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The prevalence and sociodemographic determinants of tobacco and nicotine use among students in healthcare disciplines in Saudi Arabian universities: a cross-sectional survey

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Background: Tobacco smoking is one of the most significant health-related problems worldwide. However, the prevalence and sociodemographic determinants of tobacco and nicotine use among students on healthcare courses in Saudi Arabia are limited.

Methods: This cross-sectional study used a questionnaire that was distributed via SurveyMonkey between November 2022 and June 2023 to all student universities offering healthcare courses. Data are presented as frequency and percentages. The associated sociodemographic factors with current tobacco and nicotine use were subjected to logistic regression.

Results: Overall, 5,012, of whom 3,872 (77.25%) were males, responded to the online survey. The prevalence of current tobacco and nicotine use was 3,553 (71%). The majority of users used electronic nicotine delivery systems (1,622: 32.36%). The current use of cigarettes (AOR: 1.75 (1.42 to 2.15)), e-cigarettes (AOR: 1.17 (1.01 to 1.37)), and smokeless tobacco substances (AOR: 1.35 (1.02 to 1.90)) were more pronounced among males compared to female students. However, the current use of a hookah was less among males (AOR: 0.74 (95% CI: 61 to 0.91)). Smoking cigarettes was practiced less among students living in other regions compared to the Central Region. However, smokeless tobacco

substances seem to be more prevalent in the Western, Southern, and Northern Regions, (AOR: 1.57 (95% CI: 1.09 to 2.26)), (AOR: 1.43 (95% CI: 1.04 to 1.95)), and (AOR: 1.57 (95% CI: 1.09 to 2.26)), respectively.

Conclusion: Smoking is prevalent among students in the healthcare disciplines, with electronic nicotine delivery systems being the most used product. Several sociodemographic factors were associated with higher tobacco or nicotine use.

KEYWORDS

smoking, tobacco, nicotine, healthcare, students

1 Introduction

Tobacco smoking is one of the most significant health-related problems worldwide. It poses a considerable risk for various diseases, including different types of cancers, cardiovascular diseases, and pulmonary diseases (1–3). Further, reports indicate that tobacco use has led to a high death rate globally: In 2019, tobacco was implicated in approximately 8.71 million fatalities worldwide and contributed to around 229.77 million disability-adjusted life years on a global scale (4, 5). Moreover, the use of tobacco is associated with a decrease in physical and social abilities, diminished energy levels, poor general health, and compromised mental well-being (6). Smoking goes beyond being a health concern; it may also pose a hurdle to academic success. For instance, a study revealed that smokers had significantly lower GPAs, higher absenteeism rates, and a greater number of academic warnings compared to non-smokers (7).

Tobacco use, in all its forms, has become more pervasive among college students. For instance, one study has indicated that the prevalence of tobacco use among nursing students is pervasive (8). The research indicates that 12.4% of medical students actively smoke, while almost 40% of these students are exposed to secondhand smoke. When breaking down the data by gender, they reveal that 18.6% of male medical students and 5.9% of female medical students are active smokers (9). Smoking was found to be most common in European countries, with 20% of medical students and 40% of dental students reported to be smokers. Similarly, in the Americas, the rates ranged from 13% among pharmacy students to 23% among dental students. Additionally, the use of other tobacco products was notably high in Eastern Mediterranean countries (10–23%) and in Europe (7–13%) (10). It has also been reported in one study that around 24% of students indicated they use e-cigarettes daily and around 50% of these students mentioned that they had used an e-cigarette in the last 30 days (11). Another study has revealed that around 27% of college students reported they used e-cigarettes (12). Interestingly, in the Middle East, specifically in Saudi Arabia, there is a notable lack of national-level research regarding the prevalence and sociodemographic determinants of tobacco and nicotine use among students specializing in healthcare. This gap in the research highlights the need for a national survey in Saudi Arabia to understand better the sociodemographic factors and theoretical frameworks that influence tobacco and nicotine use in this particular student group.

The goal of this study is to assess the prevalence and sociodemographic determinants of tobacco and nicotine use among

healthcare specialty students in Saudi Arabia through a national survey. Our study may pave the way toward a better understanding of how sociodemographic characteristics are associated with nicotine/tobacco behaviors among Saudi Arabian healthcare students. The findings could also support interventions aimed at ceasing or preventing nicotine and tobacco use by healthcare students here.

2 Methods

2.1 Study design and instrument

This cross-sectional study used a questionnaire that was developed to meet the study objectives. The questionnaire consisted of six items in two sections as follow:

Section one consisted of five questions including age, gender, geographical region profession and academic level.

Section Two consisted of one question regarding tobacco and nicotine use in the past 30 days.

The questionnaire was piloted and evaluated by 10 participants from the target population to ensure the comprehensibility and clarity of the questions, as well as the answers.

2.2 Data collection and sampling

The questionnaire was available and distributed via the SurveyMonkey platform from 1st of December 2022 to 30th of June 2023 to all universities in Saudi Arabia. Each data collector was responsible for distributing the survey to several universities via professional groups on social media platforms or by contacting the assigned university. A convenience sampling strategy was utilized and students, male and female, who currently study the healthcare disciplines at a university in Saudi Arabia were the main target and were invited to participate. Before starting the survey, written consent was insured for all participants and voluntary participation was confirmed by asking participants if they were happy to be in the study and they received information about the study, as well as contact information for the chief researcher. Repetitive and duplicate responses were avoided by only allowing the participants to fill out the survey link once. The estimated time to complete the questionnaire was 3 minutes.

2.3 Data analysis

The data were analyzed using the Statistical Package for Social Sciences (SPSS software, Version 29). Frequency and percentages were used to summarize demographic characteristics. Age was calculated using mean and standard deviation. The associated sociodemographic factors with current tobacco and nicotine use were subjected to multivariate logistic regression analysis. A *p* value of <0.05 was considered statistically significant.

2.4 Ethical approval

The Bioethics and Research Committee at Jazan University, Saudi Arabia approved this study with reference number REC-44/04/363.

3 Results

A total of 5,012 participants were included in the analyses. The mean (\pm SD) age of the study population was 21 (\pm 2) years, and there were more males (3,872, 77.25%) than females. The vast majority of participants were from the Southern Region of Saudi Arabia (2,089, 41.68%), followed by the Central Region (886, 17.68%) (see Table 1). Of students across different healthcare disciplines, nursing students accounted for 1,078 (21.5%), followed by nutrition and respiratory therapy students, 750 (15%) and 614 (12%), respectively. Third-year (1,513, 30%) and fourth-year (1,231, 25%) students accounted for more than half of the population. Full details of the demographic data are presented in Table 1.

3.1 Prevalence of current tobacco and nicotine users

The prevalence of current any product (tobacco and nicotine) use among students in the healthcare disciplines was 3,553 (70.89%). The majority of users used electronic nicotine delivery systems (1,622, 32.36%), followed by cigarettes (812, 16.20%) and hookahs (710, 14.17%). See Table 1.

3.2 Demographic factors associated with current use of tobacco and nicotine

The current use of tobacco and nicotine substances (e.g., cigarettes, e-cigarettes, smokeless tobacco, and any product use) was more prevalent among males compared to female students. See Table 2. Meanwhile, the current use of hookahs was less among males (AOR: 0.74 (95% CI: 61 to 0.91)). Smoking cigarettes were less among students living in other regions compared to the Central Region. Smokeless tobacco substances seemed to be more prevalent in the Western, Southern and Northern Regions (AOR: 1.57 (95% CI: 1.09 to 2.26)), (AOR: 1.43 (95% CI: 1.04 to 1.95)), and (AOR: 1.57 (95% CI: 1.09 to 2.26)), respectively. Use of cigarettes, hookahs, and smokeless tobacco substances did not differ across academic levels, whereas the current use of e-cigarettes and any product use were more

TABLE 1 Demographic data of study participants (*n* = 5,012).

Variable	n (%) or Mean (SD)
Age, years (Mean (SD))	21 (\pm 2)
Gender (male %)	3,872 (77.25%)
Geographical Region, n (%)	
Southern Region	2,089 (41.68%)
Central Region	886 (17.68%)
Western Region	824 (16.44%)
Eastern Region	646 (12.89%)
Northern Region	567 (11.31%)
Profession, n (%)	
Nursing	1,078 (21.51%)
Nutrition	750 (14.96%)
Respiratory Therapy	614 (12.25%)
Dentistry	524 (10.45%)
Medicine	492 (9.82%)
Physiotherapy	447 (8.92%)
Public health	412 (8.22%)
Pharmacy	314 (6.26%)
Medical laboratory	250 (4.99%)
Emergency medical services	131 (2.61%)
Academic level, n (%)	
1 st year	465 (9.28%)
2 nd year	1,206 (24.06%)
3 rd year	1,513 (30.19%)
4 th year	1,231 (24.56%)
5 th year	331 (6.60%)
6 th year	125 (2.49%)
Internship	141 (2.81%)
Current use, n (%)	
Electronic nicotine delivery system (e-cigarettes, e-hookah, vaping)	1,622 (32.36%)
Tobacco Cigarettes	812 (16.20%)
Hookah (Waterpipe, Mu'assel, Jurak)	710 (14.17%)
Smokeless Tobacco (Shammah)	409 (8.16%)
Any product use	3,553 (70.89%)
Never used	1,459 (29.11%)

Data are presented as n (%) or mean SD. GPA, Grade Point Average. Current smoker: someone who has smoked within the past 30 days.

common among students in their mid and advanced academic stages compared to those in their 1st year.

4 Discussion

This national survey assessed the current use of tobacco and nicotine use among students in the healthcare disciplines in Saudi Arabia and examined the sociodemographic factors associated with tobacco and nicotine among this group. The study revealed that

TABLE 2 Multivariate logistic regression models of the association between demographic variables (independent) and current tobacco and nicotine use (dependent).

Descriptor	AO.R (95% CI) Cigarettes smoking	AO.R (95% CI) Hookah	AO.R (95% CI) E-cigarettes	AO.R (95% CI) Smokeless tobacco	AO.R (95% CI) Any product use
Gender					
Female	1	1	1	1	1
Male	1.75 (1.42 to 2.15)	0.74 (0.61 to 0.91)	1.17 (1.01 to 1.37)	1.35 (1.02 to 1.90)	1.56 (1.34 to 1.82)
Region					
Central	1	1	1	1	1
Eastern	0.60 (0.45 to 0.79)	1.12 (0.85 to 1.48)	1.12 (0.90 to 1.40)	1.27 (0.85 to 1.90)	0.91 (0.72 to 1.17)
Western	0.59 (0.45 to 0.77)	1.02 (0.77 to 1.33)	1.11 (0.91 to 1.37)	1.57 (1.09 to 2.26)	0.93 (0.73 to 1.17)
Southern	0.69 (0.56 to 0.85)	0.80 (0.64 to 1.01)	0.85 (0.71 to 1.01)	1.43 (1.04 to 1.95)	0.63 (0.52 to 0.76)
Northern	0.78 (0.59 to 1.03)	0.53 (0.37 to 0.76)	0.92 (0.73 to 1.16)	1.57 (1.09 to 2.26)	0.57 (0.45 to 0.73)
Profession					
Dentistry	1	1	1	1	1
Medicine	0.67 (0.44 to 1.03)	2.55 (1.71 to 3.80)	0.60 (0.46 to 0.79)	1.55 (0.98 to 2.44)	0.92 (0.69 to 1.22)
Nursing	1.96 (1.43 to 2.68)	2.22 (1.54 to 3.19)	0.64 (0.51 to 0.80)	1.31 (0.86 to 1.99)	1.58 (1.23 to 2.02)
Nutrition	1.80 (1.29 to 2.52)	1.37 (0.92 to 2.03)	0.52 (0.41 to 0.66)	0.96 (0.61 to 1.51)	0.79 (0.61 to 1.01)
Pharmacy	2.18 (1.48 to 3.19)	1.53 (0.95 to 2.46)	0.41 (0.30 to 0.57)	0.99 (0.55 to 1.79)	0.79 (0.58 to 1.08)
EMS	0.42 (0.18 to 0.95)	3.47 (2.05 to 5.87)	0.66 (0.44 to 0.99)	1.58 (0.83 to 3.01)	1.26 (0.77 to 2.05)
Medical lab	1.03 (0.65 to 1.64)	2.17 (1.35 to 3.49)	0.66 (0.44 to 0.99)	1.87 (1.12 to 3.11)	0.72 (0.52 to 1.01)
PT	2.11 (1.48 to 3.01)	1.56 (1.01 to 2.40)	0.47 (0.35 to 0.62)	0.64 (0.36 to 1.13)	0.80 (0.61 to 1.06)
PH	0.67 (0.43 to 1.04)	1.59 (1.02 to 2.47)	1.01 (0.77 to 1.32)	1.67 (1.05 to 2.66)	1.25 (0.93 to 1.69)
RT	1.24 (0.87 to 1.77)	2.61 (1.76 to 3.85)	0.60 (0.46 to 0.77)	0.97 (0.60 to 1/56)	1.01 (0.77 to 1.32)
Academic level					
1st year	1	1	1	1	1
2nd year	1.18 (0.88 to 1.58)	0.80 (0.57 to 1.08)	1.22 (0.94 to 1.58)	0.64 (0.44 to 0.92)	0.97 (0.76 to 1.23)
3rd year	1.05 (0.79 to 1.40)	0.66 (0.49 to 0.89)	1.63 (1.27 to 2.09)	0.59 (0.41 to 0.85)	1.04 (0.82 to 1.31)
4th year	0.93 (0.68 to 1.26)	0.79 (0.58 to 1.08)	2.01 (1.55 to 2.59)	0.61 (0.41 to 0.89)	1.35 (1.05 to 1.73)
5th year	0.88 (0.58 to 1.34)	1.06 (0.72 to 1.57)	2.46 (1.78 to 3.39)	0.84 (0.51 to 1.37)	2.58 (1.79 to 3.72)
6th year	0.84 (0.45 to 1.58)	0.93 (0.54 to 1.61)	2.18 (1.41 to 3.36)	1.47 (0.81 to 1.67)	2.76 (1.61 to 4.72)
Internship	0.63 (0.33 to 1.22)	0.37 (0.19 to 0.72)	1.75 (1.15 to 2.67)	1.12 (0.62 to 2.01)	0.91 (0.60 to 1.38)

EMS, emergency medical services; PT, RT, Physiotherapy; PH, Public health; Respiratory Therapy; AOR, adjusted odd ratio; E-NDS, Electronic nicotine delivery system.

71% of students were current tobacco/nicotine users, with most of them being males in advanced academic years and internship years. Electronic nicotine delivery systems were the most commonly used product. The study also indicated that tobacco/nicotine use among students in health colleges was associated with several sociodemographic factors, including gender, region of residency, specialty, academic years, and tobacco/nicotine types.

The findings of this study are similar to previous studies conducted in Saudi Arabia and other countries. In Saudi Arabia, tobacco use is prevalent among college students (13). One study indicated that 46.4% of the 895 students reported initiation of tobacco use when entering university (14). By comparing our findings with several recent studies, it can be seen that there is an increase in using e-cigarettes among students in health colleges, in particular (15). Al-Regaiey et al. reported that of 364 students studying in the health disciplines, the prevalence of vaping was 29.9% (12). The issue of tobacco/nicotine use

among college students has also been observed in several GCC countries. Aligned with our findings, studies conducted in Bahrain, Kuwait, Qatar, and UAE found that tobacco use is prevalent among college students, and the current use of tobacco was greater among male students compared to female students, and those who were in advanced academic years (16–19). These studies also observed e-cigarette use among college students (16–19). However, a further study has indicated that the prevalence of smoking has statistically decreased among college students who study on smoke-free campuses (20). This study supports the need for active enforcement of on-campus smoke-free policies and on-campus cessation support clinics.

In agreement with other studies, male students had significantly higher odds of lifetime and current use of cigarettes, smokeless tobacco, and other nicotine products (12). Although this study did not account for the dual use of tobacco products, the results showed a

pattern of several tobacco products used among students, among them e-cigarettes. Using combustible tobacco along with other products, such as e-cigarettes, is common among youth (21, 22). Dual use of tobacco products is associated with higher odds of cardiovascular diseases and respiratory illness compared to the use of one tobacco product (23–25). Also, the tobacco use pattern found in this study has been observed globally and likely reflects sociocultural factors related to gender norms. However, it should be noted that the prevalence of tobacco use is increasing among women in Saudi Arabia and is expected to increase further in the coming decades (26). The observed and expected changes in tobacco use among women in Saudi Arabia could be related to cultural changes and having more women joining the workforce.

An interesting finding was the geographic variation observed, with lifetime and current cigarette use less common in the Eastern, Western, and Southern Regions compared to the Central Region. On the other hand, students in the Western, Southern, and Northern Regions are more likely to use smokeless tobacco compared to students in the Central Region. The underlying reasons for these regional differences are unclear but warrant further investigation. Tailored interventions and education for the high-risk regions may help reduce tobacco use. Several tobacco control interventions could be implemented to address the issue of tobacco use among students in health disciplines such as enforce in-campus smoke-free policy, run in-campus smoking cessation clinics, integrate intense tobacco control curriculum that helps in assessing scientific evidence and teaches critical skills to detect tobacco marketing activities, and engage students in developing and evaluating tobacco control measures in campus (27–29).

Monitoring the prevalence of tobacco/nicotine use among students in health disciplines and among health practitioners is essential because the patterns of tobacco use among these groups have significant implications. Tobacco use among students in health disciplines has been tracked across 70 countries through the Global Tobacco Surveillance System (GTSS). The GTSS revealed that the prevalence of smoking varied, with the highest rates observed in European countries (20% among medical students and 40% among dental students) and the Americas (ranging from 13% among pharmacy students to 23% among dental students). Other forms of tobacco use were more common in the Eastern Mediterranean (ranging from 10 to 23%). The GTSS provides insight into the beliefs of health students worldwide, as 70% of students believed in the role model status of health professionals and their responsibility in assisting patients with smoking cessation (10). Additionally, lay people often have a positive perception of health practitioners and students in health fields. Health practitioners are assumed to be reliable sources of medical information and have valid information to share about health risk factors. Thus, tobacco/nicotine use among health practitioners and students in health colleges would send an implied and incorrect health message related to tobacco/nicotine use, lead to the normalization of tobacco/nicotine use, and make practitioners resistant to offering smoking cessation to patients (30).

Although students in health disciplines are more aware of the risks of tobacco use compared to others, a high number of tobacco users were found in this study. Several factors influence tobacco use among students, including tobacco marketing activities such as misleading information and tobacco imagery in media, gender norms, and social pressure (31–33). The increase in tobacco/nicotine use among

students in health disciplines observed in our study and previous studies could also be explained by the fact that students at this age are in a transitional stage from school to university. The fact that university students usually enjoy less supervision from their parents and engage more with their peers and friends may lead to an increase in the risk of tobacco/nicotine uptake. In addition, the increase in tobacco/nicotine use among students in health colleges may be due to stress related to the difficulty of studying in this field since one of the motivations for tobacco use mentioned in a previous study was stress. Although this study did not collect data on students' incomes, Saudi students who are studying in public universities receive a monthly stipend (S.R 1,000) and an additional amount (which varies across the health field) is added to students who are in their internship year. This income may increase the affordability and accessibility of tobacco products. Therefore, it is worth re-thinking the legal age of accessing tobacco and considering a policy to raise the minimum legal age for the sale of tobacco products from 18 to 21.

This study has revealed a finding of concern about the use of electronic cigarettes among the younger generations in Saudi Arabia. The popularity of electronic nicotine delivery systems is a growing public health concern as these products are often perceived, erroneously, as safe alternatives to traditional cigarettes. The present results suggest that there is marketing and promotion of electronic cigarettes among this group. This is not uncommon for a tobacco industry that uses tactics to market tobacco products and to target young people (34). A recent study that monitored the imagery of e-cigarettes in the media found an increase in the use of e-cigarettes in Arabic media and on-demand platforms, such as Netflix (35). In Saudi Arabia, Netflix is one of the most popular platforms among the youth. Portraying e-cigarettes appealingly and attractively in media scenes would promote the use of e-cigarettes and normalize this behavior among this group. Future studies should further examine the environmental factors affecting the use of electronic cigarettes among the younger generations. In addition, the implementation of tobacco control measures that ban tobacco/nicotine advertisement, promotion, and sponsorship, increase anti-tobacco awareness, and enforce smoke-free policies, especially on campuses, should be strengthened.

4.1 Strengths and limitations

This study has several strengths, including the large national sample size, the diverse geographic regions represented, and the inclusion of students across multiple healthcare disciplines. The comprehensive assessment of multiple nicotine and tobacco products provides a thorough picture of usage patterns.

Some limitations should be acknowledged. First, the self-reported survey design raises the possibility of recall or response bias. Second, we utilized convenience sampling, which may limit generalizability compared to a random sampling design. Also, the methodology employed for participant recruitment and the approach used for sample selection in this study impeded our ability to determine the response rate. However, the large sample across diverse universities enhances representativeness. Third, we did not assess details on frequency, history and start of use, dual-use, quantity or motivations underlying the use of different tobacco and nicotine products. Further research should aim to characterize start, change and end of use (tobacco cigarette, shisha, e-cigarettes, heated tobacco and heated

nicotine products) before and while studying medicine, nursing or other healthcare.

5 Conclusion

This study provides valuable data to inform public health efforts aimed at reducing tobacco and nicotine use among future healthcare professionals in Saudi Arabia. Most healthcare discipline students showed high rates of use, underscoring the need for comprehensive interventions across nursing, medicine, dentistry, and other programs. Healthcare students who use nicotine and tobacco products themselves may be less likely to counsel their future patients about cessation (36). Integrating more robust tobacco cessation education into health sciences curricula could help address this issue.

Data availability statement

The raw data supporting the conclusions of this article will be made available by the authors, without undue reservation.

Ethics statement

The studies involving humans were approved by the Bioethics and Research Committee at Jazan University, Saudi Arabia approved this study with reference number REC-44/04/363. The studies were conducted in accordance with the local legislation and institutional requirements. The participants provided their written informed consent to participate in this study.

Author contributions

AAld: Conceptualization, Data curation, Project administration, Writing – original draft, Writing – review & editing, Validation. RS: Formal analysis, Writing – original draft, Writing – review & editing.

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Conflict of interest

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Supplementary material

The Supplementary material for this article can be found online at: <https://www.frontiersin.org/articles/10.3389/fpubh.2024.1348370/full#supplementary-material>

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