

# Determination of the Frequency of Tobacco Products and Electronic Cigarette Use of University Students and the Evaluation of Related Factors

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## Main Points

- The use of tobacco products, hookah, and e-cigarettes was high among students of both genders.
- Hookah and e-cigarette use were significantly higher among cigarette smokers.
- The most common reason for using hookah was liking and enjoying it, and the most common reason for using e-cigarettes was finding it less harmful.
- The most common reason that motivates students to use tobacco products was to adapt to the social environment.

## Abstract

In order to take control of the tobacco epidemic, it is important to question the reasons leading young people to use tobacco products such as electronic cigarettes (e-cigarettes) and hookah. The aim of this study is to determine the frequency of tobacco, hookah, and e-cigarette usage by university students and to evaluate related factors. This cross-sectional study was conducted in 2019 with university students. Size of the study group was calculated according to the strata weight for each faculty and class by using the stratified sampling method. The study group consisted of 2477 students. Of the study group, 47.8% of students used tobacco products (cigarette and hookah) or e-cigarettes. The frequency of current hookah usage was found to be 15.6%, and the frequency of e-cigarettes usage was noted as 2.1%. When we compared the reasons of the attendants for using tobacco products, factors for hookah such as liking and enjoying it (13.4%) and for e-cigarettes considering it less harmful (21.6%) and finding it helpful to quit smoking (13.7%) were noticed to have higher ratings. The rates of hookah and e-cigarettes usage were significantly high among smokers.

**Keywords:** Electronic cigarette, hookah, tobacco products, tobacco, university students

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## Introduction

The use of tobacco products is an important and preventable public health problem due to its effects on human health (Karabiber et al., n.d.). The World Health Organization (WHO) defined smoking as “the fastest spreading and longest epidemic in the world” and stated that two-thirds of all tobacco consumption in the world takes place in developing countries including Türkiye (Korkmaz et al., 2013). However, the diseases, disabilities,

and related deaths caused by tobacco and tobacco product usage are preventable problems, and so are other problems that adversely affect the quality of life. According to the WHO, approximately 1.3 billion people in the world, 47.5% of men and 10.3% of women, use tobacco and tobacco products (Bilir et al., 2010).

The use of tobacco and tobacco products can take different forms in various geographies of the world. These products can be differentiated as cigarettes,

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rolled tobacco, hookahs, which are unique to the Middle East and South Asia, and e-cigarettes, which have been introduced to the market with the advancement of technology. While the traditional hookah was on the verge of disappearing in the last century, its usage has increased due to its prevalent use in cafes (Kandela, 2000). It was reported that the current hookah usage frequency among university students in the United States varied between 6% and 20% (Eissenberg et al., 2008). In addition, the prevalence of e-cigarette use was reported to be approximately 3.7% (Schoenborn & Gindi, 2015). The importance of knowing the frequency of tobacco products and e-cigarette usage, which is an important health problem, has been emphasized in the literature. Especially, it will be useful to understand the dimensions and importance of the health problem in planning the programs that can be applied in order to control it. In addition, it will be beneficial to continuously evaluate the effectiveness of the determined control programs and to eliminate the problems seen in the programs in this direction (Dockrell et al., 2013; Eissenberg et al., 2008).

The age to start tobacco and other psychoactive substance use is usually adolescence or young adulthood. These age groups are notable for their early start to use conventional cigarettes and their diversification of other tobacco products. Particularly in recent years, the use of e-cigarettes has been increasing rapidly among young people and adults (Farsalinos et al., 2014). Depending on the brand, e-cigarette cartridges contain propylene glycol and/or glycerol, nicotine (in varying amounts), and various flavors (such as tobacco, menthol, and chocolate) (Ayers et al., 2011; King et al., 2013). On the other hand, e-cigarettes are marketed as if they help to quit or reduce conventional cigarettes. However, these products make it more difficult to quit tobacco usage by creating a vicious cycle since they mimic the act of smoking (Cahn & Siegel, 2011; Callahan-Lyon, 2014).

Questioning the reasons that lead young people to use e-cigarettes and hookahs is important for controlling these new problems created by the tobacco epidemic. This study aimed to determine the frequency of tobacco, hookah, and e-cigarette use by students and to evaluate related factors.

## Material and Methods

This cross-sectional study was conducted with students of Eskişehir Osmangazi University in 2019. The university consisted of 25,617 students. The sample size was determined according to the weight of the number of students in each faculty of the university. Since the frequency of tobacco products and e-cigarette usage by university students is not clearly known, it was accepted as 50% with a 95% confidence interval and a 2% margin of error, therefore the minimum sample was calculated as 2198 students. The student list published by Eskişehir Osmangazi University student affairs was used in the planning of the sample. In addition, the number of students in each department of formal education in all faculties (Faculty of Dentistry, Faculty of Medicine, Faculty of Health Sciences, Faculty of Engineering and Architecture, Faculty of Theology, Faculty of Arts and Sciences, Faculty of Education, Faculty of Economics and Administrative Sciences, Faculty of Tourism, Faculty of Agriculture) was calculated. The strata weight of the faculties and classes was calculated using the stratified sampling method. Verbal informed consent was obtained

from students who participated in this study. The questionnaire was replied to by the students under supervision. Students who did not agree to participate in the study, who were not present in their classrooms during the data collection days, or who did not answer the questionnaire adequately were not included in the study. Thus, 2477 students participated in the study.

The study was approved by the Eskişehir Osmangazi University Ethics Committee (Date: 22.10.2019. No: 19) and administrative permissions were obtained for the study. The study was executed in accordance with the Declaration of Helsinki.

A questionnaire consisting of three parts was used for the data collection. The first part of the questionnaire included questions about the sociodemographic characteristics of the students, in the second part there were questions about attitudes toward tobacco and e-cigarettes, and questions regarding tobacco products and e-cigarette users were included in the third part.

Smoking behaviors were evaluated in five categories based on the reports of the individuals. Individuals who never used tobacco products or e-cigarettes were accepted as “never smoked,” those who only tried but did not smoke regularly were categorized as “tried but did not smoke,” those who used to smoke but had completely quit were categorized as “smoked and quit,” and those who rarely or regularly used tobacco products or e-cigarettes were categorized as “smoking.”

## Statistical Analysis

The Statistical Package for Social Sciences version 15.0 (SPSS Inc.; Chicago, IL, USA) statistical package program was used for the statistical analysis. Descriptive statistics were indicated by number and percentage, whereas categorical variables were compared using the chi-square test. Logistic regression analysis was used to determine the features that affect hookah and e-cigarette usage. The model was constructed with independent variables (gender, cigarette, and e-cigarette smoking for both hookah and e-cigarette), which were found to be significant ( $p < 0.01$ ) with the dependent variable in univariate analysis. Statistical significance was accepted as  $p \leq .05$ .

## Results

The ages of the 2477 students who participated in the study ranged between 17 and 53 years old, with a mean of  $21.2 \pm 2.7$  years of age. Of the students, 52.1% were male and 24.8% of them were in the first grade. It was found that 47.8% of the students used a tobacco product (cigarette and hookah) and e-cigarettes. The hookah usage frequency was 15.6% and the frequency of e-cigarette usage was 2.1%. The distribution of tobacco products and e-cigarette usage habits of the students is shown in Figure 1.

It was found that 38.8% of the students thought that hookah was less addictive, and 24.4% of students thought that e-cigarettes were less harmful to health. The distribution of the students' opinions about tobacco products is given in Figure 2.

It was also found that 60.6% of the students thought that hookah tasted and smelled more pleasant than conventional cigarettes, and 35.4% of students thought that e-cigarettes could be smoked

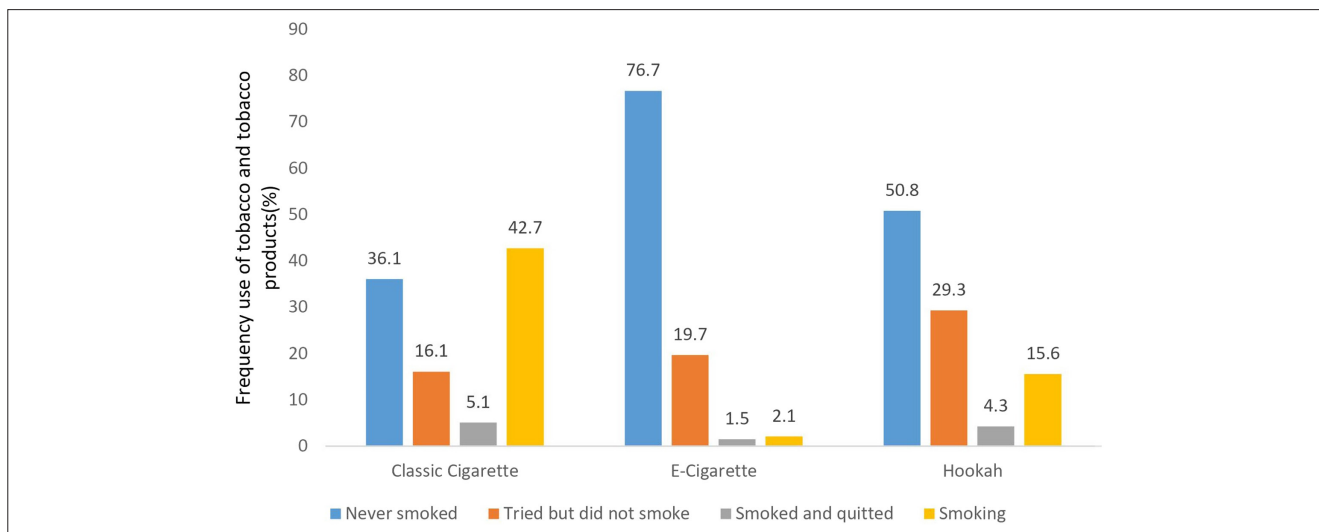


Figure 1. Distribution of Tobacco Product and E-Cigarette Use Habits of Use the Students.

more comfortably in public areas when compared to cigarettes. The distribution of the students’ opinions about hookah and e-cigarette is given in Table 1.

When the answers provided by the students were evaluated, it was observed that the three most common reasons that motivated young people to use tobacco products were “to adapt to social environment” with 32.8%, “boredom/loneliness/stress” with 31.8%, and “to look cooler” with 18.5%. In addition, the most common reasons for young people to fail to quit tobacco products were “the belief that it will not harm me, I will quit if I get sick” with 52.7%, “anxiety about being away from social environments” with 20.5%, and “anxiety about getting unpopular” with 8.2%.

The age of starting to use tobacco products ranged from 8 to 28 years old, with a mean of  $16.6 \pm 2.4$  years of age. For students who consumed tobacco products, 63.1% of them had smokers in their friend circle, 27.0% of them had smokers in their family, 1.3% of them had seen smokers on the Internet/TV/advertisements, and

8.6% of them first engaged with tobacco through other means (own desire, curiosity, boredom, or sadness). The comparison of the reasons for smoking hookah and e-cigarettes is given in Table 2.

According to the logistic regression analysis created with the variables that were significant in the chi-squared analysis, hookah usage was 1.98 times more frequent among men than women, 2.81 times more frequent among students smoking cigarettes than students not smoking cigarettes, and 6.95 times more frequent among students smoking e-cigarettes than students not smoking e-cigarettes.

According to the logistic regression analysis created with the variables that were significant in the chi-squared analysis, smoking e-cigarettes was 2.16 times more frequent among men than women, 7.35 times more frequent among students smoking cigarettes than students not smoking cigarettes, and 7.05 times more frequent among students smoking hookah than students not smoking hookah. Univariate and multiple analyses results

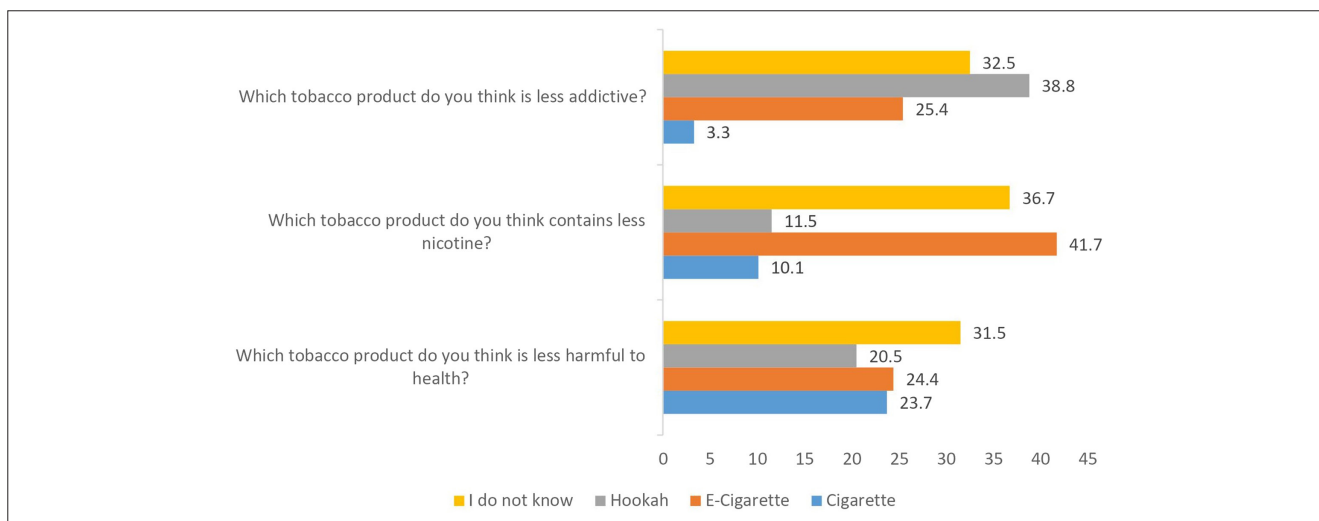


Figure 2. Distribution of Students’ Opinions about Tobacco Products.

**Table 1.**  
*Distribution of Students' Opinions About Hookah and E-Cigarette*

Suggestions	Agree n (%)	Indecisive n (%)	Do Not Agree n (%)
About Hookah			
Hookah smoke is less harmful as it passes through water.	282 (11.4)	910 (36.7)	1285 (51.9)
Its taste and smell are more pleasant than conventional cigarettes.	1500 (60.6)	594 (24.0)	383 (15.4)
I think hookah has a traditional/cultural effect.	1107 (44.7)	717 (28.9)	653 (26.4)
Hookah does not have an addictive effect like cigarettes.	663 (26.8)	870 (35.1)	944 (38.1)
Smoking can increase the desire to smoke.	855 (34.5)	1011 (40.8)	611 (24.7)
It helps to reduce and quit smoking.	245 (9.9)	893 (36.1)	1339 (54.0)
It is more expensive than cigarettes.	1223 (49.4)	842 (34.0)	412 (16.6)
It does less harm to the people around it than cigarettes.	546 (22.0)	954 (38.5)	977 (39.5)
Changing the mouthpiece of the hookah does not reduce the risk of infectious diseases.	1182 (47.7)	774 (31.3)	521 (21.0)
The sale of hookah is prohibited for those under the age of 18 years old.	1211 (48.9)	826 (33.3)	440 (17.8)
About E-cigarettes			
It is less harmful than cigarettes.	809 (32.7)	1015 (41.0)	653 (26.4)
Its taste and smell are more pleasant than conventional cigarettes.	1371 (55.3)	755 (30.5)	351 (14.2)
It helps to reduce and quit smoking.	618 (24.9)	968 (39.1)	891 (36.0)
It may not suppress the urge to smoke.	918 (37.1)	1126 (45.5)	433 (17.5)
It can increase smoking.	585 (23.6)	1252 (50.5)	640 (25.8)
It is more expensive than cigarettes.	867 (35.0)	1114 (45.0)	496 (20.0)
It does less harm to the people around it than cigarettes.	884 (35.7)	1021 (41.2)	572 (23.1)
It can be smoked more comfortably in public than cigarettes.	877 (35.4)	866 (35.0)	734 (29.6)
The sale of e-cigarettes is prohibited for those under the age of 18.	1151 (46.5)	1049 (42.3)	277 (11.2)

of hookah and e-cigarette smoking grouped according to some sociodemographic characteristics are provided in Table 3.

## Discussion

It was found that 47.9% of the university students in the study group used a tobacco product (cigarette and hookah) or at least

**Table 2.**  
*Comparison of Students' Reasons for Smoking Hookah and E-Cigarettes*

Reasons to Smoke	Hookah	E-Cigarette	p
	n* (%)	n* (%)	
Liking and enjoying	52 (13.4)	3 (5.9)	.001
Thinking it's less harmful	31 (8.0)	11 (21.6)	.001
Good taste and smell	12 (3.1)	2 (3.9)	.754
Trying to quit traditional smoking	10 (2.6)	7 (13.7)	.001
Thinking it's cheaper	7 (1.8)	3 (5.9)	.067
Environment/friend circle	4 (1.1)	—	.465
Other	18 (4.7)	2 (3.9)	.814
Total number of users	387	51	

Note: \*The percentages are evaluated based on the number of users.

one type of e-cigarette. According to the WHO 2019 data, 31.6% of the Turkish population over the age of 15 years old used tobacco products (Organization, 2019). This study also revealed that the current hookah usage frequency was 15.6%. Studies conducted among university students reported this rate to be between 9% and 32.7% (Al Mohamed & Amin, 2010; Jackson & Aveyard, 2008; Kilibarda et al., 2019; Poyrazoğlu et al., 2010). The fact that the students came from different societies and had different socio-cultural characteristics may have resulted in this varying result.

This study found that 2.1% of the students smoked e-cigarettes. Other studies conducted among university students reported this rate to be between 4.5% and 14.9% (Mirbolouk et al., 2018; Ok et al., 2020). A study conducted with university students in North Carolina reported that 4.9% of the students used e-cigarettes at least once in their lifetime, and 1.5% used it in the previous month (Sutfin et al., 2013). Another study conducted among university students reported that 39.8% of the participant students used e-cigarettes at least once in their lifetime, and 12.2% of them used e-cigarettes regularly (Lanza & Teeter, 2018). Scientific research on e-cigarette use is limited in literature, which can be explained by the fact that e-cigarette research is novel compared to other tobacco products. In addition, the reason for the low usage frequency of e-cigarette in Türkiye compared to other countries may be due to accessibility difficulties, legal prohibition, sales via Internet, smoking restrictions in certain places, and its high cost.

**Table 3.**  
Univariate and Multivariate Analysis Results of Hookah and E-Cigarette Smoking According to Some Related Variables

Features		Percentage	Univariate Analysis	Multivariate Analysis		
		%	<i>p</i>	OR	95% CI	<i>p</i>
Hookah						
Age	17 – 22	15.9	.423	—	—	—
	≥23	14.5				
Gender	Female	9.7	<.001	1.983	1.554 – 2.530	<.001
	Male	21.1				
Grade	1 and 2	15.8	.826	—	—	—
	3 and above	15.5				
Cigarette	Not smoking	8.7	<.001	2.812	2.215 – 3.570	<.001
	Smoking	24.9				
E-cigarette	Not Smoking	14.6	<.001	6.955	3.789 – 12.765	<.001
	Smoking	66.7				
E-Cigarettes						
Age	17 – 22	1.9	.186	—	—	—
	≥23	2.8				
Gender	Female	0.8	<.001	2.156	1.054 – 4.412	.035
	Male	3.2				
Grade	1 and 2	1.8	.350	—	—	—
	3 and above	2.3				
Cigarette	Not smoking	0.4	<.001	7.351	2.858 – 18.902	<.001
	Smoking	4.3				
Hookah	Not smoking	0.8	<.001	7.054	3.840 – 12.956	<.001
	Smoking	8.8				
Total		2.1				

Note: OR = Odds ratio; CI = Confidence interval.

This study showed that 24.4% of students thought that e-cigarettes were less harmful to their health compared to other tobacco products. In addition, 32.7% of the students in this study group stated that e-cigarettes were less harmful than conventional cigarettes. The participants in a study conducted among e-cigarette users, 92.9% of them reported that conventional cigarettes were more harmful to their health (Ali et al., 2019). Another study reported that 51.4% of the respondents believed that e-cigarettes were less harmful than cigarettes. Regarding hookah, 48.1% of the students stated that they agreed with the opinion that it was less harmful because it was washed with water. Additionally, 60.6% of the students stated that they agreed with the opinion that hookah was less harmful to people around when compared to conventional cigarettes (Kanık & Tözün, 2020). Contrary to this study's findings, some studies reported that hookah was less harmful and that watering removed its harmful substances (Aktaş et al., 2018; Çevik Akyıl et al., 2018; Hassoy et al., 2011). The low level of knowledge of the students on this subject and the different and unreliable sources of information may have resulted in this conclusion.

Of this study's students, 41.7% stated that e-cigarettes contained less nicotine. Another study conducted among e-cigarette users

similarly reported this rate as 40.1% (Ali et al., 2019). A study executed in England revealed that 34% of participants preferred e-cigarettes because they contained less nicotine and they found them more satisfying than nicotine replacement therapy (Dockrell et al., 2013). In general, there was a widespread opinion in existing studies about the nicotine content of e-cigarettes being lower compared to other tobacco products. One of the key reasons for this opinion may be that the intention of e-cigarettes released on the market is to quit conventional smoking. In addition, the emphasis on low nicotine rates in e-cigarette promotions may have affected the result.

This study showed that 38.8% of the students stated that hookah was less addictive. Different studies among university students found this rate to be 42.7% – 52.3% (Çevik Akyıl et al., 2018; Erbaydar et al., 2010; Hassoy et al., 2011). A study conducted in the USA revealed that 79.2% of their participants thought that conventional cigarettes were more addictive than hookah (Smith-Simone et al., 2008). However, 32.5% of the students answered this question as “I don't know” in this study. The literature reveals that the general opinion is that hookah is less addictive. The reason for the lower rate in this study compared to other studies may be due to the students' lack of knowledge.

When the students were asked about the reasons for smoking hookah in this study, the most common answer received was liking and enjoying it with a rate of 13.4%, and then the belief that it was less harmful with a rate of 8.0%. Another study conducted among students also reported pleasure as the most common reason with a rate of 70.9% (Çevik Akyıl et al., 2018). A study among hookah smokers reported that the most frequent reason for starting to smoke hookah was because of friends with a rate of 38.4% (Erbaydar et al., 2010). Another study reported that 40.5% of the participants smoked hookah to adapt to their social environment. A study conducted with university students in Iran reported that the most notable reason for smoking hookah was a pleasure with a rate of 55.8%, which is in line with this study's findings (Sabahy et al., 2011). Another study conducted abroad reported that the most common reason for smoking hookah for participants was for relaxation with a rate of 67% (Daniels & Roman, 2013). Although they accepted that hookah was unhealthy, the most common to use hookah for students was the pleasure and sense of relief it gave which is related to the stress experienced by the students. Other reasons may be the visual advertisements of hookah as a pleasurable substance in coffee shops selling hookah, and young people's preference to socialize and have a pleasant time with their friends.

This study indicated the reasons for students smoking e-cigarettes as their belief about being less harmful with a rate of 21.6%, and their trial to quit smoking conventional cigarettes with a rate of 13.7%. A study among e-cigarette smokers revealed that 62.8% of people thought that either it was less harmful or it was helpful to quit conventional smoking (Ali et al., 2019). A study on adults in the USA reported that the most common reason for using e-cigarettes was curiosity with a rate of 53%, followed by quitting or reducing smoking with a rate of 30% (Pepper et al., 2014). Similar to this study's findings, when the participants were asked to choose a single option, another study found that the most common reason for using e-cigarettes was the belief that they were less harmful with a rate of 25% and to prepare to quit smoking with a rate of 21%; these rates raised to 64% and 40%, respectively, when the participants were asked to choose multiple options (Rass et al., 2015). The literature indicates that the result found in this study is similar to previous studies.

The hookah usage of the participants in the study group was 1.98 times higher among men than women, and the probability of using e-cigarettes was 2.16 times higher among men than women according to the results of the logistic regression analysis. As encountered in several studies (Bilir et al., 2010; Korkmaz et al., 2013), this finding may be interpreted as a result of different approaches taken toward females and males in society. In more traditional patriarchal family structures, boys are more likely to enter places where they can smoke hookah and e-cigarettes. In addition, this type of society perceives such behavior as male behavior.

This study found that hookah usage was 2.81 times more frequent among cigarette smokers and 6.95 times more frequent among e-cigarette smokers. Another study reported this number as 7.1 among cigarette smokers (Hassoy et al., 2011). A different study conducted with university students reported the rate of hookah smoking among cigarette smokers as 76.3% (Aktaş et al., 2018). The high rate of hookah usage among cigarette smokers can be explained by the fact that both hookah and cigarettes serve

common purposes such as adapting to the social environment and having a pleasant time socially.

This study indicated that the use of e-cigarettes was 7.35 times higher among cigarette smokers and 7.05 times higher among hookah smokers. A study conducted among e-cigarette smokers reported that 97% smoked cigarettes (Ali et al., 2019). Another study revealed that the rate of e-cigarette usage was 10.8% among current cigarette smokers in 28 European countries (Farsalinos et al., 2016). The most notable reason for starting to smoke e-cigarettes may be the traditional thought that it helps to quit or reduce smoking.

In conclusion, the rates of tobacco products, hookah, and e-cigarette usage were high among students of both genders. The rates of hookah and e-cigarette usage were significantly higher among cigarette smokers. Among the reasons for students to consume these products, the belief that they were less harmful and the effort to enjoy and adapt to the social environment were highlighted. The habit of smoking cigarettes, e-cigarettes, or hookah is a serious problem that starts due to various sociocultural and economic reasons, as a result of incorrect and incomplete information and can only be solved with the cooperation of family, schools, media, artists, health workers, and the state.

In order to protect young people from tobacco products and e-cigarettes and prevent addiction development, educational programs should be implemented starting from middle and high school and continuing during university years. Cigarettes are the most notable products among tobacco products and are the easiest to reach, and therefore they constitute an important first step in the use of other substances. The use of all other substances is more common among smokers than non-smokers. This dual use was most frequently seen in the combination of smoking hookah and e-cigarettes. Combating the use of tobacco products is a key step in protecting university students from harmful habits. As a matter of fact, hookah coffee shops play a major role in the increase of hookah usage among university students as they are key socializing areas and are quite common in university neighborhoods. Revision of the control and legal regulations on these coffee shops will be an important step in keeping young people away from these harmful habits.

### Limitations and Directions/Suggestions for Future Research

Since this study was a cross-sectional study, cause – effect relationships could not be demonstrated. On the other hand, the study was conducted on a sufficiently large and representative sample of university students. Publications on the use of e-cigarettes and hookahs in Türkiye are limited and new. This research will contribute to the literature and will guide further publications on this subject. For future research, studies about tobacco products and e-cigarettes should be performed with larger samples in different groups. Research on the implementation of the tobacco control program should be planned. In addition, the impact of this program must be evaluated.

**Data Availability Statement:** The datasets generated during and/or analyzed during the current study are available from the corresponding author upon reasonable request.

**Ethics Committee Approval:** Ethical committee approval was received from the Ethics Committee of University of Eskişehir Osmangazi (Approval no: 19, Date: October 22, 2019).

**Informed Consent:** Verbal informed consent was obtained from the students who agreed to take part in the study.

**Peer-review:** Externally peer-reviewed.

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