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Prevalence, Knowledge, and Attitude Toward Electronic Cigarette Among Female Students in Saudi Arabia. A Cross-Sectional Study

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Abstract

Objective: The purpose of this study was to analyse and compare female students' knowledge, perception, and attitude regarding electronic cigarette ECs, as well as the prevalence of EC use.

Methods: A self-report survey collected data from 391 female students above the age of 18, smokers and non-smokers. The participants enrolled in this study were female students enrolled in various colleges at King Saud University.

Results: In total, 9.5% of them admit being smokers, with 3.8% of them were from health sciences college which represent 40.5% of all smokers; 2.8 % of participants quit smoking and mare than half of them from Health colleges; while the rest of participants who are non-smokers were mainly from community colleges. 15.6% of participants used EC just for leisure while 3.6% used it as a recreational program to quit smoking. Regarding tested knowledge about some adverse effect of EC use, [63.7%] have no idea about the content of EC vapor but the majority believe that it causes addiction and 64.2 % agreed that it is carcinogenic.

Conclusion: Early education about EC hazards on health and its uselessness effect on quitting smoking can increase awareness but not enough motivation to quit smoking. The prevalence of EC use was found to be higher also among traditional smokers and previous smokers due to false believe that it helps in smoking cessation while the majority of EC user and non-user believe that it's just a leisure and show. Knowledge about the vapor content is quit less in majority of students.

Keywords: Prevalence, Knowledge, Attitude, Electronic Cigarette, Female Students, Saudi Arabia

Introduction

The use of electronic cigarettes (ECs) is becoming more popular among young people, particularly students, which is problematic because it may be associated with a worsening of public health ***[1].*** The National Institute on Drug Abuse (NIDA) defines ECs as battery-powered devices that allow users to inhale a flavored aerosol containing nicotine via nicotine delivery system (ENDS) ***[2].*** Young individuals are drawn to e-cigarettes as a recreational program to assist people quit smoking tobacco. This could be because younger individuals are drawn to and influenced by new trends, especially if they believed that the new trend would help them quit smoking, which is an unhealthy habit ***[3, 4].*** Furthermore, the availability of a wide selection of tastes makes them attractive to majority of users. Peer pressure, curiosity, and smoking family members were all key variables in Saudi teenage EC

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use. Advertisements and social media platforms were key sources of information on EC for Saudi youth ***[5].***

There are three reasons why EC may be particularly appealing to young people. For first of all, many youths feel that vaping is less risky than smoking. Second, EC have a lower per-use cost than regular cigarettes. Finally, both youths and adults find the absence of smoke pleasant. EC, which have no odor, help to alleviate some of the stigma associated with smoking. ***[6].*** However, most people are unaware that EC include additional chemicals and metals and can give larger doses of nicotine than traditional cigarettes, which can lead to addiction and predispose users to health concerns, notably cardiac problems ***[7].*** Toxins in ECs, notably nicotine, are detrimental to the human body, according to previous findings, particularly during adolescence, because nicotine consumption during that age might have long-term consequences, including as behavioral and neurological repercussions ***[8].*** To tackle this issue, it is critical to understand the prevalence of EC usage among the young population, who are the primary consumers of ECs. More than 1.78 million middle and high school students in the United States reported using ECs. According to a recent poll conducted in the United States, ECs are the most popular tobacco product used among adolescence. Furthermore, the prevalence of EC usage among teenagers increased dramatically between 2017 and 2019, rising from 11.7 to 27.5% respectively. ***[9]***

Despite the vast range of prevalence in the Middle East, a recent study on the general population in Jeddah, Saudi Arabia found that 13.3% of smoker children below 18 years where EC users. ***[10]*** This is closer to another study on the prevalence among medical students in Riyadh conducted in 2020 ***[11]*** found that 12.2% of them used ECs. Regarding using of EC among health sciences colleges students in Jeddah, ***[12]*** found that 28% of health science students used ECs and 42.7% of them have used it as a recreational program to aid in quit smoking but only 56.7% admit successful quitting. The frequency of ECs users in several Saudi health colleges has been estimated by to be 7.9, 13.4, and 29% among dental, pharmacy, and medical students, respectively. ***[13]*** In general, a slew of research from both rich and developing countries, including Saudi Arabia, found that ECs were widely used among college students.

Few research on the prevalence, awareness, and attitudes toward E-cigarette usage among Saudi adolescents have been conducted in the Kingdom of Saudi Arabia. ***[14]*** had conducted a cross-sectional study conducted in Saudi individual age ranges from 18 to 60 years and result showed 68.9% of individuals experienced using EC and 13.7% of these users believed that vaping is absolutely safe, while 67.5% believed that it has health hazards indicating high degree of awareness. Speaking about EC health hazard, many studies were found in literature admitting the link between EC and oral cancer ***[15]***, inflammatory responses in lung tissue ***[16]***, allergic inflammation of the airway and gingiva and potentially harmful effects on CNS and CVS ***[1]***. In Jazan University, prevalence of smoking among female medical students, was found to be 5.9% and 34.9% of them started the smoking habit between 18 and 21 years old. The author found that the rate of smoking is higher while quitting rate is lower than what found among medical doctors. He recommended increase smoking cessation awareness and providing smoking cessation clinics for medical students ***[17]***. The purpose of this study was to analyze and compare female students' knowledge, perception, and attitude regarding ECs, as well as the prevalence of EC use. To achieve this purpose, this research addressed the following questions.

1- What was the prevalence of traditional smoker vs, EC users in different female colleges including the College of Health, Science, and Humanities?

2- What is the difference in attitude and knowledge toward EC use among different colleges?

3- What was the common knowledge regarding use, hazard, and social attitude toward EC among the participants?

Methodology

Study design, sample and data collection

A cross-sectional descriptive, self-reporting was used in this study. The data were gathered from September to October 2023. The participants enrolled in this study were female students enrolled in various colleges at King Saud University, including the College of Health, Science, Community and Humanities. 391 students above the age of 18, smokers and non-smokers, who expressed a desire to participate in the poll and agreed to share information for publication purposes were included. Male students and pupils under the age of 18 were excluded from the study.

Questionnaire design

Online google form-based survey study was used to collect data. A survey was developed based on an existing article ***[9]***. The online survey was distributed using official student mail and university social network. Then the data was exported as an Excel sheet to be analyzed. The questionnaire was composed of two main sections. The first section focused on gathering information about the student's colleges, year of study, gender, smoking status, history of EC usage, and whether they were being taught smoking cessation issues. The second section included nine questions addressing knowledge, views, and attitudes toward the usage of ECs.

Statistical analysis

The data obtained from exported Excel sheet was

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statistically analyzed using the statistical package for social sciences (SPSS) software version 20.0 and the results were expressed as frequency distribution tables and crosstabulation tables. The relation between smoking habit and the use of EC was measured by Pearson Correlation (r) and expressed as strong correlation if the correlation coefficient is away from the value [0] and closer to value [1]. The significance level was measured as [p-value] and expressed as significant when [$p<0.05$].

Ethical considerations

Approval for this research was obtained from the Research Ethics Committee of King Saud University (KSU-HE-23-595). The aim and objectives of the study was explained in the beginning of the questionnaire. Informed consent was obtained from the participants who will participate in the study.

Results

The final analysis included a total of 391 participants students with a range of ages from 18 years and above. Majority of participants were above 24 years old. From science colleges and Humanities colleges followed by Health colleges and Community colleges is the least (Table 1).

Table 1: Demographic characteristic of study participants

Characteristic		N (%) *
Age Group (year)	18	42 (10.7)
	19	56 (14.3)
	20	65 (16.6)
	21	48 (12.3)
	22	48 (12.3)
	23	19 (4.9)
	24	12 (3.1)
	>24	101 (25.8)
Collages	Science	138 (35.3)
	Humanities	137 (35)
	Health	97 (24.8)
	Community	19 (4.9)
Smoking status	Smoker	37 (9.5)
	Non-smoker	343 (87.7)
	Ex-smoker	11 (2.8)
Usage of electronic cigarettes	Never	316 (80.8)
	Yes, for leisure	61 (15.6)
	Yes, attempt to quit smoking	14 (3.6)

In total, 9.5% of participants admit being smokers, with 3.8% of them were from health sciences college which represent 40.5% of all smokers; 2.8 % of participants quit smoking and more than half of them from Health colleges; while the rest of participants who are non-smokers were mainly from community colleges (Table 2). 15.6% of participants used EC just for leisure while 3.6% used it as a recreational program to quit smoking (Table 3).

The use of EC to assist quitting smoking was denied by 54% of smokers and previous x-smokers, and 49% of non-smokers. Some of smokers 35% believe that EC may help in smoking cessation but 32.2% have no idea whether EC have positive or negative effects on quitting smoking. The results also showed aspects of the knowledge about some adverse effect of EC use. [63.7%] have no idea about the content of EC vapor but the majority believe that it causes addiction and [64.2 %] agreed that it is carcinogenic that is [73.8% -83.3%] linked its carcinogenic effect to the prolonged period of exposure. In addition to adverse effects, some of the students believed that EC use is just a moder trend of traditional smoke. 41% of participants strongly agreed and 27.9 % only agreed that the EC use is an issue of show and trend rather than quitting smoking. Finally, we surveyed the participant opinions about who is suitable for EC smoking education. The results were Health educator on top list 47% followed by Respiratory therapist 34% followed by physician 13%.

Table 2: Status of smoking in relation to college.

	Collages N (%)			
	Science	Humanities	Health	Community
smoker	7 (18.9)	11 (29.7)	15 (40.5)	4 (10.8)
None-smoker	130 (37.9)	123 (35.9)	76 (22.2)	14 (4.1)
Ex-smoker	1 (9.1)	3 (27.3)	6 (54.5)	1 (9,1)
Total	**138 (35.5)**	**137 (35)**	**97 (24.8)**	**19 (4.9)**

Table 3: shows the rate of use of EC among smokers and nonsmokers and its correlation.

	Use of EC if yes, why N(%)		
Smoking status	Never	Yes, for leiser	Yes, attempt to quit smoking
smoker	8 (21.6)	19 (51.4)	10 (27)
Non-smoker	303 (88.3)	36 (10.5)	4 (1.2)
Ex-smoker	5 (45.5)	6 (54.5)	0 (0)
total	316 (80.8)	61 (15.6)	14 (3.6)

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Discussion

The aim of this study is to assess the prevalence, knowledge, and attitude toward EC among female students in Saudi Arabia, provide valuable insights into the current state of awareness and attitudes towards EC and its prevalence. A cross-sectional study conducted in Saudi individual age ranges from 18 to 60 years showed that 68.9% of individuals experienced using EC ***[15]***. The prevalence of EC use was found to be higher among current smokers, and pervious smokers aged more than 24 years old. (19.2%) of smoker plus non-smoker participants experience EC use. This prevalence is lower than the prevalence in United State 27% ***[9]*** United Kingdom 37.3% ***[18]*** and China 48.5%. In comparison to prevalence of EC use in Saudi Arabia, the percentages of EC use were slightly higher than the prevalence among children below 18 years in Jeddah. ***[10]*** in addition, the prevalence among KSU participants is higher than Malaysia 3.2% ***[19]***. Almost half of smoker respondent as well as pervious smokers reported using EC (51.4%) and (54.5%) respectively. (10%) of non-smokers has tried EC. The reason and attitude toward using EC was either for quitting smoking (3.6% of participants) or just for leisure (15.6 % of all participants). Furthermore, (41% of participants) strongly agreed and (27.9 %) only agreed that EC usage is just an issue of show and following trends which is consistent with researches by ***[3, 4]*** who concluded that EC users believed that new trend would help them quit smoking and curiosity toward wide selection of tastes makes EC attractive to majority of users. The overall dual smoking (traditional cigarette plus EC) is found to be (4.9%) which is considered as a high prevalence if compared with what was found by ***[19]*** in Malaysia 2.3% and by ***(Brożek et. al., 2019)*** 1.8% among students in Central and Eastern Europe.

The prevalence differences between colleges were found to be highest among Health colleges (3.8%) and Humanities colleges (2.8%), followed by Sciences colleges (1.8%) and Community colleges is the least (1%). As can be noticed, Health colleges students are the one who are exposed more to health issue information's as well as general knowledge about toxicity of nicotine and other environmental hazard as part of their curriculum. Furthermore, ***[13]*** found that other health-related colleges such as dental, pharmacy, and medical students showed higher frequency of EC use, 7.9, 13.4, and 29% respectively, where medical students are on the top of the list. This is consistent with the fact ***[20]*** concluded, which state that rate of EC use is higher among student with higher educational levels.

Regarding student believes and awareness, more than half of smokers (54.1%) agreed that EC won't help them in quitting smoking and majority of them (63.7%) don't know whether the EC vapor contain nicotine but (30.7 to 52%) of respondents believes between agreeing and strongly agreeing that EC has addiction effect and has carcinogenic effect specially following long exposure (from 73% to 83%). ***[8]*** This is consistent with the conclusion by ***[7]*** who stated that most people are unaware that EC additional chemicals and metals and that it can give larger doses of nicotine than traditional cigarettes, which can lead to addiction and predispose users to health concerns, notably cardiac problems as well as behavioral and neurological effects ***[21]*** and lung harm, according to the Centers for Disease Control and Prevention (CDC).

Conclusion

University age is critical for smoking habits specially among health sciences and medical students. Early education about EC hazards on health and its uselessness effect on quitting smoking can increase awareness and improve attitude toward EC use but being highly educated in disease and health is not enough motivation to quit smoking. The study showed that early professional education on EC use is deficient among studied colleges at KSU. The prevalence of EC use was found to be higher also among traditional smokers and previous smokers due to false believe that it helps in smoking cessation while the majority of EC user and non-user believe that it's just a leisure and show. Though majority of student knew that EC has carcinogenic effect as traditional smoking and can cause addiction, still the knowledge about the vapor content is quid less in majority of them.

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Conflicts of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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