

Assessment of Knowledge and Attitude toward E-cigarette Among Nursing Student at Private Sector University

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Abstract

Background: E-cigarette use has become increasingly common among young adults, while misconceptions regarding their health effects, addictive potential, and safety continue to exist. Nursing students are future healthcare professionals who can play an important role in educating individuals about the risks associated with e-cigarette use.

Aim: To assess the level of knowledge and attitude toward e-cigarettes among nursing students at a private-sector university.

Methods: A descriptive cross-sectional study was conducted among 158 BSN Generic nursing students. Data were collected using a structured questionnaire assessing sociodemographic characteristics, knowledge, and attitudes toward e-cigarettes. Descriptive statistics, including frequencies and percentages, were used to summarize the findings.

Results: Most participants were male (72.8%) and aged 21–24 years. The majority (76.6%) had heard about e-cigarettes. Knowledge regarding specific issues was limited, with 45.6% recognizing their addictive potential, 51.3% recognizing that they can contain nicotine, and 68.4% being unsure about government regulations. Ever use of e-cigarettes was reported by 13.3% of participants, including 5.1% current users and 8.2% former users. Regarding attitudes, 48.7% agreed or strongly agreed that using e-cigarettes is fun, whereas 51.3% disagreed or strongly disagreed that e-cigarettes improve one's image.

Conclusion: Nursing students demonstrated relatively high general awareness but important gaps in specific knowledge and mixed attitudes toward e-cigarettes. Evidence-based educational programs should be incorporated into nursing curricula.

Keywords: E-cigarettes, electronic cigarettes, nursing students, knowledge, attitude, vaping

Introduction

The electronic cigarettes (e-cigarettes) are battery-powered devices, also referred to as electronic nicotine delivery systems (ENDS). They are known by other terms, like e-hookahs and vapes (Kotewar et al., 2023). The design of the e-cigarette was first invented by Herbert A. Gilbert in 1963 and later patented by Hon Lik in China in 2003 and introduced to the U.S. market in 2007 (Hampsher-Monk et al., 2024). The first e-cigarettes were designed as substitutes for traditional cigarettes and were marketed as a potentially less harmful alternative to smoking conventional cigarettes. The idea behind these gadgets is to heat a liquid into an aerosol inhalable by the user. Typically, the liquid in vaping e-cigarettes includes nicotine,

propylene glycol, vegetable glycerin, and different flavoring chemicals (Lu et al., 2022). Nicotine, a highly addictive substance that can impair brain function, and flavoring chemicals, potential harmful chemicals, and heavy metals like lead, nickel and tin (Naeem et al., 2020) may be present in the aerosol of e-cigarettes, even though they are not considered to be as harmful as traditional cigarettes.

There has been a significant rise in the use of e-cigarettes, especially among college and university students. There are numerous varieties of e-cigarettes, and hundreds of brands and thousands of flavors have come to market. These devices usually involve heating a liquid mixture of glycerol, propylene glycol, nicotine and flavours to create an aerosol (Yang, 2018). The introduction of e-cigarettes in China in the early 2000s contributed to a significant change in patterns of tobacco and nicotine use worldwide. The growing variety and availability of e-cigarette products have helped to make them popular among young people, including university and college students. In addition to investigating sociodemographic factors, knowledge and attitudes regarding e-cigarette use among students, it is critical to assess the prevalence of ever and current use of e-cigarettes among university and college students.

The World Health Organization (WHO) says there are significant differences in the regulation of e-cigarettes around the world. Historically, there are few countries with comprehensive laws and policies on these products, and some countries have no minimum age requirement for e-cigarette purchase (Van Der Eijk et al., 2021). Marketing via social media and a wide variety of appealing flavours has also been prominent in contributing to the rising trend of children and young people using e-cigarettes. Adverse exposure to e-cigarette-related content on social media can lead to more positive perceptions and willingness to use e-cigarettes among youth (Kwon & Park, 2020). This is especially important because youth might find flavored e-cigarettes appealing, more socially acceptable and less harmful than cigarettes.

The global use of e-cigarette has risen, especially among college and university students. The global e-cigarette consumption by Alduraywish et al. (2023) stood at 68 million in 2020 and rose to 82 million in 2021. The estimated numbers in the Eastern Mediterranean Region, the African Region, the European Region, the Americas and the Western Pacific Region were 9.2 million, 5.6 million, 20.1 million, 16.8 million and 16.0 million, respectively, while in the South-East Asian Region it was 14.3 million. When it comes to the development of countries, especially in Asia, there is a risk of increasing vulnerability towards e-cigarettes due to limited public awareness, poor health education and other social and environmental factors (Ab Rahman et al., 2019). The rise in the use of E-cigarettes is troubling because the aerosol products could include chemicals that could have adverse effects on respiratory and cardiovascular health, and nicotine is highly addictive. E-cigarette use has been linked to respiratory issues and other health effects, and the first case of e-cigarette or vaping-associated lung injury has further raised concerns about the health risks associated with vaping (Cao et al., 2020).

A big worry with e-cigarette use is their perceptions that e-cigarettes are safe or significantly less harmful than regular cigarettes. This misunderstanding can lead to higher usage and can make people less aware of the possible health effects of inhaling e-cigarette smoke. Nicotine is present in both regular and many e-cigarettes and can be addictive, leading to an addiction to nicotine via brain's reward system (Mahajan et al., 2021). The positive attitudes towards e-cigarette use, along with insufficient awareness of the potential risks, may lead to continued use among youth. These attitudes could impact psychological and behavioural health as well as other body systems, including cardiovascular and respiratory systems (Sapru et al., 2020). Hence, increasing knowledge and addressing misconceptions about e-cigarettes is a critical part of e-cigarette prevention among young adults.

E-cigarette use is growing quickly among young people attending college and universities in developing nations, in part due to media and public lack of awareness of potential health impacts. A lack of knowledge and misinformation about e-cigarettes in Pakistan can foster the perception that they are safer than traditional cigarettes (Noor et al., 2025). Some people use e-cigarettes as a way to help them to quit smoking traditional cigarettes, and others think that e-cigarettes have low levels of nicotine and are not very harmful. E-cigarettes could also have a more positive image in society than traditional cigarettes. These perceptions can be maintained and supported by poor knowledge and positive attitudes, as well as exposure to content in social media (Gowin et al., 2017). It is necessary to know the knowledge and attitudes of the college and university students towards e-cigarette use in order to know the factors contributing to the increasing use of e-cigarettes and to formulate suitable health education and awareness programs.

Methods

A descriptive cross-sectional study design was used to assess the knowledge and attitudes regarding e-cigarette use among nursing students at a private-sector university. The study was conducted in a private nursing college over a period of six months. The target population consisted of both male and female nursing students enrolled in the second to fourth years of study. A simple random sampling technique was used to select participants. The sample size was initially calculated using Slovin's formula, $n = N/[1 + N(e)^2]$, where n represents the sample size, N represents the population size, and e represents the margin of error. The final sample size of the study was **158 nursing students**. Students from the second, third, and fourth years were included, while teachers and other university staff were excluded. Ethical principles were followed throughout the study. Participation was voluntary, informed consent was obtained, and participants were assured that their privacy and confidentiality would be maintained.

Data Collection Procedure

Data were collected using an adopted questionnaire designed to assess knowledge and attitudes toward e-cigarette use among nursing students. The questionnaire consisted of three sections: demographic information, knowledge-related questions, and attitude-related questions. Data were collected from nursing students in their lecture halls. Before completing the questionnaire, participants were informed about the purpose of the study and the importance of their participation. They were given adequate time to complete the questionnaire independently. Participation was voluntary, and no participant was forced to participate. After completion, the questionnaires were collected and checked for completeness. All information obtained from the participants was kept confidential and used only for research purposes.

Data Analysis Procedure

The collected data were entered, organized, and analyzed using the **Statistical Package for the Social Sciences (SPSS), version 27**. Descriptive statistics were used to summarize the demographic characteristics and study variables. Frequencies and percentages were calculated for categorical variables, while means and standard deviations were calculated for continuous variables where appropriate. The findings were presented in tables and interpreted according to the objectives of the study.

Results

Demographic Analysis

Results

Table 1

Sociodemographic Characteristics and E-Cigarette Use of the Participants (N = 158)

Variable	Category	n	%
Gender	Male	115	72.8
	Female	43	27.2

Age (years)	18–20	38	24.1
	21–24	111	70.3
	25–27	15	9.5
Class	2nd year	55	34.8
	3rd year	61	38.6
	4th year	42	26.6
Ever used e-cigarettes	Yes	21	13.3
	No	137	86.7
E-cigarette use status	Current user	8	5.1
	Former user	13	8.2
	Never user	137	86.7

Table 1 presents the sociodemographic characteristics and e-cigarette use status of the study participants. Of the 158 participants, the majority were male (115, 72.8%), whereas females constituted 27.2% (n = 43). Most participants were aged 21–24 years (n = 111, 70.3%), followed by those aged 18–20 years (n = 38, 24.1%) and 25–27 years (n = 15, 9.5%). Regarding academic level, the largest proportion of participants were from the third year (n = 61, 38.6%), followed by the second year (n = 55, 34.8%) and fourth year (n = 42, 26.6%). Most participants reported that they had never used e-cigarettes (n = 137, 86.7%), while 13.3% (n = 21) reported having used them at some point. Among the total sample, 5.1% (n = 8) were current users and 8.2% (n = 13) were former users. Overall, the findings indicate that e-cigarette use was relatively uncommon among the participants, with the sample predominantly comprising male students aged 21–24 years.

Table 2
Participants' Knowledge Regarding E-Cigarettes (N = 158)

No.	Knowledge Item	True n (%)	False n (%)	Not sure n (%)
1	Have you ever heard about e-cigarettes?	121 (76.6)	13 (8.2)	24 (15.2)
2	E-cigarettes are addictive.	72 (45.6)	53 (33.5)	33 (20.9)
3	E-cigarettes are a potential cause of asthma attacks and allergies.	78 (49.4)	44 (27.8)	36 (22.8)
4	E-cigarettes can contain nicotine.	81 (51.3)	44 (27.8)	33 (20.9)
5	The health risks of e-cigarettes are the same as normal cigarettes.	71 (44.9)	50 (31.6)	37 (23.4)
6	E-cigarettes have the same chemicals as normal cigarettes.	48 (30.4)	60 (38.0)	50 (31.6)
7	Are you aware of any government regulations on e-cigarettes?	38 (24.1)	12 (7.6)	108 (68.4)
8	E-cigarettes are less harmful to health than normal cigarettes.	61 (38.6)	71 (44.9)	26 (16.5)
9	E-cigarettes are not harmful to health.	36 (22.8)	91 (57.6)	31 (19.6)
10	Can e-cigarettes be used in smoke-free places?	43 (27.2)	71 (44.9)	44 (27.8)
11	E-cigarette vapor is dangerous to babies and children.	69 (43.7)	49 (31.0)	40 (25.3)

Table 2 demonstrates that participants had varying levels of knowledge regarding e-cigarettes. Most participants had heard about e-cigarettes ($n = 121$, 76.6%), indicating a relatively high level of general awareness. However, knowledge concerning specific health effects was less consistent. More than half of the participants recognized that e-cigarettes can contain nicotine ($n = 81$, 51.3%), while 49.4% ($n = 78$) identified e-cigarettes as a potential cause of asthma attacks and allergies. Only 45.6% ($n = 72$) correctly recognized their addictive potential. Furthermore, 44.9% ($n = 71$) believed that e-cigarettes have health risks similar to conventional cigarettes. Considerable uncertainty was observed regarding government regulations, with 68.4% ($n = 108$) reporting that they were not sure about existing regulations. Similarly, 31.6% ($n = 50$) were unsure whether e-cigarettes contain the same chemicals as conventional cigarettes. Although 57.6% ($n = 91$) correctly rejected the statement that e-cigarettes are completely harmless, 38.6% ($n = 61$) believed that e-cigarettes are less harmful than conventional cigarettes. Overall, the findings suggest that while general awareness of e-cigarettes was relatively high, important gaps remained in participants' knowledge concerning addiction, chemical composition, health risks, and government regulations.

Table 3
Participants' Attitudes Toward E-Cigarettes (N = 158)

No.	Attitude Item	Strongly Agree n (%)	Agree n (%)	Not Sure n (%)	Disagree n (%)	Strongly Disagree n (%)
1	Using e-cigarettes is fun.	34 (21.5)	43 (27.2)	41 (25.9)	25 (15.8)	15 (9.5)
2	E-cigarettes make someone look stylish.	13 (8.2)	40 (25.3)	59 (37.3)	31 (19.6)	15 (9.5)
3	E-cigarettes relieve one's stress.	13 (8.2)	25 (15.8)	68 (43.0)	42 (26.6)	10 (6.3)
4	E-cigarettes have a problem-solving effect.	7 (4.4)	30 (19.0)	65 (41.1)	40 (25.3)	16 (10.1)
5	E-cigarettes help to cut down on tobacco smoking.	15 (9.5)	40 (25.3)	68 (43.0)	23 (14.6)	12 (7.6)
6	E-cigarettes enhance one's performance.	3 (1.9)	21 (13.3)	70 (44.3)	46 (29.1)	18 (11.4)
7	E-cigarettes increase one's concentration.	7 (4.4)	18 (11.4)	64 (40.5)	48 (30.4)	21 (13.3)
8	E-cigarettes improve one's image.	7 (4.4)	15 (9.5)	55 (34.8)	49 (31.0)	32 (20.3)

Table 3 shows considerable variation in participants' attitudes toward e-cigarette use. The statement that received the greatest overall agreement was that using e-cigarettes is fun, with 48.7% of participants either strongly agreeing (21.5%) or agreeing (27.2%). In contrast, uncertainty was prominent for several attitude statements. For example, 43.0% of participants were unsure whether e-cigarettes relieve stress, and the same proportion were unsure whether e-cigarettes help reduce tobacco smoking. Similarly, 44.3% were unsure whether e-cigarettes enhance performance, while 40.5% were uncertain about their effect on concentration. A predominantly unfavorable attitude was observed toward the statements that e-cigarettes improve users' image and increase concentration. More than half of participants disagreed or strongly disagreed that e-cigarettes improve one's image (51.3%), while 43.7% disagreed or strongly disagreed that e-cigarettes increase concentration. Overall, the findings indicate that

participants' attitudes were characterized by substantial uncertainty, although there was some positive perception of e-cigarettes as enjoyable and, to a lesser extent, stylish.

Table 4

Combined Positive, Neutral, and Negative Responses to Selected Attitude Statements (N = 158)

No.	Attitude Item	Agree/Strongly Agree n (%)	Not Sure n (%)	Disagree/Strongly Disagree n (%)
1	Using e-cigarettes is fun.	77 (48.7)	41 (25.9)	40 (25.3)
2	E-cigarettes make someone look stylish.	53 (33.5)	59 (37.3)	46 (29.1)
3	E-cigarettes relieve one's stress.	38 (24.1)	68 (43.0)	52 (32.9)
4	E-cigarettes have a problem-solving effect.	37 (23.4)	65 (41.1)	56 (35.4)
5	E-cigarettes help to cut down on tobacco smoking.	55 (34.8)	68 (43.0)	35 (22.2)
6	E-cigarettes enhance one's performance.	24 (15.2)	70 (44.3)	64 (40.5)
7	E-cigarettes increase one's concentration.	25 (15.8)	64 (40.5)	69 (43.7)
8	E-cigarettes improve one's image.	22 (13.9)	55 (34.8)	81 (51.3)

Table 4 provides a consolidated interpretation of participants' attitudes by combining the strongly agree/agree and strongly disagree/disagree categories. Nearly half of the participants (48.7%, n = 77) agreed that using e-cigarettes is fun, making it the most positively perceived characteristic. One-third of participants (33.5%, n = 53) also believed that e-cigarettes make a person look stylish. However, uncertainty was the predominant response for several statements, particularly regarding stress relief (43.0%, n = 68), reduction of tobacco smoking (43.0%, n = 68), and enhancement of performance (44.3%, n = 70). Negative attitudes were particularly evident regarding the perceived effects of e-cigarettes on concentration and personal image. A total of 43.7% (n = 69) disagreed or strongly disagreed that e-cigarettes increase concentration, whereas 51.3% (n = 81) disagreed or strongly disagreed that e-cigarettes improve one's image. These findings suggest that although some participants associated e-cigarettes with enjoyment and a stylish appearance, the majority did not endorse claims concerning improved concentration, performance, or image, while a substantial proportion remained uncertain about their potential benefits.

Discussion

The aim of the present study was to evaluate the knowledge and attitude of the nursing students of a private sector university towards e-cigarettes. The total number of BSN Generic students involved in the study were 158, both males and females from different academic years. The results revealed that there were more male participants than female (72.8% vs. 27.2%). The majority of the participants were young adults (aged 21-24) with the highest percentage in the 21-24 age group. Representing students from different levels of nursing education were students from the second, third, and fourth years of the BSN Generic program. The gender disparity observed in the current study agrees with that of Wamamili et al. (2020) who also found gender differences in e-cigarette use and perceptions among university students. It is important to note

that the current study was conducted with a sample of nursing students that has a different demographic makeup than the wider student population, so the knowledge and attitudes of the current sample need to be interpreted in this light.

The results of the present study showed that participants were lacking in knowledge or had misconceptions on a number of key issues about e-cigarettes. While 76.6% of respondents had heard of e-cigarettes, the knowledge about the health effects and regulation of e-cigarettes was limited. Only 45.6% recognized that e-cigarettes are addictive, 49.4% recognized their potential to cause asthma attacks and allergies, and 51.3% knew that e-cigarettes can contain nicotine. In particular, knowledge about regulations by the government was limited, with 68.4% of participants unsure if there were specific government regulations around e-cigarettes. The results suggest that widespread awareness of e-cigarettes was not a reflection of full knowledge of e-cigarettes. The results reported by Alduraywish et al. (2023) contradicted some aspects of the current study, especially the level of awareness about the negative effects of e-cigarettes. Their study showed that they had more awareness about addiction and respiratory effects. The difference could be attributable to differences in study subjects, educational level, access to information about health, and access to e-cigarette related information in various settings.

The results on knowledge of e-cigarette addiction and government regulation are especially relevant. The findings of the present study revealed that 54.4% did not view e-cigarettes as addictive, and 68.4% were not sure about the government regulations concerning e-cigarette use. This suggests that there are significant knowledge gaps even among the nursing students, who are likely to have come into contact with more information on health. Similar awareness issues were raised by Taylor et al. (2021) who found that young people were similarly not well informed about e-cigarette rules, indicating that knowledge of regulations may not be sufficiently conveyed to the general population. The lack of awareness about regulation may also lead to uncertainty about the safety and acceptability of the use of e-cigarettes. It is especially important to understand the nature of nicotine addiction given the potential for nicotine delivery via e-cigarette use and the potential for nicotine dependence. The present findings indicate that there may be a teaching moment in nursing education for correcting misconceptions regarding the nature of nicotine, addiction, and the regulation of e-cigarettes.

The present study also revealed some misconceptions about relative harmfulness of e-cigarettes and traditional cigarettes. Of those who participated, 38.6% thought that e-cigarettes are less harmful than conventional cigarettes and 22.8% thought that e-cigarettes are not harmful to health. Slightly over half (44.9%) said the health dangers of e-cigarettes were the same as conventional cigarettes. These results highlight the lack of clarity in relation to the health risks of e-cigarette use. In a study conducted by Alduraywish et al. (2023) in Riyadh, Saudi Arabia, among first-year university students, the results showed that the knowledge of the harmful effects was relatively high, as 61.2% of students recognized addiction as a harmful effect, while 61% recognized asthma as a harmful effect. They found that their results were greater than what was seen in the present study. The Riyadh study also revealed low awareness of the similarity of risks and chemical composition of e-cigarettes and tobacco cigarettes. The findings agree with the current research which show that students can identify some health effects but not a comprehensive understanding of the health risks of e-cigarette use. The findings of the present study resonate with Alduraywish et al. (2023) findings to highlight the importance of knowledge building through educational interventions.

The results of the current study on attitudes towards e-cigarettes indicated positive, negative and ambivalent attitudes. Nearly half of the participants (48.7%) considered using e-cigarettes as fun, and the recreational use of e-cigarettes is still a reality for a large number of nursing students. One-third (33.5%) thought that someone looks stylish when they use e-cigarettes. A significant percentage were not sure if e-cigarettes ease stress (43.0%), help to reduce smoking of tobacco (43.0%), or improve performance (44.3%). The results of this study align with the

study conducted by Aghar et al. (2020), which looked at perceptions and attitudes towards e-cigarettes, and found that social and recreational perceptions were associated with e-cigarette attitudes among young people. Findings of the present study indicate that e-cigarettes have a popular social image even among students who may not necessarily believe that they are health beneficial. In addition, Yang et al. (2024) provided some evidence on the perception of e-cigarettes as a smoking cessation tool, which remains a subject of ongoing debate concerning e-cigarettes and smoking cessation. This is because the significant number who were “unsure” on this matter in the current study suggests that misconceptions and incomplete information could impact attitudes towards e-cigarette use.

The finding of the present study is supported by the results of a cross sectional study carried out on dental students of 11 countries. Alhajj et al. (2022) examined the knowledge, beliefs, attitudes and practices surrounding the use of e-cigarettes among 5,697 dental students. The study revealed that 90.8% of the respondents were aware of the e-cigarettes, and the most widely reported source of information was social media (33.2%). Although the general knowledge was very high, the researchers found the level of knowledge of the participants was inadequate and deemed the overall level of knowledge to be less than satisfactory. These findings are similar to the current study, where 76.6% of the participants had heard of e-cigarettes and exhibited notable deficits in specific knowledge.

The findings of the present study are also comparable with research conducted among university students in Hangzhou, China. Fang et al. (2022) studied 563 university students and reported that only 42.6% knew that e-cigarettes contain nicotine, while 31.1% considered e-cigarettes to be tobacco products. Only 8.2% of participants had ever used e-cigarettes, and the study concluded that students had relatively limited knowledge and generally unsupportive attitudes toward e-cigarettes. The present study showed a higher proportion of participants who recognized that e-cigarettes can contain nicotine (51.3%) and a higher proportion who had ever used e-cigarettes (13.3%). Both studies demonstrate that relatively low levels of e-cigarette use can coexist with incomplete knowledge. The present study also showed that 43.7% of participants disagreed or strongly disagreed that e-cigarettes increase concentration, while 51.3% disagreed or strongly disagreed that e-cigarettes improve one's image. These findings indicate that participants did not strongly endorse several commonly perceived benefits of e-cigarettes. The overall evidence from the present study and previous research suggests that nursing students may possess general awareness of e-cigarettes while still having misconceptions concerning addiction, health effects, regulation, smoking cessation, and perceived benefits. Educational programs integrated into nursing curricula could strengthen students' knowledge and enable them to provide accurate health education and counseling regarding e-cigarette use.

Conclusion:

The present study concluded that although most nursing students (76.6%) had general awareness of e-cigarettes, important gaps remained in their knowledge regarding nicotine addiction, health risks, chemical contents, and government regulations. The findings also revealed mixed attitudes, with 48.7% of students considering e-cigarette use fun, while substantial proportions were uncertain about their ability to relieve stress, reduce tobacco smoking, or enhance performance. E-cigarette use was relatively low, as only 13.3% of participants reported ever using e-cigarettes, including 5.1% current users and 8.2% former users. Despite the low prevalence of use, the presence of misconceptions among future nurses is a concern because nursing students are expected to provide accurate health education and counseling. The study highlights the need for structured educational programs and inclusion of evidence-based information about e-cigarettes in the BSN curriculum to improve students'

knowledge, promote appropriate attitudes, and strengthen their ability to educate patients and communities about the potential risks associated with e-cigarette use.

Recommendations

Based on the findings of the present study, it is recommended that nursing institutions incorporate comprehensive and evidence-based education about e-cigarettes into the BSN curriculum, with particular emphasis on nicotine addiction, health effects, chemical contents, secondhand exposure, government regulations, and misconceptions regarding smoking cessation and perceived benefits. Regular awareness sessions, seminars, and health education programs should be conducted to improve nursing students' knowledge and promote healthier attitudes toward e-cigarette use. Students should also be encouraged to participate in anti-tobacco and nicotine-prevention activities so that they can develop effective counseling and health-promotion skills. Nursing faculty should provide updated information based on current scientific evidence and public-health guidelines. Future studies should include larger and more diverse samples from multiple universities and should examine factors associated with e-cigarette use, knowledge, and attitudes among nursing students. Longitudinal and interventional studies are also recommended to evaluate whether educational programs improve knowledge and attitudes toward e-cigarettes over time.

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