only primary school or less. Tertiary education among mothers was most common in Turkey (42.9%) and least in Afghanistan (12.3%). E-cigarette use among close friends was acknowledged by 53.4% of Dutch students, 24.7% of Afghan students, and 21.9% of Turkish students. This demographic profile highlights a diverse sample across the three countries, with notable differences in gender distribution and parental education, which

may serve as potential confounding factors. A full comparative breakdown is provided in Table 1.

Table 1: Demographic breakdown of all three countries.

Variables	Countries			
	Afghanistan	Netherlands	Turkey	Total
Sex				
Male	56(26.7%)	118(56.2%)	36(17.1%)	210(100%)
Female	42(21.0%)	88(44.0%)	70(35.0%)	200(100.0%)
Prefer not to say	0(0%)	3(100%)	0(0%)	3(100%)
Age				
<20 years	29(20.6%)	76(53.9%)	36(25.5%)	141(100.0%)
> 20 Years	30(23.6%)	57(44.9%)	40(31.5%)	127(100.0%)
20 years	39(26.9%)	75(51.7%)	31(21.4%)	145(100.0%)
Major				
Medical University	9(7.6%)	14(11.9%)	95(80.5%)	118(100.0%)
Non-Medical University	89(30.2%)	194(65.8%)	12(4.1%)	295(100.0%)
Year in University				
First-Second Year	46(18.9%)	127(52.3%)	70(28.8%)	243(100.0%)
Third-Fourth Year	52(30.6%)	81(47.6%)	37(21.8%)	170(100.0%)
Living Area				
Urban	83(27.1%)	133(43.5%)	90(29.4%)	306(100.0%)
Rural	15(14.0%)	75(70.1%)	17(15.9%)	107(100.0%)
Father's Educational Level				
primary or less	23(47.9%)	23(47.9%)	2(4.2%)	48(100.0%)
Secondary education (high school or equivalent)	29(27.9%)	55(52.9%)	20(19.2%)	104(100.0%)
Tertiary education (college, university, or higher)	46(17.6%)	130(49.8%)	85(32.6%)	261(100.0%)
Mother's Educational Level				
primary or less	40(44.4%)	40(44.4%)	10(11.1%)	90(100.0%)
Secondary education (high school or equivalent)	38(23.8%)	95(59.4%)	27(16.9%)	160(100.0%)
Tertiary education (college, university, or higher)	20(12.3%)	73(44.8%)	70(42.9%)	163(100.0%)
Monthly Living Cost (USD)				
≤300	77(34.1%)	89(39.4%)	60(26.5%)	226(100.0%)
>300	21(11.2%)	119(63.6%)	47(25.1%)	187(100.0%)
Smoking a tobacco cigarette				
Yes	53(26.5%)	123(61.5%)	24(12.0%)	200(100.0%)
No	45(21.1%)	85(39.9%)	83(39.0%)	213(100.0%)
Currently live with smokers.				
Yes	48(21.8%)	132(60.0%)	40(18.2%)	220(100.0%)
No	50(25.9%)	76(39.4%)	67(34.7%)	193(100.0%)
Family members ever use tobacco cigarettes				
Yes	53(24.0%)	121(54.8%)	47(21.3%)	221(100.0%)
No	45(23.4%)	87(45.3%)	60(31.3%)	192(100.0%)
Family members ever use e-cigarettes				
Yes	41(22.5%)	110(60.4%)	31(17.0%)	182(100.0%)
No	57(24.7%)	98(42.4%)	76(32.9%)	231(100.0%)
Close friends ever use tobacco cigarettes				
Yes	61(24.2%)	136(54.0%)	55(21.8%)	252(100.0%)
No	37(23.0%)	72(44.7%)	52(32.3%)	161(100.0%)
Close friends ever use e-cigarettes (vaping)				
Yes	62(24.7%)	134(53.4%)	55(21.9%)	251(100.0%)
No	36(22.2%)	74(45.7%)	52(32.1%)	162(100.0%)

92.3% of the study population has heard of ECs mostly through university/school, social media, and friends (30.9%, 23.2% 21.9% respectively).

Knowledge gaps were evident among participants across key areas. Notably, 64.6% incorrectly believed that e-cigarettes are approved by the U.S. Food and Drug Administration (FDA), and 51.3% falsely assumed they do not contribute to secondhand smoke exposure. In contrast, 70.1% correctly identified that flavorings differ in harmfulness. Knowledge regarding health risks was moderately strong: 66.8% recognized the link to bladder cancer, 56.2% acknowledged the association with lung cancer, and 73.8% understood potential impairment of heart and lung function due to e-cigarette use.

These results indicate a basic awareness of some health risks associated with vaping; however, significant misconceptions persist, particularly concerning regulatory approval and secondhand exposure. A full distribution of responses is provided in Table 2.

Table 2: E-cigarette knowledge questions, frequency, and percentage.

Knowledge Questions	No.	Valid %
E-cigarettes are associated with bladder cancer		
False__Wrong Answer	137	33.2%
True__Correct Answer	276	66.8%
E-cigarettes are FDA-approved		
True__Wrong Answer	267	64.6%
False__Correct Answer	146	35.4%
Some flavors of E-cigarettes are more harmful than others		
False__Wrong Answer	122	29.5%
True__Correct Answer	291	70.5%
Swallowing the liquid in E-cigarettes accidentally can cause poisoning that is potentially fatal		
False__Wrong Answer	96	23.2%
True__Correct Answer	317	76.8%
E-cigarettes are not associated with lung cancer		
True__Wrong Answer	181	43.8%
False__Correct Answer	232	56.2%
E-cigarettes impair lung and heart functions		
False__Wrong Answer	108	26.2%
True__Correct Answer	305	73.8%
E-cigarettes do not contribute to secondhand smoking		
True__Wrong Answer	212	51.3%
False__Correct Answer	201	48.7%
E-cigarettes can have an effect on fetal development		
False__Wrong Answer	85	20.6%
True__Correct Answer	328	79.4%
Nicotine is present in most E-cigarettes		
False__Wrong Answer	87	21.1%
True__Correct Answer	326	78.9%
Harmful flavorings and toxins are found in the E-cigarette aerosol		
False__Wrong Answer	76	18.4%
True__Correct Answer	337	81.6%
E-cigarettes are harmful		
True__Wrong Answer	178	43.1%
False__Correct Answer	235	56.9%
Some components of the liquid found in E-cigarettes can cause harmful lung conditions		
False__Wrong Answer	93	22.5%
True__Correct Answer	320	77.5%
E-cigarettes are not addictive		
True__Wrong Answer	163	39.5%
False__Correct Answer	250	60.5%
E-cigarettes are suitable for pregnant women		
True__Wrong Answer	137	33.2%

False__Correct Answer	276	66.8%
E-cigarettes are suitable for children		
True__Wrong Answer	141	34.1%
False__Correct Answer	272	65.9%

Participants' attitudinal responses reflected mixed views on e-cigarette use. A total of 62.7% perceived vaping as more socially acceptable than traditional smoking, while 48.9% considered recreational experimentation acceptable. Additionally, 55.4% viewed e-cigarettes as effective cessation tools; 59.8% believed they assist in reducing or quitting smoking, and 54.5% supported their use as substitutes for conventional cigarettes. The full distribution of responses is presented in Table 3.

Table 3: E-cigarette attitude questions, frequency, and percentage.

Attitude questions	No.	Valid %
Should E-cigarettes be recommended to a non-smoker?		
No__ Negative Attitude	217	52.5%
Yes__ Positive Attitude	196	47.5%
Do you think E-cigarettes are harmful to health?		
Yes__ Negative Attitude	308	74.6%
No__ Positive Attitude	105	25.4%
Should the use of E-cigarettes be allowed in places that do not allow smoking?		
No__ Negative Attitude	229	55.4%
Yes__ Positive Attitude	184	44.6%
Would you consider someone who uses E-cigarettes a smoker?		
Yes__ Negative Attitude	276	66.85
No__ Positive Attitude	137	33.2%
Do you think the use of E-cigarettes can lead to reliance?		
Yes__ Negative Attitude	275	66.6%
No__ Positive Attitude	138	33.4%
Do you think the government should regulate the use of E-cigarettes?		
Yes__ Negative Attitude	267	64.6%
No__ Positive Attitude	146	35.4%
Do you feel more comfortable using or openly talking about smoking E-cigarettes, compared to cigarettes?		
No__ Negative Attitude	158	38.3%
Yes__ Positive Attitude	255	61.7%
Do you feel it is more socially acceptable to smoke E-cigarettes, compared to cigarettes?		
No__ Negative Attitude	154	37.3%
Yes__ Positive Attitude	259	62.7%
Should E-cigarettes be used as a replacement for regular cigarettes?		
No__ Negative Attitude	188	45.5%
Yes__ Positive Attitude	225	54.5%
Experiment with E-cigarettes for pleasure?		
No__ Negative Attitude	211	51.1%
Yes__ Positive Attitude	202	48.9%
Do you think using E-cigarettes would be an effective way to help in smoking cessation?		
No__ Negative Attitude	184	44.6%
Yes__ Positive Attitude	229	55.4%
Do you think it is acceptable to use E-cigarettes as a smoking cessation method?		
No__ Negative Attitude	200	48.4%
Yes__ Positive Attitude	213	51.6%
Do you think E-cigarettes can help people cut down on cigarettes or quit smoking?		
No__ Negative Attitude	166	40.2%
Yes__ Positive Attitude	247	59.8%

E-cigarette Practice

The prevalence of e-cigarette use was 54.2%. Among users, 27.1% vaped 1–2 days in the previous week,

and 24.9% reported daily use exceeding 20 times. Authorized retailers supplied devices for 41.2% of users, and 38.5% found access to products easy. Most spent 10–28 EUR per purchase (29.8%). Initial use generally began after age 18, with 39.5% having no intention to quit vaping. Detailed information regarding these findings is presented in Table 4.

Table 4: E-cigarette practice question frequency and percentage.

Practice Questions	No.	Valid %
Currently using e-cigarettes		
Yes	224	54.2%
No	189	45.8%
If yes, Duration of use within the last 7 days		
> 5 days	86	20.8%
3-4 days	26	6.3%
1-2 days	112	27.1%
Frequencies of e-cigarette usage per day		
<20 times a day	103	24.9%
>20 times a day	26	6.3%
Not Daily	95	23.0%
Time of initiating usage after waking up		
After 1-2 hours	97	23.5%
It varies	94	22.8%
Immediately after waking up	33	8.0%
Place of purchase e-cigarette		
Authentic store	170	41.2%
Online shop	54	13.1%
Ease of purchase?		
Yes	159	38.5%
No	65	15.7%
Price per purchase (EUR)		
>28	10	2.4%
≥10	91	22.0%
10-28	123	29.8%
Price of e-cigarette liquid (EUR)		
< 5	21	5.1%
>4	87	21.1%
4-5	116	28.1%
Age of the first trial		
< 18 years old	155	37.5%
≥18 years old	69	16.7%
Intention to quit		
Yes	164	39.7%
No	60	14.5%

This study provides valuable insights into the factors influencing e-cigarette use, particularly its association with traditional smoking habits, social and family influence, and demographic characteristics. Additionally, the findings highlight significant patterns in knowledge, attitudes, and practices (KAP) related to smoking and vaping. The statistically significant p-values (0.00) across multiple variables indicate strong associations, underscoring the impact of environmental, social, and educational factors on smoking behavior. Of the participants, 56.2% (n=232) demonstrated poor knowledge of e-cigarettes. Turkish students showed higher knowledge levels (43.1%) compared to those from Afghanistan (21.0%) and the Netherlands (35.9%) (p=0.00). Attitudes were predominantly negative, with 73.4% holding poor attitudes and only 26.6% positive.

Regarding practice, 54.2% exhibited good practices, while 45.8% had poor ones. The Netherlands showed the highest prevalence of poor knowledge (61.6%) and the highest proportion of positive attitudes (62.7%). Conversely, Turkey and Afghanistan reported lower positive attitudes (12.7% and 23.4%, respectively) and higher poor practice rates, especially in Turkey (44.4%) (p=0.00). Sex was significantly associated with knowledge (p=0.001); females (59.1%) had better knowledge than males (40.3%). Attitudes did not differ significantly by sex (p=0.2). However,

practice varied (p=0.001), with females demonstrating better practices (59.4%) than males (40.2%).

These findings highlight notable gaps in knowledge and generally negative attitudes despite moderate use practices, emphasizing the need for targeted educational interventions. For further details, please refer to Table 5 below.

Table 5: Knowledge, Attitude and Practice.

Variables	Frequency (n)			Valid%	
Good knowledge	181			43.8%	
Poor knowledge	232			56.2%	
Good Attitude	110			26.6%	
Poor Attitude	303			73.4%	
Good Practice	224			54.2%	
Poor Practice	189			45.8%	
Variables	Good Practice	Poor Practice		Total	P- value
Good knowledge	46(25.4%)	135(74.6%)		181(100.0%)	0.00
Poor knowledge	178(76.7%)	54(23.3%)		232(100.0%)	
Variables	Countries				
	Afghanistan	Netherlands	Turkey	Total	P- value
Good knowledge	38(21.0%)	65(35.9%)	78(43.1%)	181(100.0%)	0.00
Poor knowledge	60(25.9%)	143(61.6%)	29(12.5%)	232(100.0%)	
Good Attitude	27(24.5%)	69(62.7%)	14(12.7%)	110(100.0%)	
Poor Attitude	71(23.4%)	139(45.9%)	93(30.7%)	330(100.0%)	
Good Practice	54(24.1%)	147(65.6%)	23(10.3%)	224(100.0%)	
Poor Practice	44(23.3%)	61(32.3%)	84(44.4%)	189(100.0%)	
Variables	Sex				
	Male	Female	Prefer not to say	Total	P- value
Good knowledge	73(40.3%)	107(59.1%)	1(0.6%)	181(100.0%)	0.001
Poor knowledge	137(59.1%)	93(40.1%)	2(0.9%)	232(100.0%)	
Good Attitude	58(52.7%)	50(45.5%)	2(1.8%)	110(100.0%)	0.2
Poor Attitude	150(49.5%)	152(50.2%)	1(0.3%)	303(100.0%)	
Good Practice	90(40.2%)	133(59.4%)	1(0.4%)	224(100.0%)	0.001
Poor Practice	110(58.2%)	77(40.7%)	2(1.1%)	189(100.0%)	

The analysis revealed significant associations (p = 0.00) between tobacco cigarette smoking and e-cigarette use. Among current e-cigarette users, 72.8% also smoked tobacco, whereas only 19.6% of non-e-cigarette users smoked tobacco. Living with smokers was significantly linked to e-cigarette use, with 69.2% of users cohabiting with smokers. Similarly, 65.2% of e-cigarette users had family members who smoked tobacco, compared to 39.7% of non-users. Having family members who vape was also significantly associated; 65.2% of users reported family vaping versus 22.2% among non-users. Peer influence showed strong correlations: 74.6% of e-cigarette users had close friends who vaped, and 74.1% had friends who smoked tobacco, compared to 44.4% and lower rates among non-users, respectively. These findings underscore familial and social environments as key factors influencing vaping behavior.

Discussion

This study assessed the Knowledge, Attitudes, and Practices (KAP) regarding e-cigarettes among university students in Afghanistan, the Netherlands, and Turkey. To provide a broader context, we compare our findings with studies conducted in Saudi Arabia. [6], China [4], Indonesia [11], Egypt [10], Jordan [13], Malaysia [14] and France [15]. The findings highlight significant variations in e-cigarette awareness, attitudes, and usage trends across different cultural and regulatory environments.

Our study found that e-cigarette use varied significantly based on demographic factors such as age, gender, and academic background. In Afghanistan, the Netherlands, and Turkey, the majority of e-cigarette users were male students aged 19-25. This aligns with findings from Saudi Arabia, where 66.2% of e-cigarette users were male, and most users were between 19 and 22 years old [6].

In contrast, studies from France and China showed that while male students were more likely to use e-cigarettes, female users were also prevalent [15,4].

Financial status also played a role in e-cigarette consumption. In our study, students from middle- to high-income families reported higher e-cigarette use,

which is consistent with findings from France, where students facing fewer financial difficulties were more likely to experiment with vaping. [15]. Similarly, Saudi Arabian students who lived off-campus in rented accommodations were more likely to use e-cigarettes compared to those living with their families [6].

Demographic factors such as age, gender, and financial status conditions play a significant role in shaping e-cigarette consumption patterns among university students. While young adult males remain the predominant users, social influences and economic background also contribute to e-cigarette adoption. Future research should explore the long-term health impacts of e-cigarettes across diverse demographic groups, with a focus on mental health interventions and policy regulation to reduce vaping among at-risk populations.

Knowledge of E-Cigarettes

Our study found that Turkish students exhibited the highest level of awareness (43.1%), followed by Afghan (21.0%) and Dutch students (35,9%). This disparity is consistent with findings from China, where students demonstrated moderate awareness but had significant gaps in understanding the nicotine content and long-term health risks [4].

The study reported that 10.5% of Jordanians [13]. Students used e-cigarettes, whereas our study found a significantly higher prevalence (54.2%). This stark difference suggests that cultural, social, and regulatory factors may influence e-cigarette adoption. The higher prevalence in the international sample, particularly in the Netherlands, could be attributed to greater social acceptance and easier access to e-cigarettes compared to Jordan [13]. These misconceptions reflect a global issue: students often receive information from social media, friends, and advertisements, which may not provide accurate health information. The study found that medical students in Jordan had better knowledge than non-medical students, a pattern also observed in our study, where Turkish students, many of whom were medical students, had higher knowledge levels compared to Afghan and Dutch students.

Attitudes Toward E-Cigarettes

Attitudes toward e-cigarettes varied significantly across different countries. In our study, Afghan and Turkish students held predominantly negative views (23.4%) (30.7% respectively), whereas Dutch students were more accepting (62.7% positive attitude).

The studies in Indonesia show that students' attitudes toward e-cigarettes are influenced by their social environment. The study revealed that many Jordanian students perceived e-cigarettes as a less harmful and less addictive alternative to traditional cigarettes. Similarly, in our study, 62.7% felt e-cigarettes were more socially acceptable than traditional cigarettes, and 54.5% believed e-cigarettes should replace regular cigarettes. However, both studies also indicate a significant portion of students hold negative attitudes toward e-cigarettes, with 73.4% of international students expressing concerns about their safety.

In Malaysia, strong opposition was observed, with 62.4% of students supporting a ban on e-cigarettes [14]. Similarly, in Saudi Arabia, although some students saw e-cigarettes as a smoking cessation tool, many viewed them as equally addictive as traditional cigarettes [6].

Conversely, Indonesian students displayed highly favorable perceptions, with 91.3% expressing positive attitudes [11]. French students largely perceived e-cigarettes as a safer alternative, though they associated their use with other risky behaviors such as binge drinking. Meanwhile, in Jordan and Egypt, clinical-year students were more likely to support e-cigarettes for smoking cessation compared to their preclinical counterparts [10,13].

These findings indicate that cultural beliefs, policy regulations, and exposure to e-cigarette users significantly shape students' attitudes toward vaping.

E-Cigarette Use and Prevalence

The prevalence of e-cigarette uses among university students showed notable differences across countries. In our study, Turkish students reported the highest e-cigarette use (44.4%), followed by Afghan (23.3%) and Dutch students (32.3%).

In Saudi Arabia, 27.7% of health science students reported using e-cigarettes, a rate significantly higher than conventional cigarette smoking (14.1%) [6]. France had a similar prevalence, with 23.0% of students having tried e-cigarettes [15].

Malaysia reported a relatively low prevalence (6.6%) [14] while in Egypt, 7.3% of medical students reported usage, with a higher prevalence among males [10]. Jordan had a significantly higher prevalence (37.4%) [13], whereas China and Indonesia reported lower usage rates (8.2%) [11].

A consistent finding across all studies was the strong influence of peer networks on e-cigarette use. Students who had friends or family members using e-cigarettes were more likely to experiment with vaping. This trend was evident in Saudi Arabia and Malaysia,

where students with vaping peers had significantly higher usage rates [14,6].

E-Cigarettes as a Smoking Cessation Tool

In our study, social media (23.1%) and University/Schools (30.9%) were the most common sources of information on e-cigarettes, but in Jordan, social media (43.1%) and friends (32.9%) were the most common sources of information on e-cigarettes. Additionally, both studies found a strong correlation between conventional cigarette smoking and e-cigarette use, reinforcing the idea that e-cigarettes are not always used as a smoking cessation tool but rather as an additional form of nicotine consumption.

Countries with strict regulations, such as Malaysia and Jordan, exhibited lower e-cigarette prevalence rates. In Malaysia, the National Fatwa Council declared vaping forbidden (haram), significantly influencing students' attitudes and behaviors [13,14]. Similarly, Jordan prohibits e-cigarette advertising and sales to individuals under 19 [13]. By contrast, Saudi Arabia and Indonesia, where regulations are more lenient, reported higher e-cigarette usage rates [6,11]. France, despite implementing regulations restricting sales to minors, still had a high proportion of experimental users [15].

These findings emphasize the impact of government policies and public health campaigns on vaping behaviors. Countries with stronger tobacco control measures tend to see lower e-cigarette usage among youth. Overall, peer influence, social media exposure, and regulatory environments play crucial roles in shaping students' e-cigarette knowledge, attitudes, and behaviors. Future public health efforts should focus on harmonizing policies and increasing educational initiatives to mitigate the growing trend of e-cigarette use among university students worldwide.

Key Takeaways

1. E-cigarette use is strongly linked to traditional smoking habits, indicating a potential dual-use problem rather than e-cigarettes serving as an alternative to quitting.
2. Household smoking environments significantly influence e-cigarette use, reinforcing the need for family-based prevention programs.
3. Peer influence is one of the most powerful predictors of smoking behavior, making peer-led interventions critical in tobacco control strategies.
4. Despite moderate knowledge levels, attitudes toward smoking remain poor, suggesting that awareness alone is insufficient—interventions must address social and behavioral aspects.
5. Cultural, gender, and educational differences play a role in smoking behavior, requiring customized public health approaches based on demographic characteristics.

Policy and Intervention Suggestions

- *Targeted Awareness Campaigns:* Programs should challenge behaviors and focus on peer groups.
- *Family-Based Interventions:* Smoke-free home initiatives and parental education to reduce youth vaping.
- *Peer-Led Prevention:* Schools and universities should adopt peer-led anti-smoking programs.
- *Regulations:* Stricter e-cigarette sales controls and environmental policies (e.g., public bans) are needed.
- *Gender-Specific Strategies:* Female-focused programs to reinforce avoidance; male-targeted campaigns emphasizing health risks.
- *Culturally Adapted Approaches:* Prevention must consider cultural norms and smoking prevalence differences.

Conclusion

This study emphasizes the complex interactions between knowledge, social context, and demographics in smoking and vaping behaviors. Comprehensive interventions combining education, behavioral reinforcement, policy, and peer influence are crucial to reduce tobacco and e-cigarette use effectively.

Declarations

Clinical Trial Declaration

Not Applicable.

Consent to Participate Declaration

All individuals who took part in this study were fully informed about the study's objectives, procedures, and their rights as participants. Participation was entirely voluntary, and written informed consent was obtained from each participant prior to their inclusion in the research.

Ethical Approval

This study did not require formal approval as there was no institutional review board or ethics committee available. However, the study was conducted in accordance with the ethical principles of the Declaration of Helsinki. Participants were informed

about the study objectives, and informed consent was obtained from all participants [16].

Funding Declaration

Not Applicable.

Clinical Trial Number

Not Applicable.

Human Ethical and Consent to Participate Declaration

Not Applicable.

References

1. Morteza. (2021). Statistics of vape and e-cigarette use in the world. *Vapersco*.
2. WHO. (2024). Tobacco: E-cigarettes. *World Health Organization, Geneva*.
3. World Health Organization, Tobacco. (2023).
4. Fang, J., Ren, J., Ren, L., Max, W., Yao, T., et al. (2022). Electronic cigarette knowledge, attitudes and use among students at a university in Hangzhou, China. *Tobacco Induced Diseases*, 20:9.
5. Hartono, R., Yan, C., Chen, Y., Ma, B., Deng, Y., et al. (2024). Knowledge, attitude, and practice of e-cigarette use among undergraduate students: A comparative study between China and Indonesia. *Tobacco Induced Diseases*, 22:10-18332.
6. Qanash, S., Alemam, S., Mahdi, E., Softah, J., Touman, A. A., et al. (2019). Electronic cigarette among health science students in Saudi Arabia. *Annals of Thoracic Medicine*, 14(1):56-62.
7. Hajat, C., Stein, E., Shantikumar, S., Niaura, R., Ferrara, P., et al. (2022). A scoping review of studies on the health impact of electronic nicotine delivery systems. *Internal and Emergency Medicine*, 17(1):241-268.
8. AlMuhaissen, S., Mohammad, H., Dabobash, A., Nada, M. Q., Suleiman, Z. M. (2022). Prevalence, knowledge, and attitudes among health professions students toward the use of electronic cigarettes. *In Healthcare*, 10(12):2420.
9. Paudyal, P., Movia, M. (2019). Knowledge, attitudes and beliefs towards electronic cigarettes among university students in Austria. *European Journal of Public Health*, 29(Supplement_4):ckz186-709.
10. Mostafa, O. A., Taha, M. A. (2024). Knowledge, attitude, and use of electronic cigarettes among Cairo University medical students. *Journal of the Egyptian Public Health Association*, 99(1):29.
11. Deng Rui, Chen Ying, Yan Chao Fang, Ma Bo Ting, Deng Ya Qi, et al. (2024). Knowledge, attitude, and practice of e-cigarette use among undergraduate students: A comparative study between China and Indonesia. *Research Square*, 25.
12. Aghar, H., El-Khoury, N., Reda, M., Hamadeh, W., Krayem, H., et al. (2020). Knowledge and attitudes towards E-cigarette use in Lebanon and their associated factors. *BMC Public Health*, 20(1):278.
13. Al-Sawalha, N. A., Almomani, B. A., Mokhemer, E., Al-Shatnawi, S. F., Bdeir, R. (2021). E-cigarettes use among university students in Jordan: Perception and related knowledge. *PLoS One*, 16(12):e0262090.
14. Salleh, N. (2021). Knowledge, attitude and practice on electronic cigarette and their associated factors among undergraduate students in a public university. *IIUM Medical Journal Malaysia*.
15. Tavolacci, M. P., Vasiliu, A., Romo, L., Kotbagi, G., Kern, L., et al. (2016). Patterns of electronic cigarette use in current and ever users among college students in France: a cross-sectional study. *BMJ Open*, 6(5):e011344.
16. World Medical Association. (2025). World Medical Association Declaration of Helsinki: ethical principles for medical research involving human participants. *JAMA*, 333(1):71-74.