

Knowledge, Frequency, and Perceptions of E-cigarettes among Medical Students at Rawalpindi Medical University: A Cross-Sectional Study

Ubaid Ullah¹, Fatima Nasir², Narjis Zaidi³

^{1,2} Student of Fourth Year MBBS, Rawalpindi Medical University, Rawalpindi, Pakistan.

³ APWMO, Senior Supervisor, Rawalpindi Medical University.

Author's Contribution

^{1,2,3} Conception of the study

^{1,2,3} Experimentation/Study Conduction

^{1,2} Analysis/Interpretation/Discussion

^{1,2} Manuscript Writing

³ Critical Review

³ Facilitation and Material Analysis

Corresponding Author

Ubaid Ullah,

Final Year MBBS Student,

Rawalpindi Medical University,

Rawalpindi, Pakistan.

Email: ubaidullahhabibullah@gmail.com

Article Processing

Received: 15/06/2025

Accepted: 30/09/2025

Cite this Article: Ullah U, Nasir F, Zaidi N. Knowledge, Frequency, and Perceptions of E-cigarettes among Medical Students at Rawalpindi Medical University: A Cross-Sectional study *SJRMCMC*. 2025; S2:25.

Conflict of Interest: Nil

Funding Source: Nil

Access Online:



Abstract

Background: E-cigarettes are classified as tobacco products by the FDA and CDC due to their nicotine content. Their use is increasing globally, especially among youth. Medical students are expected to be well-informed due to their direct patient interactions. Therefore, the purpose of this study is to determine the awareness, frequency, and perceptions of medical students of Rawalpindi Medical University regarding the use of e-cigarettes.

Objectives: The study aims to evaluate the trends, frequency, and perception of e-cigarettes among students at Rawalpindi Medical University.

Materials and Methods: A sample size of 365 was calculated using the OpenEPI calculator, involving currently enrolled students from the first to the fifth year at Rawalpindi Medical University. Variables included were about participants' cigarette use, frequency, perception, and knowledge. Informed consent was acquired from all participants involved in the study. The chi-square test and the Independent-Samples t-test were used to evaluate the differences between these groups. The analysis was done using the Statistical Package for Social Sciences (IBM® SPSS® 27).

Results: Of the 365 students who took part in the survey, 261(71.5%) were female, and 104(28.5%) were male. The participants had an average age of 21.1 ± 2.2 years. Of the total responders, 52(14.2%) smoked traditional cigarettes. Male respondents were much more likely to smoke traditional cigarettes (69.2% vs. 30.8%, $p < 0.001$). Overall, it was found that 249 students, or 68.2%, were aware of e-cigarettes. Most e-cigarette users think that e-cigarettes are safer than non-users (82.8% vs 67%).

Conclusion: A significant portion of respondents demonstrated better awareness, yet e-cigarette usage did not appear to be extensively prevalent within the study sample. Individuals typically viewed e-cigarettes as comparatively safer. Further studies from developing countries are necessary to assess their safety and efficacy as a smoking cessation aid.

Keywords: E-Cigarettes, Perception, Smoking, E-Cig use

Introduction

Despite not containing tobacco, the US Food and Drug Administration (FDA) and the Centers for Disease Control and Prevention (CDC) classify e-cigarettes as "tobacco products" for regulatory purposes¹. E-cigarettes, promoted as less hazardous substitutes for traditional cigarettes, have experienced widespread adoption, especially among adolescents.² Undergraduate medical students are expected to have a better understanding and awareness, as they directly interact with patients during their training.³ Therefore, the purpose of this study is to determine the awareness, frequency, and perceptions of medical students of MBBS regarding e-cigarettes at Rawalpindi Medical University. According to an internet-based survey conducted among older students, males in a higher college class had at least one close friend who smoked, had a family history of smoking, or had roommates who smoked e-cigarettes, all of whom reported using e-cigarettes at significantly higher rates. A cross-sectional survey was performed between January and March 2018. Three fields of study (medical, humanistic, and technical) were randomly selected from a group of 245 different fields of study within Universities in Katowice showed that e-cigarettes are more addictive than traditional cigarettes⁵ According to 2016 research conducted in Egypt, 57.5% of participants had heard of e-cigarettes, and in Saudi Arabia, 68.9% of the smoker participants used e-cigarettes⁶ Concerns about vaping as a prelude to tobacco use are voiced by the WHO. On the other hand, some research shows how effective it is at helping adults quit smoking⁷

On the National level, data were collected from 350 individuals. The average age of health professionals included in the study was 30.6(2.60). The percentages for present smokers (39%) and past smokers (22%) were both high⁸ A study conducted in Sindh found

that of the 500 students, the mean age was 21.5 ± 1.7 years, and 58% were females. Of the students, more than sixty-six (65.6%) knew about e-cigarettes, thirty-one (6.2%) had used them, and six (1.2%) self-reported using them every day⁹ The study aims to evaluate the trends, frequency, and perception of e-cigarettes among students at Rawalpindi Medical University. Comprehending medical students' perspectives and practices can guide focused educational initiatives, and the study underscores that medical students, including those at Rawalpindi Medical University, are involved.

Materials and Methods

This cross-sectional study was carried out from May 1 to July 31, 2025, at the Rawalpindi Medical University. Undergraduate medical students currently enrolled in the MBBS program at Rawalpindi Medical University make up our study population. A sample size of 365 was calculated using the OpenEPI sample size calculator tool. A 65% prevalence of e-cigarette awareness was considered from the reference study with a 95% confidence interval and a 5% margin of error.⁹ Informed consent was acquired from all participants involved in the study. Sampling was done with convenience sampling, and a self-administered questionnaire was distributed to participants. This approach was considered suitable for an exploratory evaluation of medical students' awareness and perceptions, even though it might restrict generalizability.

We classified smokers and non-smokers as follows: Smokers were defined as those who reported having smoked tobacco/cigarettes once or occasionally. Nonsmokers were individuals who reported having never smoked cigarettes. E-cigarette users are those who use any form of electronic cigarette. Current smokers were individuals who reported having

smoked at least one cigarette in the last week. Occasional smokers are those who smoke cigarettes monthly.

Inclusion criteria contained only the medical students enrolled in the MBBS at Rawalpindi Medical University, and they were also 18 years or older. Exclusion criteria included students of other medical fields, such as Allied health sciences (AHS), preexisting health conditions like COPD, Asthma, and students having Neurological issues. A self-structured questionnaire was circulated among medical students. Variables include residence (Boarder or Day scholar), income, academic awareness of the risks associated with e-cigarettes, personal consumption, and opinions.

Awareness is the measurable state of being conscious of specific information, stimuli, or phenomena. It reflects the individual's recognition, knowledge, or perception under study.¹⁰ Perception refers to a measurable response to sensory stimuli, reflecting how individuals detect, recognize, and interpret these stimuli¹¹

A descriptive analysis was conducted to characterize demographic features as well as the knowledge and use of e-cigarettes. The chi-square test and the Independent-Samples t-test were used to evaluate the

differences between these groups. For every statistical test that was conducted, a p-value of less than 0.05 was considered statistically significant, meaning that a significant association is present between two variables. The analysis was done using the Statistical Package for Social Sciences (IBM® SPSS® 27).

Results

Of the 365 students who took part in the survey, 261(71.5%) were female, and 104 (28.5%) were male. The sample had an average age of 21.1 ± 2.2 years. Of the total responders, 52(14.2%) smoked traditional cigarettes. 16(4.4%) of those who smoke occasionally, while 36(9.86%) have only tried once. Male respondents were much more likely to smoke traditional cigarettes (69.2% vs. 30.8%, $p < 0.001$). In our sample, 29(7.9%) respondents reported using e-cigarettes, and all of them also reported smoking traditional cigarettes. Overall, it was found that 249 students, or 68.2%, were aware of e-cigarettes. Social media platforms were the primary source of information for over half of the respondents, 128(51.4%), followed by family and friends, 66(26.5%), medical curriculum, 38(14.2%), and health groups, 17(6.3%). In contrast, we discovered that e-cigarettes were substantially more likely to be heard of by non-cigarette users (85.8% vs. 14.2%).

Table 1 Details Regarding Use of E-cigarettes Among Medical ($n = 365$).

Parameters	Total, n (%)	E-cigarette users, n (%)	Non-users, n (%)	p-value
No. of students	365	52(14.2%)	313(85.8)	<0.001
Gender				<0.001
Male	104(28.5%)	36(69.2%)	68(21.7%)	
Female	261(71.5%)	16(30.8%)	245(78.3%)	

Year of MBBS				<0.002
1 st	65(17.8%)	7(13.5%)	58(18.5%)	
2 nd	112(30.7%)	15(28.8%)	97(31%)	
3 rd	61(16.7%)	6(11.5%)	55(17.6%)	
4 th	70(19.2%)	6(11.5%)	64(20.4%)	
5 th	57(12.1%)	18(34.6%)	39(12.5%)	
Heard about e-cigarettes				0.015
Yes	249(68.2%)	43(82.7%)	206(65.8%)	
No	116(31.8%)	9(17.3%)	107(34.2%)	
Source of information				0.034
Social media platforms	205(56.2%)	21(40.4%)	184(58.8)	
Family and friends	85(23.3%)	18(34.6%)	67(21.4%)	
Medical curriculum	52(14.2%)	7(13.5%)	45(14.4%)	
Use e-cigarettes				<0.001
Yes	29(7.9%)	29(55.8%)	0(0%)	
No	336(92.1%)	23(44.3%)	313(100%)	
Frequency of use				
Once	13(44.8%)	13(44.8%)	0(0%)	
<Weekly	2(6.9%)	2(6.9%)	0(0%)	
Weekly	4(13.8%)	4(13.8%)	0(0%)	
Monthly	10(34.5%)	10(34.5%)	(0%)	

Note. Demographics presented as percentages

Compared to e-cigarette users, many non-users perceived that the use of e-cigarettes is associated with mental health issues like Anxiety and Depression (92.6% vs 82.8%), causes CVS and Respiratory problems (90.5% vs 89.7%), and is

associated with addiction (91.4% vs 86.2%). Most e-cigarette users think that e-cigarettes are safer than non-users (82.8% vs 67%) and believe that medical college played a role in starting the use of e-cigarettes (72.4% vs 47.6%).

Table 2: Knowledge and Perception of E-cigarette Use Among Medical Students.

	E-cigarette users		Non-users	
	Yes (%)	No (%)	Yes (%)	No (%)
Do you know about e-cigarettes?	27(93.1%)	2(6.9%)	222(66.1%)	114(33.9%)
Are there any dangerous chemicals in e-cigarettes?	24(82.8%)	5(17.2%)	293(87.2%)	43(12.8%)
Do you believe that e-cigarettes affect the environment?	22(75.9%)	7(24.1%)	284(84.5%)	52(15.5%)
Is there any link between vaping and mental health issues like anxiety and depression?	24(82.8%)	5(17.2%)	311(92.6%)	25(7.4%)
Do you think e-cigarettes cause cardiovascular and respiratory problems?	26(89.7%)	3(10.3%)	304(90.5%)	32(9.5%)
Do you think e-cigarettes have an addiction potential?	25(86.2%)	4(13.8%)	307(91.4%)	29(8.6%)
Are e-cigarettes considered safer than traditional cigarettes?	24(82.8%)	5(17.2%)	225(67%)	111(33%)
Do you think medical colleges played a role in starting or increasing the frequency of e-cigarettes?	21(72.4%)	8(27.6%)	160(47.6%)	176(52.4%)
Will you recommend e-cigarettes to someone who wants to quit smoking?	17(58.6%)	12(41.4%)	88(26.2%)	248(73.8%)
Do you believe that vaping should be banned in public places?	19(65.5%)	10(34.5%)	310(92.3%)	26(7.7%)

Note. Data presented as a percentage

E-cigarette users recommended e-cigarettes more than traditional cigarettes than non-users (58.6% vs 26.2%). Most non-users recommended banning e-cigarettes in public places more than e-cigarette users (92.3% vs 65.5%). In our study, most individuals were females (71.5% vs 28.5%), and more than half of the population was aware of e-cigarettes (68.2% vs 31.8%). Females consider e-cigarettes more

dangerous than Males (64.1% vs 22.7%). Females consider it more hazardous than Males (63% vs 20.8%). Boarder students living in hostels were found to be more e-cigarette users than Day scholars (11.1% vs 4.5%). No significant association of females considering e-cigarettes safer than males is observed (47.9% vs 20.3%; p value: 0.447). It means that both females and males consider it safer than

traditional cigarettes. Students with a family income of less than 100,000 are more likely to be e-cigarette

users than those with a family income of more than 100,000 (12.9% vs 5.4%; p value: 0.012)

Table 3: Table Representing Knowledge and Perception Compared with Gender.

		Male	Female	p value
Do you know about e-cigarettes?	Yes	84(23%)	165(45.2%)	0.001
	No	20(5.5%)	96(26.3%)	
Are there any dangerous chemicals in e-cigarettes?	Yes	83(22.7%)	234(64.1%)	0.012
	No	21(5.8%)	27(7.4%)	
Do you believe that e-cigarettes affect the environment?	Yes	76(20.8%)	230(63%)	<0.001
	No	28(7.7%)	31(8.5%)	
Is there any link between vaping and mental health issues like anxiety and depression?	Yes	84(23%)	251(68.8%)	<0.001
	No	20(5.5%)	10(2.7%)	
Do you think e-cigarettes cause cardiovascular and respiratory problems?	Yes	88(24.1%)	242(66.3%)	0.018
	No	16(4.4%)	19(5.2%)	
Do you think e-cigarettes have an addiction potential?	Yes	86(23.6%)	246(67.4%)	<0.001
	No	18(4.9%)	15(4.1%)	
Do you think medical colleges played a role in starting or increasing the frequency of e-cigarettes?	Yes	61(16.7%)	120(32.9%)	0.029
	No	43(11.8%)	141(38.6%)	
Will you recommend e-cigarettes to someone who wants to quit smoking?	Yes	37(10.1%)	68(18.6%)	0.07
	No	67(18.4%)	193(52.9%)	
Do you believe that vaping should be banned in public places?	Yes	84(23%)	245(67.1%)	<0.001
	No	20(5.5%)	16(4.4%)	

Note. Gender Comparison using p-values

Discussion

E-cigarettes are becoming more popular around the world, but little is known about their effectiveness and safety, as well as how young people, who are most likely to use them, feel about them.¹² Our study is to fill this research vacuum in a developing nation and demonstrate the awareness and understanding of undergraduate medical students. We discovered that although a sizable portion of respondents were aware of e-cigarettes, their use was often lower than that of traditional tobacco products, with men making up the bulk of e-cigarette users. These findings align with a study among medical students in Sindh.⁹ However, our study's percentage of e-cigarette users was greater at 7.9% as opposed to 6.2%.

A cross-sectional study was conducted in a sample of students at the School of Medicine of the University of Barcelona, Spain, between September and December 2017. Of the 159 medical students who responded to the survey, the vast majority (87.4%) believed that ECs can result in addiction.¹³ A cross-sectional survey was performed between January and March 2018. Three fields of study (medical, humanistic, and technical) were randomly selected from a group of 245 different fields of study within Universities in Katowice, showing that e-cigarettes are more addictive than traditional cigarettes⁵. According to 2016 research conducted in Egypt, 57.5% of participants had heard of e-cigarettes. In Saudi Arabia, 68.9% of the smoker participants used e-cigarettes.⁶ A cross-sectional study conducted among medical students in Sindh, 2018, reported 6.2% of their participants as e-cigarette smokers.⁹

When asked about recommending e-cigarettes to those who want to quit smoking, 28.8% of respondents recommended it, which is almost the same as the study conducted in Sindh, Pakistan,

among medical students (28.8%; 27.4%).⁹ But it is lower than international data, e.g., 35.8% in a cross-sectional study in Saudi Arabia.¹⁴ This could be a result of e-cigarettes' potential lack of popularity in Pakistan, which prevents them from being recognized as a smoking cessation tool. Moreover, e-cigarettes, promoted as less hazardous substitutes for traditional cigarettes, have experienced widespread adoption, especially among adolescents.²

It is interesting to know that most cigarette users were aware of e-cigarettes and the dangerous chemicals present in them. However, information about some severe side effects, like bronchiolitis, lipoid pneumonia, and eosinophilic pneumonia, is increasingly becoming available.¹⁵ It is also reported by the American Heart Association (AHA) that elevated blood pressure, heart rate, arrhythmia, and many other cardiovascular-related adverse effects are associated with it.¹⁶ In our study, a vast majority of participants were aware of its side effects and its use-related adverse effects.

Public health problems are raised by the coexistence of high awareness, positive perceptions, and concurrent use of traditional tobacco. The idea that e-cigarettes are less dangerous could unintentionally encourage dual usage rather than quitting, undermining tobacco control initiatives. This misunderstanding is especially problematic for medical students since it may affect how they counsel patients in the future.

When a t-test was applied to identify the difference in overall knowledge of e-cigarettes, Females scored significantly higher than males on knowledge, [$t(149.91) = -2.64, p = .009, d = 0.35$ (female = 5.24, SD = 1.10; male = 4.82, SD = 1.49)]. However, Males and females did not differ significantly in perception scores, [$t(363) = 1.12, p = 0.262, d = 0.13$ (male = 2.46,

SD = 1.06; female = 2.33, SD = 0.99]. When tests were applied to find the association of knowledge and perception of e-cigarettes between e-cigarette users and non-users, it was observed that there was no significant difference in knowledge scores between e-cigarette users and non-users, [$t(33.03) = 0.08$, $p = 0.939$, $d = 0.02$ (no = 5.12, SD = 1.24; yes = 5.10, SD = 1.24)] but e-cigarette users scored higher on perception than non-users, $t(363) = -2.37$, $p = .018$, $d = 0.46$ (users = 2.79, SD = 1.15; non-users = 2.33, SD = 1.00). It can be because of widespread availability, ads, awareness, and interaction with patients, leading to higher knowledge among both users and non-users.

Despite its limitations, this study was conducted among medical students in Rawalpindi Medical University, a developing country. The generalizability of our study is limited since it only provides a snapshot of medical students' use and frequency perceptions, which may differ from the views of other students enrolled in non-medical universities and colleges. The ratio of female students in our setting has a difference of almost 1:3, which led to the increased number of female participants, and it might have led to some skewed representation. Additionally, we mostly relied on self-reported estimates of tobacco and e-cigarette use; hence, it is impossible to rule out self-reporting errors in this data. Due to limitations on funding, we were also unable to assess the extent of self-report misclassification because we did not employ any biochemical verification methods.

Conclusion

In conclusion, a significant portion of respondents demonstrated better awareness, yet e-cigarette usage did not appear to be extensively prevalent within the study sample. Individuals typically viewed e-cigarettes as comparatively safer and showed an increased likelihood of simultaneous cigarette smoking and the

use of traditional tobacco. The perception that e-cigarettes are less harmful among both users and non-users is concerning. Further studies from developing countries are necessary to assess their safety and efficacy as a smoking cessation aid. Additionally, periodic surveillance is essential for a comprehensive understanding of e-cigarette use across various populations and settings.¹⁷

References

1. Malani PN, Walter KL. What are e-cigarettes? *JAMA*. 2024 Sep 3;332(9):768-.
2. Sun R, Mendez D, Warner KE. Trends in nicotine product use among US adolescents, 1999-2020. *JAMA Network Open*. 2021 Aug 2;4(8):e2118788-.
3. Alduraywish SA, Aldakheel FM, Alsuhaibani OS, Jabaan AD, Alballa RS, Alrashed AW, Alhassan MK, Aldwaighri MK. Knowledge and attitude toward E-cigarettes among first-year university students in Riyadh, Saudi Arabia. *InHealthcare* 2023 Feb 8 (Vol. 11, No. 4, p. 502). MDPI.
4. Alzalabani AA, Eltaher SM. Perceptions and reasons of E-cigarette use among medical students: an internet-based survey. *Journal of the Egyptian Public Health Association*. 2020 Aug 17;95(1):21.
5. Jankowski M, Krzystanek M, Zejda JE, Majek P, Lubanski J, Lawson JA, Brozek G. E-cigarettes are more addictive than traditional cigarettes—a study in highly educated young people. *International journal of environmental research and public health*. 2019 Jul;16(13):2279.
6. Abduldaem AM, Allogmani AM, Karbouji MA, Alharbi AS, Al-Zalabani AH. Awareness and Attitude toward Smoking E-Cigarettes. *The Egyptian Journal of Hospital Medicine*. 2018 Jan;31(5653):1-6.
7. Lindson N, Butler AR, McRobbie H, Bullen C, Hajek P, Wu AD, Begh R, Theodoulou A, Notley C, Rigotti NA, Turner T. Electronic cigarettes

- for smoking cessation. *Cochrane Database of Systematic Reviews*. 2025(1).
8. Shahbaz F, Ahmad HW, Ahmad S, Abid I, Mohamad AA, Ansa N, Haider N, Saleem J, Tahir N, Shahbaz M. Knowledge, Perceptions and Use of Electronic Cigarettes Among Health Professionals: Knowledge, Perceptions and Use of Electronic Cigarettes. *Pakistan Journal of Health Sciences*. 2023 Feb 28:139-44.
 9. Iqbal N, Khan ZA, Anwar SM, Irfan O, Irfan B, Mushtaq A, Bibi M, Siddiqui F, Khan JA. Electronic cigarettes use and perception amongst medical students: a cross-sectional survey from Sindh, Pakistan. *BMC research notes*. 2018 Mar 22;11(1):188.
 10. AWARENESS Definition & Meaning - Merriam-Webster [Internet]. [cited 2025 Jul 27]. Available from: <https://www.merriam-webster.com/dictionary/awareness>
 11. PERCEPTION | English meaning - Cambridge Dictionary [Internet]. [cited 2025 Jul 27]. Available from: <https://dictionary.cambridge.org/dictionary/english/perception>
 12. Samad S, Baloch B, Abdul Qadeer M. Vaping epidemic among the youth in Pakistan: urgent measures required to combat the rising trend. *Future Science OA*. 2024 Feb 14;10(1):FSO965.
 13. Ferrara P, Ramon-Torrell JM, Masuet-Aumatell C. Medical students' perceptions towards e-cigarettes: highlighting the gap in universities' curricula. *Health Educ Care*. 2019;4(3).
 14. Alzahrani SH, Alghamdi RA, Almutairi AM, Alghamdi AA, Aljuhani AA, Albalawi AH. Knowledge and attitudes among medical students toward the clinical usage of e-cigarettes: a cross-sectional study in a university hospital in Saudi Arabia. *Risk management and healthcare policy*. 2021 May 13:1969-84.
 15. Bravo-Gutiérrez OA, Falfán-Valencia R, Ramírez-Venegas A, Sansores RH, Ponciano-Rodríguez G, Pérez-Rubio G. Lung damage caused by heated tobacco products and electronic nicotine delivery systems: a systematic review. *International journal of environmental research and public health*. 2021 Apr 13;18(8):4079.
 16. Rose JJ, Krishnan-Sarin S, Exil VJ, Hamburg NM, Fetterman JL, Ichinose F, Perez-Pinzon MA, Rezk-Hanna M, Williamson E. Cardiopulmonary impact of electronic cigarettes and vaping products: a scientific statement from the American Heart Association. *Circulation*. 2023 Aug 22;148(8):703-28.
 17. World Health Organization. Urgent action needed to protect children and prevent the uptake of e-cigarettes [Internet]. Geneva: World Health Organization; 2023 Dec 14 [cited 2025 Aug 9]. Available from: <https://www.who.int/news/item/14-12-2023-urgent-action-needed-to-protect-children-and-prevent-the-uptake-of-e-cigarettes>